INDEX

INTER C.A. COSTING

OVERHEADS: ABSORPTION COSTING MATHOD

Q. 1. From the details furnished below you are required to compute a comprehensive machine-hour rate:

Original purchase price of the machine (subject to depreciation at 10% per annum on original cost)	₹ 3,24,000
Normal working hours for the month (The machine works for only 75% of normal capacity)	200 hours
Wages to Machine-man	₹ 125 per day (of 8 hours)
Wages to Helper (machine attendant)	₹ 75 per day (of 8 hours)
Power cost for the month for the time worked	₹ 15,000
Supervision charges apportioned for the machine centre for the month	₹ 3,000
Electricity & Lighting for the month	₹ 7,500
Repairs & maintenance (machine) including Consumable stores per month	₹17,500
Insurance of Plant & Building (apportioned) for the year	₹ 16,250
Other general expense per annum	₹ 27,500

The workers are paid a fixed Dearness allowance of ₹ 1,575 per month. Production bonus payable to workers in terms of an award is equal to 33.33% of basic wages and dearness allowance. Add 10% of the basic wage and dearness allowance against leave wages and holidays with pay to arrive at a comprehensive labour-wage for debit to production.

Ans. Effective machine hours = 200 hours × 75% = 150 hours

Computation of Comprehensive Machine Hour Rate

	Per month (₹)	**Per hour (₹)**
Fixed cost		
Supervision charges	3,000.00	
Electricity and lighting	7,500.00	
Insurance of Plant and building (₹16,250 ÷ 12)	1,354.17	
Other General Expenses (₹`27,500 ÷ 12)	2,291.67	
Depreciation (₹ 32,400 ÷ 12)	2,700.00	
	16,845.84	112.31

Direct Cost		
Repairs and maintenance	17,500.00	116.67
Power	15,000.00	100.00
Wages of Machine man		44.91
Wages of Helper		32.97
Machine Hour rate (Comprehensive)		406.86

Wages per machine hour

	Machine Man	**Helper**
Wages for 200 hours		
Machine-man (₹ 125 × 25)	₹ 3,125.00	----
Helper (₹ 75× 25)	----	₹ 1,87,500
Dearness Allowance (DA)	₹ 1,575.00	₹ 1,575.00
	₹ 4,700.00	**₹ 3,450,.00**
Production bonus (1/3 of Basic and DA)	1,567.00	1,150.00
Leave wages (10% of Basic and DA)	470.00	345.00
	6 ,737.00	**4,945.00**
Effective wage rate per machine hour	₹ 44.91	₹ 32.97

Q. 2. A machine costing ₹ 10 lakhs, was purchased on 1-4-2014. The expected life of the machine is 10 years. At the end of this period its scrap value is likely to be ₹ 10,000. The total cost of all the machines including new one was ₹ 90 lakhs.

The other information is given as follows:

(i) Working hours of the machine for the year was 4,200 including 200 non-productive hours.

(ii) Repairs and maintenance for the new machine during the year was ₹ 5,000.

(iii) Insurance Premium was paid for all the machine ₹ 9,000

(iv) New machine consumes 8 units of electricity per hour, the rate per unit being ₹ 3.75

(v) The new machine occupies 1/10th area of the department. Rent of the department is ₹ 2,400 per month.

(vi) Depreciation is charged on straight line basis.

Compute machine hour rate for the new machine. Solution:.

Ans. Computation of machine hour rate of new

		Total (₹)	Per hour (₹)
A.	**Standing Charges:**		
I.	Insurance Premium Rs.9,000 x $\frac{1}{9}$	1,000	
II.	Rent x $\frac{1}{10}$ x Rs.2,400 x 12 months	2,880	
		3,880	**0.97***
B.	**Machine Expenses**		
I.	Repairs and Maintenance (₹ 5,000 ÷ 4,000 hours)		1.25
II	Depreciation $\left(\frac{₹\ 10,00,000 - ₹\ 10,000}{10\ years \times 4,000\ hours}\right)$		24.75
III	Electricity (8 units x ₹ 3.75)		30.00
	Machine hour rate		56.97

Working Note

1 **Calculation of productive Machine hour rate**

Total hours	4,200
Less: Non-Productive hours	200
Effective machine hours	4,000

***** ₹ 3,880 ÷ 4,000 hours = ₹ 0.97

Q. 3. A company has three production departments (M_1, M_2 and A_1) and three service department, one of which Engineering service department, servicing the M_1 and M_2 only. The relevant information are as follows:

	Product X	Product Y
M_1	10 Machine hours	6 Machine hours
M_2	4 Machine hours	14 Machine hours
M_3	14 Direct Labour hours	18 Direct Labour hours

The annual budgeted overhead cost for the year are:

	Indirect Wages (₹)	Consumable Supplies (₹)
M_1	46,520	12,600
M_2	41,340	18,200
A_1	16,220	4,200

Stores	8,200	2,800
Engineering Service	5,340	4,200
General Service	7,520	3,200

	(₹)	
- Depreciation on Machinery	39,600	
- Insurance on Machinery	7,200	
- Insurance of Building	3,240	(Total building insurance cost for M_1 is one third of annual premium)
- Power	6,480	
- Light	5,400	
- Rent	12,675	(The general service deptt. Is located in a building owned by the company. It is valued of ₹ 6,000 and is charged into cost at notional value of 8% per annum. This cost is additional to the rent shown above).

The value of issues of materials to the production departments are in the same proportion as shown above for the Consumable supplies.

The following data are also available:

'Department	Book Value Machinery (₹)	Area (Sq. ft.)	Effective H.P. hours %	Production Direct Labour hour	Capacity Machine hour
M_1	1,20,000	5,000	50	2,00,000	40,000
M_2	90,000	6,000	35	1,50,000	50,000
A_1	30,000	8,000	0.5	3,00,000	----
Stores	12,000	2,000	----	----	----
Engg. Service	36,000	2,500	10	----	----
General Service	12,000	1,500	----	----	----

Required:

(i) Prepare a overhead analysis sheet, showing the bases of apportionment of overhead to departments.

(ii) Allocate service department overheads to production department ignoring the apportionment of service department costs among service departments.

(iii) Calculate suitable overhead absorption rate for the production departments.

(iv) Calculate the overheads to be absorbed by two products, X and Y.

Ans. (i) Summary of Apportionment of Overheads

(₹)

Items	Basis of Apportionment	Total Amount	Production Deptt.			Service Deptt.		
			M_1	M_2	A_1	Store Service	Engineering Service	General Reserve
Indirect Wages	Allocation given	1,25,140	46,520	41,340	16,220	8,200	5,340	7,520
Consumable Stores	Allocation given	45,200	12,600	18,200	4,200	2,800	4,200	3,200
Depreciation	Capital value of machine (20:15:5:2:6:2)	39,600	15,840	11,880	3,960	1,584	4,752	1,584
Insurance of Machine	Capital value of machine (20:15:5:2:6:2)	7,200	2,880	2,160	720	288	854	288
Insurance on Building	1/3rd to M_1 Balance area basis (-:12:16:4:5:3)	3,240	1,080	648	864	216	270	162
Power	HP Hr% (10:7:1:-:2:-)	6,840	3,240	2,268	324	----	648	----
Light	Area (10:12:16:4:5:3)	5,400	1,080	1,296	1,728	432	540	324
Rent*	Area (10:12:16:4:5:-)	12,675	2,697	3,236	4,315	1,079	1,348	----
Total		**2,44,935**	**85,937**	**81,028**	**32,331**	**14,599**	**17,962**	**13,078**

*Rent to be apportioned among the departments which actually use the rented building. The notional rent is imputed cost and is not included in the calculation.

(ii) Allocation of service departments overheads

Service Deptt.	Basis of Apportionment	Production Deptt.			Service Deptt.		
		M_1	M_2	A_1	Store Service	Engineering Service	General Service
Store	Ratio of consumable value (126, 182, 42)	5,256	7,591	1,752	(14,599)	----	----
Engineering Service	In Machine hours Ratio of M_1 and M_2 (4, 5)	7,983	9,979	----	----	(17,962)	----
General Service	Labour hour Basis (20 : 15 : 30)	4,024	.3,018	6,036	----	----	(13,078)

Production Department allocated in (i)		85,937	81,028	32,331	----	----	----
Total		**1,03,200**	**1,01,616**	**40,119**	----	----	----

(iii) **Overhead Absorption Rate**

	M_1	M_2	A_1
Total overhead allocated	1,03,200	1,01,616	40,119
Machine hours	40,000	50,000	----
Labour hours	----	----	3,00,000
Rate per machine hour	258	2,032	----
Rate per Direct Labour	----	----	0.134

(iv) **Statement showing overhead absorption for Product X and Y.**

Machine Deptt.	Absorption Rate	Product X		Product Y	
		Hours	(₹)	Hours	(₹)
M_1	2.58	10	25.80	6	15.48
M_2	2,032	4	8.13	14	28.45
A_1	0.134	14	1.88	18	2.41
			35.81		**46.34**

Q. 4. In a manufacturing company factory overheads are charged as fixed percentage basis on direct labour and office overheads are charged on the basis of percentage of factory cost. The following information are available related to the year ending 31st March, 2014:

	Product A	Product B
Direct Materials	₹ 19,000	₹ 15,000
Direct Labour	₹ 15,000	₹ 25,000
Sales	₹ 60,000	₹ 80,000
Profit	25% on cost	25% on sales price

You are required to find out:

(i) The percentage of factory overheads on direct labour.

(ii) The percentage of office overheads on factory cost

Ans. Let, the percentage of factory overheads on direct labour is 'x' and the percentage of office overheads on factory cost is 'y', then the total cost of product A and product B will be as follows:

	Product A (₹)	Product B (₹)
Direct Materials	19,000	15,000
Direct Labour	15,000	25,000
Prime Cost	34,000	40,000
Factory Overheads (Direct Labour x x)	150 x	250 x
Factory Cost (i)	34,000 + 150 x	40,000 + 250 x

Office overheads (Factor cost x y) (ii)	340 y + 1.5 x y	400 + 2.5 x y
Total Cost [(i) + (iii)]	34,000 + 150 x + 340 y + 1.5 xy	40,000 + 250 x + 400 y – 2.5 x y

Total cost on the basis of sales is

	Product A (₹)	**Product B (₹)**
Sales	60,000	80,000
Less : Profit		
Product A – 25% on cost or 20% on Sales	12,000	----
Product B – 25% on Sales	----	20,000
Total Cost	48,000	60,000

Thus,

Total Cost of A is $34,000 + 150x + 340y + 1.5xy = 48,000$

Or, $150x + 340y + 1.5xy = 14,000$ ……(i)

Total Cost of B is $40,000 + 250x + 400y + 2.5xy = 60,000$

Or, $250x + 400y + 2.5xy = 20,000$ ……(ii)

Equation (ii) multiplied by 0.6 and after deducting from equation (i), we get

Total Cost of A is $150x + 340y + 1.5xy = 14,000$ ……(i)

$150x + 240y + 1.5xy = 12,000$ ……(ii)

$100y = 2,000$

Or, $y = 20$

Putting value of y in equation (i), we get

$150x + 340 \times 20 + 1.5x \times 20 = 14,000$

Or, $150x + 30x = 14,000 – 6,800$

Or, $180x = 7,200$

Or, $x = 40$

Hence, (i) the factory overheads on direct labour = 40% and

(ii) the office overheads on factory cost = 20%.

COST ACCOUNTING SYSTEM

Q. 1. A Company operates separate cost accounting and financial accounting systems. The following is the list of opening balances as on 1.04.2013 in the Cost Ledger.

	Debit (₹)	Credit (₹)
Stores Ledger Control Account	53,375	----
WIP Control Account	1,04,595	----
Finished Goods Control Account	30,780	----
General Ledger Adjustment Account	---	1,88,750

Transactions for the quarter ended 30.06.2013 are as under:

	(₹)
Material purchased	26,700
Materials issued to production	40,000
Materials issued to factory for repairs:	900
Factory wages paid (including indirect wages 23,000)	77,500
Production overheads incurred	95,200
Production overheads under – absorbed and written off	3,200
Sales	2,56,000

The Company's gross profit is 25% on Cost of Sales. At the end of the quarter, WIP stocks increased by ₹ 7,500.

Prepare the relevant Control Accounts, Costing Profit & Loss Account and General Ledger Adjustment Account to record the above transactions for the quarter ended 30.06.2013.

Ans.

General Ledger Adjustment A/c

Particulars	(₹)	Particulars	(₹)
To Sales	2,56,000	By Balance b/d	1,88,750
To Balance c/d	1,80,150	By Stores Ledger Control A/c (Materials purchased)	26,770
		By Wages Control A/c (Factory wages paid)	77,500
		By Factory Overheads Control A/c (Production overhead incurred)	95,200
		By Costing Profit & Loss A/c	48,000
	4,36,150		**4,36,150**

Dr. Stores Ledger Control A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Balance b/d	53,375	By WIP Control A/c (Materials issued to production)	40,000
To General Ledger Adjustment A/c (Materials purchased)	26,700	By Factory Overheads Control A/c (Materials issued for repairing)	900
		By Balance c/d	39,175
	80,075		**80,075**

Dr. WIP Control A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,04,595	By Finished Goods Control A/c (Balancing Figure)	2,02,900
To Stores Ledger Control A/c	40,000	By Balance c/d	1,12,095
To Wages Control A/c	54,500		
To Factory Overhead Control A/c	1,15,900		
	3,14,995		**3,14,995**

Dr. Finished Goods Control A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Balance b/d	30,780	By Cost of Sales A/c (Refer to Note)	2,04,800
To WIP Control A/c	2,02,900	By Balance c/d	28,880
	2,33,680		**2,33,680**

Note: Gross profit is 25% of Cost of Sales or 20% on sales.

Hence cost of sales = ₹ 2,56,000 – 20% of ₹ 2,56,000 = ₹ 2,04,800

Dr. Factory Overhead Control A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Stores Ledger Control A/c	900	By Costing Profit & Loss A/c (Under absorption of Overhead)	3,200
To Wages Control A/c	23,000	By WIP Control A/c	1,15,900
To General Ledger Adj. A/c	95,200		
	1,19,100		**1,19,100**

Dr. Cost of Sales A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Finished Goods Control A/c	2,04,800	By Costing Profit & Loss A/c	2,04,800

Dr. Sales A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Costing Profit & Loss A/c	2,56,000	By GLA A/c	2,56,000

Dr. Wages Control A/c Cr.

Particulars	(₹)	Particulars	(₹)
To General Ledger Adj. A/c	77,500	By Factory overhead control A/c (Wages paid for Indirect labour)	23,000
		By WIP Control A/c (Wages paid for Direct labour)	54,500
	77,500		**77,500**

Dr. Costing Profit & Loss A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Factory O/H Control A/c	3,200	By Sales A/c	2,56,000
To Cost of Sales A/c	2,04,800		
To General Ledger Adj. A/c (Profit)	48,000		
	2,56,000		**2,56,000**

Trial Balance (as on 30.06.2013)

	Dr. (₹)	Cr. (₹)
Stores Ledger Control A/c	39,175	----
WIP Control A/c	1,12,095	----
Finished Goods Control A/c	28,880	----
To General Ledger Adjustment A/c	----	1,80,150
	1,80,150	**1,80,150**

Q. 2. Following information have been extracted from the cost records of XYZ Pvt. Ltd.

	(₹)
Opening balance	54,000
Purchases	2,88,000
Transfer from WIP	1,44,000
Issue to WIP	2,88,000
Issue for repairs	36,000
Deficiency found in stock	10,800
Work – in – Progress:	**(₹)**
Opening Balance	1,08,000
Direct Wages applied	1,08,000
Overheads charged	4,32,000
Closing balance	72,000
Finished Production:	**(₹)**
Entire production is sold at a profit of 15% on cost of WIP	
Wages paid	1,26,000
Overheads incurred	4,50,000

Draw the Stores Ledger Control Account, Work-in-Progress Control Account, Overheads Control Account and Costing Profit and Loss Account

Ans. **Stores Ledger Control A/c**

Particulars	**(₹)**	**Particulars**	**(₹)**
To Balance b/d	54,000	By Work – in – Process A/c	2,88,000
To General Ledger Adjustment A/c	2,88,000	By Overhead Control A/c	36,000
To Work – in – Process A/c	1,44,000	By Overhead Control A/c (Deficiency)	10,880
		By Balance c/d	1,51,200
	4,86,000		**4,86,000**

*Deficiency assumed as normal (alternatively can be treated as abnormal loss

Work in Progress Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,08,000	By Stores Ledger Control A/c	1,44,000
To Stores Ledger Control A/c	2,88,000	By Closing P/L A/c (Balancing figures being Cost of finished goods)	7,20,000
To Wages Control A/c	1,08,000	By Balance c/d	72,000
To Overheads Control A/c	4,32,000		
	9,36,000		**9,36,000**

Overheads Control A/c

Particulars	(₹)	Particulars	(₹)
To Stores Ledger Control A/c	36,000	By Work – in – Progress A/c	4,32,000
To Stores Ledger Control A/c	10,800	By Balance c/d (Under absorption)	82,800
To Wages Control A/c (₹ 1,26,000 - ₹ 1,08,000)	18,000		
To General Ledger Adj. A/c	4,50,000		
	5,14,000		**5,14,000**

Costing Profit & Loss A/c

Particulars	(₹)	Particulars	(₹)
To Work – in – Progress	7,20,000	By Gen. Ledge Adj. A/c (Sales) (₹ 7,20,00 x 115%)	8,28,000
To Gen. Ledger Adj. A/c (Profit)	1,08,000		
	8,28,00		**8,28,000**

Note: Under absorption of overheads is carried forward. Alternatively we could have written it off.

Q. 3. BPR Limited keeps books on integrated accounting system. The following balances appear in the books as on April 1, 2013.

	Dr. (₹)	Cr. (₹)
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:

	(₹)	**(₹)**
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	----	14,189
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.

Ans, **Dr. Stores Control A/c Cr.**

Particulars	(₹)	Particulars	(₹)
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**

Dr. Wages Control A/c Cr.

Particulars	(₹)	Particulars	(₹)
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**

Dr. Work – in - Progress A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Balance b/d	38,675	By Finished 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**

Dr. Production Overheads A/c Cr.

Particulars	(₹)	Particulars	(₹)
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 (₹ 91,000 – ₹ 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.

Dr. Finished Goods A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Balance b/d	52,325	By Cost on 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		
	5,80,960		**5,80,960**

Dr. Administration Overheads A/c Cr.

Particulars	(₹)	Particulars	(₹)
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**

Dr. Cost of Sales A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Finished Goods A/c	5,00,500	To Sales A/c	5,32,350
To Selling Overheads	31,850		
	5,32,350		**5,32,350**

Dr. Sales A/c Cr.

Particulars	(₹)	Particulars	(₹)
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**

Dr. Factory Overheads / Production Overheads Outstanding A/c Cr.

Particulars	(₹)	Particulars	(₹)
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**

Dr. Prepaid Administration Overheads A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Balance b/d	9,975	By Admin. Overheads A/c	9,975
	9,975		**9,975**

Dr. Provision for Depreciation A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Balance c/d	26,164	By Balance b/d	11,375
		By Production Overheads A/c	14,789
	26,164		**26,164**

Dr. Provision for Doubtful Debts A/c Cr.

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

Dr. Profit & Loss A/c Cr.

Particulars	(₹)	Particulars	(₹)
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

Dr. Trade Receivables A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Balance c/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**

Dr. Trade Payables A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Bank	2,9,775	By Balance b/d	18,200
To Balance c/d	15,925	By Stores Control A/c	2,27,500
	2,45,700		**2,45,700**

Dr. Non – Current Assets A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,47,875	By Balance c/d	1,47,875
	1,47,875		**1,47,875**

Dr. Bank A/c Cr.

Particulars	(₹)	Particulars	(₹)
To Trade Receivables	6,59,750	By Balance c/d	22,750
		By Direct Wages	1,97,925
		By Indirect Wages	11,375
		By Production Overheads (₹84,750+₹6,250)	91,000
		By Admin. 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. (₹)
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. 4. The following figures have been extracted from the cost records of a anufacturing company.

	(₹)
Stores:	
Opening Balance	63,000
Purchases	3,36,000
Transfer from Work – in – Progress	1,68,000
Issues to Work – in – Progress	3,36,000
Issues to Repairs and Maintenance	42,000
Deficiencies found in Stock taking	12,600
Work – in – Progress	
Opening Balance	1,26,000
Direct Wages applied	1,26,000
Overhead Applied	5,04,000
Closing Balance	84,000

Finished Products:

Entire output is sold at a Profit of 10% on actual cost from work-in-progress. Others: Wages incurred ₹ 1,47,000; Overhead incurred ₹ 5,25,000.

Income from investment ₹ 21,000; Loss on sale of Fixed Assets ₹ 42,000.

Draw the stores control account, work-in-progress control account, costing profit and loss account, profit and loss account and reconciliation statement

Ans.

Stores Ledger Control Account

Particulars	**(₹)**	**Particulars**	**(₹)**
To Balance c/d	63,000	By Work – in – Progress	3,36,000
To General Ledger Adjustment A/c	3,36,000	By Overhead A/c	42,000
To Work – in – Progress A/c	1,68,000	By Overhead A/c (Deficiency Assumed as Normal)	12,600
		By Balance c/d	1,76,400
	5,67,000		**5,67,000**

Work – in - Progress Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,26,000	By Stores Ledger Control A/c	1,68,000
To Stores Ledger Control A/c	3,36,000	By Costing Profit & Loss A/c (Finished Goods at cost Balancing figure)	8,40,000
To Wages Control A/c	1,26,000	By Balance c/d	84,000
To Overhead A/c (Applied)	5,04,000		
	10,92,000		**10,92,000**

Costing Profit and Loss Account

Particulars	(₹)	Particulars	(₹)
To Work – in – Progress A/c	8,40,000	By General Ledger Adjustment A/c Sales (₹8,40,000 + ₹84,000)	9,24,000
To General Ledger Adjustment A/c (Profit)	84,000		
	9,24,000		**9,24,000**

Financial Profit and Loss Account

Particulars	(₹)	Particulars	(₹)
To Opening Stock		By Sales	9,24,000
Stores 63,000		By Income from Investment	21,000
WIP 1,26,000	1,89,000	By Closing Stock	
To Purchases	3,36,000	Stores 1,76,400	
To Wages	1,47,000	WIP 84,000	2,06,400
To Overhead	5,25,000	By Loss	33,600
To Loss on Sale of Fixed Assets	42,000		
	12,39,000		**12,39,000**

Reconciliation Statement

Particulars	(₹)
Profit as per Cost Account	84,000
Add : Income from Investment	21,000
	1,05,000
Less: Under absorption of overhead 96,600	
Loss on Sale of Fixed Assets 42,000	1,38,600
Loss as per Financial Account	33,600

Note: Deficiency in stock taking may be treated as abnormal loss and it can be transferred from stores ledger Control Account to Costing Profit and Loss Account. Then consequential changes in accounting entries in overheads Control Account has to be done.

Working Notes:

Overheads Control Account

Particulars	(₹)	Particulars	(₹)
To Stores Ledger Control A/c	42,000	By Work – in – Progress	5,04,000
To Stores Ledger Control A/c	12,600	By Balance c/d	96,600
To Wages Control A/c Indirect Wages (₹1,47,000-₹1,26,000)	21,000		
To General Ledger Adj. A/c	5,25,000		
	6,00,600		**6,00,600**

Note: Under absorption of overheads is carried forward. Alternatively we could have written it off.

Q. 5. R Limited showed a net loss of ₹ 35,400 as per their cost accounts for the year ended 31st March, 2014. However, the financial accounts disclosed a net profit of ₹ 67,800 for the same period. The following information were revealed as a result of scrutiny of the figures of cost accounts and financial accounts:

		(₹)
(i)	Administrative overhead under recovered	25,500
(ii)	Factory overhead over recovered	1,35,000
(iii)	Depreciation under charged in Cost Accounts	26,000
(iv)	Dividend received	20,000
(v)	Loss due to obsolescence charged in Financial Accounts	16,800
(vi)	Income tax provided	43,600
(vii)	Bank interest credit in Financial Accounts	13,600
(viii)	Value of Opening Stock:	
	In Cost Accounts	1,65,000
	In Financial Accounts	1,45,000
(ix)	Value of Closing Stock	
	In Cost Accounts	1,25,500
	In Financial Accounts	1,32,000
(x)	Goodwill written – off in Financial Accounts	25,000
(xi)	Notional rent of own premises charged in Cost Accounts	60,000

(xii)	Provision for doubtful debts in Financial Accounts	15,000

Prepare a reconciliation statement by taking costing net loss as base.

Ans. Statement of Reconciliation

Sl. No.	Particulars	Amount (₹)	Amount (₹)
	Not loss as per Cost Accounts		(325,400)
	Additions		
1.	Factory O/H over recovered	1,35,000	
2.	Dividend Received	20,000	
3.	Bank Interest received	13,600	
4.	Difference in Value of Opening Stock (1,65,000 – 1,45,000)	20,000	
5.	Difference in Value of Closing Stock (1,32,000 – 1,25,500)	6,500	
6.	Notional Rent of own Premises	60,000	2,55,100
	Deductions		
1.	Administration O/H under recovered	25,500	
2.	Depreciation under charged	26,000	
3.	Loss due to obsolescence	16,800	
4.	Income tax Provided	43,600	
5.	Goodwill written-off	25,000	
6.	Provision for doubtful debts	15,000	(1,51,900)
	Net Profit as per Financial A/c.		67,800

PROCESS COSTING

Q. 1. 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
	(₹)	(₹)	(₹)	(₹)
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 ₹ 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.

Ans. **(i) Dr. Process 'X' Account Cr.**

Particulars	Cost (₹)	Profit (₹)	Total (₹)		Cost (₹)	Profit (₹)	Total (₹)
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 20% on cost)	----	74,000	74,000				
	2,96,000	**74,000**	**3,70,000**		**2,96,000**	**74,000**	**3,70,000**

Dr. Process 'Y' Account Cr.

Particulars	Cost (₹)	Profit (₹)	Total (₹)		Cost (₹)	Profit (₹)	Total (₹)
To Opening Stock	23,000	4,000	27,000	By Process 'Z' A/c (Transfer)	5,36,379	2,26,127	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							
Prime Cost	4,64,379	73,621	6,10,000				
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**

Dr. Process 'Z' Account Cr.

Particulars	Cost (₹)	Profit (₹)	Total (₹)		Cost (₹)	Profit (₹)	Total (₹)
To Opening Stock	30,000	10,000	40,000	By Process 'Z' 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	9,44,500				
To Manufacturing Overheads	66,500	----	65,500				
Total Cost	**7,45,269**	**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**

Dr. Finished Stock Account Cr.

Particulars	Cost (₹)	Profit (₹)	Total (₹)		Cost (₹)	Profit (₹)	Total (₹)
To Opening Stock	25,000	20,000	45,000	By Costing P & L A/c (Transfer)	7,41,862	6,58,138	14,00,000
To Process ;Z A/c	**7,45629**	**5,50,371**	**12,96,000**				
Total	**7,70,629**	**5,70,371**	**13,41,00**				
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**				
	7,45,629	**5,50,371**	**12,96,000**		**7,45,629**	**5,50,371**	**12,96,000**

Costing Profit & Loss Account

Dr. for the year ending 31st March, 2014 Cr.

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

Workings:

Calculation of amount of unrealized profit on closing stock:

Process 'X' = Nil

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

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

$$\text{Finished Stock} = \frac{\text{Rs.5,50,371}}{\text{Rs.12,96,000}} \times \text{Rs.50,000} = \text{Rs.21,231}$$

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

Liabilities	Amount (₹)	Assets	Amount (₹)
Net Profit	6,58,138	Closing Stock	
		Process – Y	20,000
		Process – Y	32,000
		Process – Z	39,000
		Finished Stock	50,000
			1,41,000
		Less: Provision for unrealised profit	35,362
			1,05,638

Q. 2. A product passes through two processes A and B. During the year 2013, the input to process A of basic raw material was 8,000 units @ ₹ 9 per unit. Other information for the year is as follows:

	Process A	Process B
Output Units	7,500	4,800
Normal Loss (% to input)	5%	10%
Scrap value per unit (₹)	2	10
Direct Wages (₹)	12,000	24,000
Direct Expenses (₹)	6,000	5,000
Selling price per unit (₹)	15	25

Total overheads ₹ 17,400 were recovered as percentage of direct wages. Selling expenses were ₹ 5,000. These are not allocated to the processes. 2/3rd 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 and B Accounts.

Ans. **Process- A Account**

Particulars	Units	Amount (₹)		Units	Amount (₹)
To Input	8,000	72,000	By Normal Loss (5% of 8,000 units x ₹ 2)	400	800
To Direct Wages		12,000	By Abnormal Loss (100 units x ₹ 12,60)	100	1,250
To Direct Exp.		6,000	By Process B A/c (7,500 units x $^2/_3$ x ₹12.60)	5,000	62,500
To Overheads (₹.17,400 x $^1/_3$)			By Profit & Loss A/c (7,500 units x $^1/_3$ x ₹12.60)	2,500	31,250
	8,000	**95,800**		**8,000**	**95,800**

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

Process- B Account

Particulars	Units	Amount (₹)		Units	Amount (₹)
To Process A/c	5,000	62,500	By Normal Loss (10% of 5,000 units x ₹ 10)	500	5,000
To Direct Wages		24,000	By Finished Stock A/c or Profit & Loss A/c (48,000 units x ₹ 21,80)	4,800	1,04,640
To Direct Exp.		5,000			
To Overheads $\left(\text{Rs.17,400 x } \frac{2}{3}\right)$					
To Abnormal Loss	**300**	6,540			
	5,300	**1,09,640**		**5,300**	**1,09,640**

$$\text{Cost per unit} = \frac{\text{Rs.1,03,100 - Rs.5,000}}{\text{5,000 units - 500 units}} - \frac{\text{Rs.98,100}}{\text{4,500 units}} = \text{Rs.21.60}$$

Working

Profit & Loss A/c

Particulars	Amount (₹)	Amount (₹)		Amount (₹)	Amount (₹)
To Cost of Sales	5,000	62,500	By Sales		
Process A (2,500units x ₹12.50)	31,250		Process A (2,500 units x ₹ 15)	37,500	
Process B (4,000units x ₹21.80)	1,04,640	1,35,890	Process B (4,800 units x ₹ 26)	1,20,000	1,57,500
To Abnormal Loss			By Abnormal Gain		
Process A (100units x ₹12.50-2)		1,050	Process B (300 units x ₹ 21.80-10)		3,540
To Selling Expenses		5,000			
To Net Profit		19,100			
		1,81,040			**1,81,040**

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 PRODUCTS & BY PRODUCTS

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 ₹ 40,00,000. Sunshine had no beginning or ending inventories. Sales of Product O in March, 2014 were ₹ 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'	₹ 80,00,000	₹ 1,20,00,000
Super N'	₹ 32,00,000	₹ 40,00,000
Super P'	₹ 36,00,000	₹ 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	₹ 20,00,000
Product N	₹ 12,00,000
Product P	₹ 28,00,000

You are required to answer:

(i) How the joint cost of ₹ 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.

Ans.

(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 (₹)	Joint cost allocated (₹)
M	20,00,000	10,00,000 $\left(\frac{Rs.20,00,000}{80,00,000}\right)$ x Rs.40,00.000
N	12,00,000	6,00,000 $\left(\frac{Rs.12,00,000}{80,00,000}\right)$ x Rs.40,00.000
O	20,00,000	10,00,000 $\left(\frac{Rs.20,00,000}{80,00,000}\right)$ x Rs.40,00.000
P	28,00,000	14,00,000 $\left(\frac{Rs.28,00,000}{80,00,000}\right)$ x Rs.40,00.000
Total	**80,00,000**	**40,00,000**

(b) Physical output (gallon) Method

Products	Physical output (in gallon)	Joint cost allocated (₹)
M	3,00,000	24,00,000 $\left(\frac{3,00,000\ gallon}{5,00,000\ gallon}\right)$ x Rs.40,00.000
N	1,00,000	8,00,000 $\left(\frac{1,00,000\ gallon}{5,00,000\ gallon}\right)$ x Rs.40,00.000
O	50,000	4,00,000 $\left(\frac{50,000\ gallon}{5,00,000\ gallon}\right)$ x Rs.40,00.000
P	50,000	4,00,000 $\left(\frac{50,000\ gallon}{5,00,000\ gallon}\right)$ x Rs.40,00.000
Total	**5,00,000**	**40,00,000**

(c) Estimated Net Realizable Value Method

Products	Sales revenue after further processing	Sales revenue at the point of split off	Further processing costs	Net realizable value	Joint cost allocated
	(₹)	(₹)	(₹)	(₹)	(₹)
(a)	(b)	(c)	(d)	(e)=[(b) – (d)] or (c)	
'Super M'	1,20,00,000	--	80,00,000	40,00,000	$\left(\frac{Rs.40,00,000}{80,00,000}\right)$ x Rs.40,00.000 = 20,00,000
'Super N'	40,00,000	--	32,00,000	8,00,000	$\left(\frac{Rs.8,00,000}{80,00,000}\right)$ x Rs.40,00.000 = 4,00,000
'O'	--	20,00,000	--	20,00,000	$\left(\frac{Rs.20,00,000}{80,00,000}\right)$ x Rs.40,00.000 = 10,00,000
'Super P'	48,00,000	--	36,00,000	12,00,000	$\left(\frac{Rs.12,00,000}{80,00,000}\right)$ x Rs.40,00.000 = 6,00,000
		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 (₹)	N (₹)	P (₹)
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 ₹ 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 ₹ 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. @ ₹ 4 per kg.	₹ 10,000	–
Direct labour	₹ 6,250	₹ 6,900
Overheads	₹ 4,500	₹ 6,900
Normal Loss	10% of input	–
Scrap value of loss	₹ 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	₹ 24 per kg.
Joint product B	₹ 18 per kg.
Joint product C	₹ 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.

Ans.

(a) Process- 1 Account

	Qty. (kg.)	**Rate per kg. (₹)**	**Amount (₹)**		**Qty. (kg.)**	**Rate per kg. (₹)**	**Amount (₹)**
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	250	2	500
				(10% of input)			
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. (₹)	Amount (₹)		Qty. (kg.)	Rate per kg. (₹)	Amount (₹)
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. (₹)	Amount (₹)		Qty. (kg.)	Rate per kg. (₹)	Amount (₹)
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.)	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
A	900	24	1,600	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

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

   = ₹ 20,250

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

2. Joint Cost of three products under Process- 2

	(₹)
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	$\frac{Rs.34,500 \times 9}{23}$ = Rs.13,500
B	800	$\frac{Rs.34,500 \times 8}{23}$ = Rs.12,000
C	600	$\frac{Rs.34,500 \times 6}{23}$ = Rs.9,000

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

Joint Products	Output	Selling Price (p.u.)	Sales Revenue	Apportionment of Joint Cost on the basis of market value of production
	(In Kg.)	(₹)	(₹)	
A	900	24	21,600	$\frac{Rs.34,500 \times 3}{6}$ x Rs.17,250
B	800	18	14,400	$\frac{Rs.34,500 \times 2}{6}$ x Rs.11,500
C	600	12	7,200	$\frac{Rs.34,500 \times 1}{6}$ x 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 ₹ 2,12,400

	M1	B1	B2
Cost after separation	-	₹ 35,000	₹ 24,000
No. of units produced	4,000	1,800	3,000
Selling price per unit	₹ 100	₹ 40	₹ 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.

Ans.

(i) Statement showing allocation of Joint Cost

Particulars	**B1**	**B2**
No. of units Produced	1,800	3,000
Selling Price Per unit (₹)	40	30
Sales Value (₹)	72,000	90,000
Less: Estimated Profit (B1 -20% & B2 -30%)	(14,400)	(27,000)
Cost of Sales	57,600	63,000
Less: Estimated Selling Expenses (B1 -15% & B2-5%)	(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 (₹)**	**B_1 (₹)**	**B_2 (₹)**
Sales Value (A)	4,00,000 (4,000 × ₹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 = ₹ 1,44,900 + ₹ 14,400 + ₹ 27,000 = ₹ 1,86,300			

SERVICE COSTING

Q. 1. A lorry starts with a load of 24 tonnes of goods from station A. It unloads 10 tonnes at station B and rest of goods at station C. It reaches back directly to station A after getting reloaded with 18 tonnes of goods at station C. The distance between A to B, B to C and then from C to A are 270 kms, 150 kms and 325 kms respectively. Compute 'Absolute tonnes km. and 'Commercial tones-km'.

Ans. Absolute tonnes km.:

= Weight in tonnes × Distance in km.

= From A to B + from B to C + from C to A

= (24 tonnes × 270 km.) + (14 tons × 150 km.) + (18 tonnes × 325 km.)

= 6,480 tonnes-km. + 2,100 tonnes-km. + 5,850 tonnes-km.

= 14,430 tonnes-km.

Commercial Tonnes km.

= Average weight load × Total distance (km.) travelled

$$\left(\frac{24 + 14 + 18}{3}\right)$$

= Tonnes x 745 km.

= 3,906.67 Tonnes km

Q. 2. 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 ₹ 9 per hour operated. Fuel, oil, tyres, repairs and maintenance cost ₹ 1.20 per km.

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

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

	Mine A (₹)	Mine B (₹)
Fixed Cost per trip : (Refer to working note 1)		
(Driver's wages, depreciation, insurance and taxes)		
A : 1 hour 20 miniutes @ ₹ 9 per hour	12.00	
B : 1 hour 30 minutes @ ₹ 9 per hour		13.50
Running and maintenance cost:		
(Fuel, Oil, Tyres, repairs and maintenance)		
A 20 km ₹ 1.20 per km.	24.00	
B 30 km. ₹ 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 tip		
	Running; time to & fro	40 minutes	60 minutes
		$\left(20 \text{ km} \times \frac{60 \text{ minutes}}{30 \text{ km}}\right)$	$\left(30 \text{ km} \times \frac{60 \text{ minutes}}{30 \text{ km}}\right)$
	Un-loading time	10 minutes	10 minutes
	Loading time	30 minutes	20 minutes
	Total operated time	80 minutes or	90 minutes or
(2)	Effective tonnes – km	50 (5 tonnes x 10 km)	75 (5 tonnes x 15 km)

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
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	₹10 per litre. Each litre gives 4 km. per litre of diesel on an average
Driver's Salary	₹ 2,000 per month
License and Taxes	₹ 5,000 per annum per truck
Insurance	₹ 5,000 per annum for all the three vehicles
Purchase price per truck	₹ 3,00,000. Life 10 years. Scrap value at the end of litre is ₹ 10,000
Oil and sundries	₹ 25 per 100 km. run
General Overhead	₹ 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.

Ans. (i) Annual Cost Statement of three vehicles

	(₹)
Diesel (1,37,784 km ÷ 4 km) x ₹ 10) (Refer to Working Note 1)	3,36,960
Oil & sundries {(1,34,784 km. ÷ 100 km.) × ₹ 25}	33,696
Maintenance {(1,34,784 km. × ₹ 0.25) + ₹ 6,000} (Refer to Working Note 2)	39,696
Drivers' salary {(₹ 2,000 × 12 months) × 3 trucks}	72,000
Licence and taxes (₹ 5,000 × 3 trucks)	15,000
Insurance	5,000
Depreciation {(₹ 2,90,000 ÷ 10 years) × 3 trucks}	87,000
General overhead	11,084
Total annual cost	6,00,436

(ii) Cost per km. run

$$\text{Cost per kilometer run} = \frac{\text{Total annual cost 1 of vehicles}}{\text{Total kilometre travelled annually}} \text{(Refer to working note 1)}$$

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

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

$$\text{Cost per tonne km} = \frac{\text{Total annual cost 1 of vehicles}}{\text{Total effective tonnes kms. per annum}} \text{(Refer to working note 1)}$$

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

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

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**	**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:

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

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

$$= \text{Rs.0.25}$$

Fixed maintenance cost = Total maintenance cost – Variable maintenance cost

= ₹ 46,050 – 1,60,200 kms x ₹ 0.25

= ₹ 6,000

Q. 4. A transport company has 20 vehicles, which capacities are as follows:

No. of Vehicles	Capacity per Vehicle
5	9 tonne
6	12 tonne
7	15 tonne
2	20 tonne

The company provides the goods transport service between stations 'A' to station 'B'. Distance between these stations is 200 kilometres. Each vehicle makes one round trip per day an average. Vehicles are loaded with an average of 90 per cent of capacity at the time of departure from station 'A' to station 'B' and at the time of return back loaded with 70 per cent of capacity. 10 per cent of vehicles are laid up for repairs every day. The following information are related to the month of October, 2013

Salary of Transport Manager	₹ 30,000
Salary of 30 drivers	₹ 4,000 each driver
Wages of 25 Helpers	₹ 2,000 each helper
Wages of 20 Labourers	₹ 1,500 each labourer
Consumable stores	₹ 45,000
Insurance (Annual)	₹ 24,000
Road Licence (Annual)	₹ 60,000
Cost of Diesel per litre	₹ 35
Kilometres run per litre each vehicle	5 Km.
Lubricant, Oil etc.	₹ 23,500
Cost of replacement of Tyres, Tubes, other parts etc.	₹ 1,25,000
Garage rent (Annual)	₹ 90,000
Transport Technical Service Charges	₹ 10,000
Electricity and Gas charges	₹ 5,000
Depreciation of vehicles	₹ 2,00,000

There is a workshop attached to transport department which repairs these vehicles and other vehicles also. 40 per cent of transport manager's salary is debited to the workshop. The transport department is charged ₹ 28,000 for the service rendered by the workshop during October, 2013. During the month of October, 2013 operation was 25 days.

You are required:

(i) Calculate per ton-km operating cost.

(ii) Find out the freight to be charged per ton-km, if the company earned a profit of 25 per cent on freight.

Ans. (i) Operating Cost Sheet for the month of October, 2013

	Particulars	**Amount (₹)**
(A)	Fixed Charges:	
	Manager's salary (₹ 30,000 × 60%)	18,000
	Drivers' Salary (₹ 4,000 x 30 drivers)	1,20,000
	Helpers' wages (₹ 2,000 x 25 helpers)	50,000
	Labourer wages (₹ 1,500 x 20 labourers)	30,000
	Insurance (₹ 24,000 ÷ 12 months)	2,000
	Road licence (₹ 60,000 ÷ 12 months)	5,000
	Garage rent (₹ 90,000 ÷ 12 months)	7,500
	Transport Technical Service Charges	10,000
	Share in workshop expenses	28,000
	Total (A)	**2,70,500**
(B)	Variable Charges:	
	Cost of diesel (Working Note 1)	12,60,000
	Lubricant, Oil etc.	23,500
	Depreciation	2,00,000
	Replacement of Tyres, Tubes & other parts	1,25,000
	Consumable Stores	45,000
	Electricity and Gas charges	5,000
	Total (B)	**16,58,500**

	Total Cost (A + B)	**19,29,000**
	Total Ton-Kms. (Working Note 2)	**18,86,400**
	Cost per ton-km. (C ÷ D)	1.022

(ii) Calculation of Chargeable Freight

Cost per ton-km	₹ 1.022
Add: Profit @ 25% on freight or 33⅓% on cost	₹ 0.341
Chargeable freight per ton-km.	₹ 1.363 or ₹ 1.36

Working Notes:

1. Cost of Diesel:

Distance covered by each vehicle during October, 2013

= 200 km x 2 x 25 days x 90% = 9,000 km

$$\text{Consumption of diesel} = \frac{9{,}000 \text{ km} \times 20 \text{ vehicles}}{5 \text{ km}} = 36{,}000 \text{ litres}$$

Cost of diesel = 36,000 litres x ₹ 35 = ₹ 12,60,000

2. **Calculation of total ton – km**

Total Ton-Km. = Total Capacity x Distance covered by each vehicle x Average Capacity Utilisation ratio

$$[(5 \times 9 \text{ ton}) + (6 \times 12 \text{ ton}) + (7 \times 15 \text{ ton}) + (2 \times 20 \text{ tone})] \times 9{,}000 \text{ km.} \frac{(90\% + 70\%)}{2}$$

= (45 + 72 + 105 + 40)

= 262 x 9,000 x 80%.

= 18,86,400 ton-km.

Q. 5. The following information relates to a bus operator:

Cost of the bus	₹	18,00,000
Insurance charges		3% p.a.
Manager-cum accountant's salary	₹	8,000 p.m.
Annual Tax	₹	50,000
Garage Rent	₹	2,500 p.m.
Annual repair & maintenance	₹	1,50,000
Expected life of the bus		15 years
Scrap value at the end of 15 years	₹	1,20,000
Driver's salary	₹	15,000 p.m.

Conductor's salary	₹	12,000 p.m.
Stationery	₹	500 p.m.
Engine oil, lubricants (for 1200 km.)	₹	2,500
Diesel and oil (for 10 km.)	₹	52
Commission to driver and conductor (shared equally)		10% of collections
Route distance		20 km long

The bus will make 3 round trips for carrying on the average 40 passengers in each trip. Assume 15% profit on collections. The bus will work on the average 25 days in a month.

Calculate fare for passenger-km

Ans. Working Notes:

(i) Calculation of Depreciation of Bus (per month)

$$= \frac{\text{Cost of the bus - Scrap Value at the end of the 15 years}}{\text{Expected Life of the bus}}$$

$$= \frac{\text{Rs.18,000-Rs.1,20,000}}{\text{15 years}}$$

= Rs.1,12,000p.a.

$$\text{Depreciation per month} = \frac{\text{Rs.1,12,000}}{\text{12 months}} = \text{Rs.9.333.33}$$

(ii) Calculation of total distance travelled and Passenger km per month

Total distance = 3 trips × 2 × 20 k.m. × 25 days = 3,000 k.m.

Total Passenger-km. = 3 trips × 2 × 20 k.m. × 25 days × 40 passengers

= 1,20,000 Passenger-k.m.

(iii) Cost of Engine oil, Lubricants and Diesel & Oil (per month)

$$\text{Engine oil \& lubricants} = \frac{\text{Total distance travelled}}{\text{1,200 km}} \times \text{Rs.2,500}$$

$$= \frac{\text{3,000 km}}{\text{1,200 km}} \times \text{Rs.2,500} = \text{Rs.6,250}$$

$$\text{Diesel and Oil} = \frac{\text{Total distance travelled}}{\text{10 km}} \times \text{Rs.52}$$

$$= \frac{\text{3,000 km}}{\text{10 km}} \times \text{Rs.52} = \text{Rs.15,600}$$

Statement showing the Operating Cost per Passenger-km.

(i)	**Standing Charges:**		
	Depreciation (Working Note : (II)	9,333.3	
	Insurance Charge $\left(\frac{Rs.18,000}{12} \times 3\%\right)$	4,500	
	Manager – cum – accountant's Salary $\left(\frac{Rs.50,000}{12}\right)$	8,000	
	Annual Tax (p.m.)	4.166.67	
	Garage Rent	2,500	28,500
(ii)	**Maintenance Charges:**		
	Repair & Maintenance per month $\left(\frac{Rs.1,50,000}{12}\right)$		12,500
(iii)	**Running Cost**		
	Driver's Salary	15,000	
	Conductor's Salary	12,000	
	Stationery	500	
	Engine oil & lubricants (Working Note (iii)]	6,250	
	Diesel and oil (Working Note – (iii)	15,600	
	Total running cost before deducting commission to driver and conductor	49,350	49,350
	Total cost excluding commission to driver and conductor		90,350
	Driver's commission on collection*		6,023.34
	Conductor's commission on collection*		6,023.33
	Total Cost (i) + (ii) + (iii)		1,02,396.67
	Add : Profit**		18,070
	Total Collection		**1,20,466.67**

Working Note:

Total costs before commission on collection and net profit is ₹ 90,350.

Commission on collection to driver and conductor is 10% of collection and Profit is 15% of collection means

100% - (10% + 15%) i.e. 75% = ₹ 90,350

$$\text{So,Total collection} = \frac{\text{Rs.90,350}}{75} \times 100 = \text{Rs.1,20,466.67}$$

*Total Commission on collection = 10% × ₹ 1,20,466.67 = ₹12,046.67

Driver's share = 50% × ₹ 12,046.67 = 6,023.34

Conductor's share = 50% × ₹ 12,046.67 = 6,023.33

** Profit on collection = ₹ 1,20,466.67 × 15% = ₹ 18,070

$$\text{Fare per Passenger km} = \frac{\text{Total Collection}}{\text{Total Passenger km (Working Note (ii)}}$$

$$= \frac{\text{Rs.1.20.466.67}}{1,20,000}$$

= Rs.1,004(appx.)

Q. 6. A mini-bus, having a capacity of 32 passengers, operates between two places - 'A' and 'B'. The distance between the place 'A' and place 'B' is 30 km. The bus makes 10 round trips in a day for 25 days in a month. On an average, the occupancy ratio is 70% and is expected throughout the year.

The details of other expenses are as under:

Insurance	**Amount (₹)**	
Garage Rent	15,600	Per annum
Road Tax	2,400	Per quarter
Repairs	5,000	Per annum
Salary of operating staff	4,800	Per quarter
Tyres and Tubes	7,200	Per month
Diesel: (one litre is consumed for every 5 km)	3,600	Per quarter
Oil and Sundries	13	Per litre
Depreciation	22	Per 100 km run
	68,000	Per annum

Passenger tax @ 22% on total taking is to be levied and bus operator requires a profit of 25% on total taking.

Prepare operating cost statement on the annual basis and find out the cost

per passenger kilometer and one way fare per passenger.

Ans. Operating Cost Statement

	Particulars	**Total Cost Per annum (₹)**
(A)	**Fixed Charges:**	
	Insurance	15,600
	Garage rent (₹ 2,400 × 4 quarters)	9,600
	Road Tax	5,000
	Salary of operating staff (₹ 7,200 × 12 months)	86,400
	Depreciation	68,000
	Total (A)	**1,84,600**
(B)	**Variable Charges:**	
	Repairs (₹ 4,800 × 4 quarters)	19,200
	Tyres and Tubes (₹ 3,600 × 4 quarters)	14,400
	Diesel {(1,80,000 km. ÷ 5 km.) × ₹13}	4,68,000
	Oil and Sundries {(1,80,000 km. ÷ 100 km.) × ₹ 22}	39,600
	Total (B)	**5,41,200**
	Total Operating Cost (A+B)	7,25,800
	Add: Passenger tax (Refer to WN-1)	3,01,275
	Add: Profit (Refer to WN-1)	3,42,359
	Total takings	**13,69,434**

Calculation of Cost per passenger kilometre and one way far per passenger:

$$\text{Cost per Passenger Km} = \frac{\text{Total Operating Cost}}{\text{Total Passenger - Km}}$$

$$= \frac{\text{Rs.7,25,800}}{\text{40,32,000 Passenger - Km}} = \text{Rs.0.18}$$

$$\text{One way fare per Passenger} = \frac{\text{Total Takings}}{\text{Total Passenger - Km}} \times 30 \text{ km}$$

$$= \frac{\text{Rs.13,69,434}}{\text{40,32,000 Passenger - Km}} \times 30 \text{ km} = \text{Rs.10.20}$$

Working Notes:

1. Let total taking be X then Passenger tax and profit will be as follows: X = ₹ 7,25,800 + 0.22 X + 0.25X

   X – 0.47 X = ₹ 7,25,800

   $$X = \frac{Rs.7,25,800}{0.53} = Rs.13,69,434$$

   Passenger tax = ₹ 13,69,434 × 0.22 = ₹ 3,01,275

   Profit = ₹ 13,69,434 × 0.25 = ₹ 3,42,359

2. Total Kilometres to be run during the year

   = 30 km.× 2 sides × 10 trips × 25 days × 12 months = 1,80,000 Kilometres

3. Total passenger Kilometres

   = 1,80,000 km. × 32 passengers × 70% = 40,32,000 Passenger- km.

Q. 7. In order to develop tourism, ABCL airline has been given permit to operate three flights in a week between X and Y cities (both side). The airline operates a single aircraft of 160 seats capacity. The normal occupancy is estimated at 60% throughout the year of 52 weeks. The one-way fare is ₹ 7,200. The cost of operation of flights are:

Fuel cost (variable)	₹ 96,000 per flight
Food served on board on non-chargeable basis	₹ 125 per passenger
Commission	5% of fare applicable for all booking
Fixed cost:	
Aircraft lease	₹ 3,50,000 per flight
Landing Charges	₹ 72,000 per flight

Required:

(i) Calculate the net operating income per flight.

(ii) The airline expects that its occupancy will increase to 108 passengers per flight if the fare is reduced to ₹ 6,720. Advise whether this proposal should be implemented or not.

Ans. (i) **No. of passenger 160 seats x 60% = 96**

	(₹)	(₹)
Fare collection (96 passengers x ₹ 7,200)		6,91,200
Variable costs:		
Fuel	96,000	
Food (96 passengers x ₹ 125)	12,000	
Commission (5% of ₹ 6,91,200)	34,560	1,42,560
Contribution per flight		5,48,640
Fixed costs:		
Aircraft Lease	3,50,000	
Landing charges	72,000	4,22,000
Net income per flight		1,26,640

(ii)

	(₹)	(₹)
Fare collection (108 passengers x ₹6,720)		7,25,760
Variable costs:		
Fuel	96,000	
Fodd (108 passengers x ₹125)	13,500	
Commission (5% of ₹ 7,25,760)	36,288	1,45,788
Contribution		**5,79,972**

There is an increase in contributory in ₹ 31,332. Hence the proposal is acceptable.

MATERIAL COST

Q. 1. A company has the option to procure a particular material from two sources: Source I assures that defectives will not be more than 2% of supplied quantity.

Source II does not give any assurance, but on the basis of past experience of supplies received from it, it is observed that defective percentage is 2.8%.

The material is supplied in lots of 1,000 units. Source II supplies the lot at a price, which is lower by ₹ 100 as compared to Source I. The defective units of material can be rectified for use at a cost of ₹ 5 per unit.

You are required to find out which of the two sources is more economical.

Ans, Comparative Statement of procuring material from two sources

	Material Source	**Material Source**
	I	**II**
Defective (in %)	2 (Future estimate)	28 (Past experience)
Units supplied (in one lot)	1,000	1,000
Total defective units in a lot	20	28
	(1,000 units × 2%)	(1,000 units ×2.8%)
Additional price paid per lot (₹) (A)	100	–
Rectification cost of defect (₹) (B)	100	140
	(20 units × ₹ 5)	(28 units × ₹ 5)
Total additional cost per lot (₹): [(A) + (B)]	200	140

On comparing the total additional cost incurred per lot of 1,000 units, we observe that it is more economical, if the required material units are procured from material source II.

Q. 2. A company manufactures 5,000 units of a product per month. The cost of placing an order is ₹ 100. The purchase price of the raw material is ₹ 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 leve (iii) Maximum level

(iv) Minimum level (v) Average stock level

Ans.

(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. + $\frac{1}{2}$ x 1,196 kg. = 2,548 kg.

Working Note

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

Cost of placing an order (O) = ₹ 100

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

Economic Order Quantity (EOQ) = $\sqrt{\frac{2AQ}{C \times i}}$

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

Q. 3. 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 ₹ 100 and the inventory carrying cost is ₹ 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 (₹)
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.

Ans. 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. $EOQ=\sqrt{\frac{2 \times 40{,}000 \text{ kgs} \times ₹\ 100}{₹\ 2}}=2{,}000\text{kgs.}$

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 × ₹ 100)	= ₹ 2,000
Carrying cost (₹) (½ × 2,000 kg. × ₹ 2)	= ₹ 2,000
Total cost	₹ 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 kg. + 4,000 kg. = 5,000 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.		(₹)	Kg.	(₹)	(₹)	(₹)
(1)	(2)	(3) = (2) × ₹ 100	(4) = ½ × (1)	(5) = (4) × ₹ 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 ₹ 4,000, which is minimum.

(Refer to working notes 3 and 4)

Q. 4. PQR Ltd., manufactures a special product, which requires 'ZED'. The following particulars were collected for the year 2013-14:

(i) Monthly demand of Zed : 3,000 units

(ii) Cost of placing an order : ₹ 500

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

(iv) Cost per unit : ₹ 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.

Ans. (i) Re-order quantity = $\sqrt{\frac{2AO}{C \times i}}$

$$= \sqrt{\frac{2 \times 3{,}000 \text{ units} \times 12 \text{ months} \times 500}{₹\ 60 \times 10\%}}$$

$$= 2{,}450 \text{units (Approx.)}$$

(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 + 2,450 units – (250 units x 5 weeks) = 7,200 units

(v) Average stock level

= ½ (Minimum stock level + Maximum stock level)

= ½ (2,750 + 7,200) = 4,975 units

Q. 5. The annual carrying cost of material 'X' is ₹ 3.6 per unit and its total carrying cost is ₹ 9,000 per annum. What would be the Economic order quantity for material 'X', if there is no safety stock of material X?

Ans. Calculation of Economic Order Quantity

$$\text{Average Inventory} = \frac{\text{Total Carrying Cost}}{\text{Carrying Cost per unit}} = \frac{₹\ 9{,}000}{₹\ 360} = 2{,}500 \text{units}$$

Economic Order Quantity = Average Inventory x 2 = 2,500 units x 2 = 5,000 units.

Q. 6. 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'.

Ans. 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. 7. Assume that the following quantity discount schedule for a particular bearing is available to a retail store:

Order size (unit)	Discount
0 - 49	0%
50 – 99	5%
100 – 199	10%
200 and above	12%

The cost of a single bearing with no discount is ₹ 30. The annual demand is 250 units. Ordering cost is ₹ 20 per order and annual inventory carrying cost is ₹ 4 per unit. Determine the optimal order quantity and the associated minimal total cost of inventory and purchasing costs, if shortages are not allowed.

Ans. Working Notes

1. EOQ without discount

$$EOQ = \sqrt{\frac{2AO}{Ci}} = \sqrt{\frac{2 \times 250 \text{ units} \times ₹ 20}{₹ 4}}$$

$$= \sqrt{2,500} = 50 \text{units}$$

2. Prices with discount for different order size

5% Discount = 30 – 5% = ₹ 28.50

10% Discount = 30 – 10% = ₹ 27.00

12% Discount = 30 – 12% = ₹ 26.40

Statement of Computing Total cost at various order sizes

Orders size (units)	No. of Orders in a year	Ordering Cost (₹)	Carrying cost of average inventory (₹)	Purchase cost (₹)	Total cost (₹)
(1)	(2)	(3)	(4)	(5)	(3+4+5) = (6)
50	5 ($\frac{250 \text{ units}}{50 \text{ units}}$)	100 (5 orders x ₹ 20)	100 ($\frac{50 \text{ units}}{2}$ x 4)	7,125 (250 x ₹28.50)	7,325
100	2.5* ($\frac{250 \text{ units}}{100 \text{ units}}$)	50 (2.5 orders x ₹ 20)	200 ($\frac{100 \text{ units}}{2}$ x 4)	6,750 (250 x ₹ 27)	7,000
125	2 ($\frac{250 \text{ units}}{125 \text{ units}}$)	40 (2 orders x ₹ 20)	250 ($\frac{125 \text{ units}}{2}$ x 4)	6,750 (250 x ₹ 27)	7,040
200	1.25* ($\frac{250 \text{ units}}{200 \text{ units}}$)	25 (1.25 ordersx₹20)	400 ($\frac{200 \text{ units}}{2}$ x 4)	6,00 (250 x ₹ 26.4)	7,025
250	1 ($\frac{250 \text{ units}}{260 \text{ units}}$)	20 (1 order x ₹ 20)	500 ($\frac{250 \text{ units}}{2}$ x 4)	6,600 (250 x ₹ 26.4)	7,120

Optimal order quantity = 100 units

Minimum total cost of inventory and purchasing cost = ₹ 7,000.

Note: Theoretically it may be 2.5 orders, (250÷100), however practically 3 orders are required. Therefore ordering cost would be ₹ 60 (3 × 20) and total cost ₹ 7,010 (60 + 200 + 6750).

We have assumed that carrying cost per unit per annum will not change with change in purchase price.

Q. 8. Following details are related to a manufacturing concern:

Re-order Level	1,60,000 units
Economic Order Quality	90,000
Minimum Stock Level	1,00,000 units
Maximum Stock Level	1,90,000 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

Ans. 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.

$$\frac{\text{Max. leadtime + Min. leadtime}}{2} = 6 \text{ days} \qquad \text{(ii)}$$

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

$$\frac{\text{Min. leadtime + 4 days + Min. leadtime}}{2} = 6 \text{ days}$$

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

Or, 2 Min. lead time = 8 days

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

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 $= \frac{1,60,000 \text{ units}}{8 \text{ days}} = 20,000$ 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, Maximum Consumption per day $= \frac{60,000 \text{ units}}{4 \text{ days}} = 15,000$ units

JOB COSTING & BATCH COSTING

Q. 1. A factory incurred the following expenditure during the year 2013:

	(₹)	(₹)
Direct Material Consumed	----	12,00,000
Manufacturing Wages	----	7,00,000
Manufacturing Overhead:		
Fixed	3,60,00	----
Variable	2,50,00	6,10,000
		25,10,000

In the year 2014, following changes are expected in production and cost of production:

(i) Production will increase due to recruitment of 60% more workers in the factory.

(ii) Overall efficiency will decline by 10% on account of recruitment of new workers.

(iii) There will be an increase of 20% in Fixed overhead and 60% in Variable overhead.

(iv) The cost of direct material will be decreased by 6%.

(v) The company desire to earn a profit of 10% on selling price.

Ascertain the cost of production and selling price.

Ans. **Budgeted Cost Sheet for the year 2014**

Particulars			**(Amount ₹)**
Direct material consumed		12,00,000	
Add: 44% due to increased output		5,28,000	
		17,28,000	
Less: 6% for decline in price		1,03,680	16.24.320
Direct wages (manufacturing)		7,00,000	
Add: 60% increase		4,20,000	11.20.000
Prime cost			27.44.320
Manufactured Overhead:			
Fixed	3,60,000		
Add: 20% increase	72,000	4.32.000	
Variable	2,50,000		
Add : 60% increase	1,50,000		
		4,00,000	8,32,000
Cost of Production			35,76,320
Add: 1/9 of Cost or 10% on selling price			3,97,369
Selling Price			**39,73,669**

Production will increase by 60% but efficiency will decline by 10%.

160 – 10% of 160 = 144%

So increase by 44%.

Note: If we consider that variable overhead once will change because of increase in production (From ₹ 2,50,000 to ₹ 4,00,000) then with efficiency declining by 10% it shall be ₹ 3,60,000 and then again as mentioned in point No. (iii) of this question it will increase by 60% then variable overhead shall be ₹ 3,60,000 x 160% = ₹ 5,76,000. Hence, total costs shall be ₹ 37,52,320 and profit shall be 1/9th of ₹ 37,52,320 = ₹ 4,16,924. Thus, selling price shall be ₹ 41,69,244.

Q. 2. Arnav Motors Ltd. manufactures pistons used in car engines. As per the study conducted by the Auto Parts Manufacturers Association, there will be a demand of 80 million pistons in the coming year. Arnav Motors Ltd. is expected to have a market share of 1.1% of the total market demand of the pistons in the coming year. It is estimated that it costs ₹1.50 as inventory holding cost per piston per month and that the set-up cost per run of piston manufacture is ₹ 3,500.

(i) What would be the optimum run size for piston manufacturing?

(ii) Assuming that the company has a policy of manufacturing 40,000 pistons per run, how much extra costs the company would be incurring as compared to the optimum run suggested in (i) above?

Ans. (i) Optimum run size or Economic Batch Quantity (EBQ) = $\sqrt{\frac{2 \times D \times S}{C}}$

Where, D = Annual demand i.e. 1.15% of 8,00,00,000 = 9,20,000 units

S = Set-up cost per run = ₹ 3,500

C = Inventory holding cost per unit per annum

= ₹ 1.5 × 12 months = ₹ 18

$$EBQ = \sqrt{\frac{2 \times 9,20,000 \text{ units} \times Rs.3,500}{Rs.18}} = 18,915 \text{ units}$$

(ii) Calculation of Total Cost of set – up and inventory holding.

	Batch Size	**No. of set – ups**	**Set – up Cost (₹)**	**Inventory holding cost (₹)**	**Total Cost (₹)**
A	40,000 units	23 $\left(\frac{9,20,000}{40,000}\right)$	80,500 (23 x ₹3,500)	3,60,000 $\left(\frac{40,000 \text{ x Rs.}18}{?}\right)$	4,40,500
B	18,915 units	49 $\left(\frac{9,20,000}{18,915}\right)$	1,71,500	1,70,235 $\left(\frac{18,915 \text{ x Rs.}18}{2}\right)$	3,41,735
	Extra Cost (A – B)				**98,765**

EMPLOYEE COST AND DIRECT EXPENSE

Q. 1. Accountant of your company had computed labour turnover rates for the quarter ended 30th September, 2013 as 14%, 8% and 6% under Flux method, Replacement method and Separation method respectively. If the number of workers replaced during 2nd quarter of the financial year 2013-14 is 36, find the following:

(i) The number of workers recruited and joined; and

(ii) The number of workers left and discharged.

Ans.

$$\text{Labour Turnover Rate (Replacement Method)} = \frac{\text{No. of workers replaced}}{\text{Average No. of workers}}$$

$$\text{Or} \quad \frac{8}{100} = \frac{36}{\text{Average No. of workers}}$$

$$\text{Or} \quad \text{Average No. of workers} = 450$$

$$\text{Labour Turnover Rate (Replacement Method)} = \frac{\text{No. of workers replaced}}{\text{Average No. of workers}}$$

$$\text{Or} \quad \frac{6}{100} = \frac{\text{No. of workers separated}}{450}$$

$$\text{Or} \quad \text{No. of workers separated} = 27$$

$$\text{Labour Turnover Rate (Flux Method)} = \frac{\text{No. of Separators + No. of accession (Joinings)}}{\text{Average No. of workers}}$$

$$\text{Or} \quad \frac{14}{100} = \frac{27 + \text{No. of accessions (Joinings)}}{450}$$

$$\text{Or} \quad 100\,(27 + \text{No. of Accessions} = 6{,}300$$

$$\text{Or} \quad \text{No. of Accessions} = 36$$

(i) The No. of workers recruited and Joined = 36

(ii) The No. of workers left and discharged = 27

Q. 2. Human Resources Department of A Ltd. computed labour turnover by replacement method at 3% for the quarter ended June 2015. During the quarter, fresh recruitment of 40 workers was made. The number of workers at the beginning and end of the quarter was 990 and 1,010 respectively.

You are required to calculate the labour turnover rate by Separation Method and Flux Method.

Ans. $$\text{Labour Turnover by Replacement Method} = \frac{\text{No. of workers replaced during the quarter}}{\text{Average no. of workers on roll during the quarter}}$$

$$\text{Or,} \quad 0.03 = \frac{\text{No. of workers replaced during the quarter}}{(990 + 1{,}010) \div 2}$$

Or, No. of workers replaced during the quarter = 0.03 × 1,000 = 30 workers

(i) Labour Turnover by Separation Method

$$= \frac{\text{No. of workers separated during the year}}{\text{Average no. of workers or roll during the quarter}} \times 100$$

$$= \frac{\text{Worker at beginning + Fresh recruitment + Replacements - Workers at closing}}{\text{Average no. of workers or roll during the quarter}} \times 100$$

$$= \frac{990 + 40 + 30 - 1{,}010}{(990 + 1{,}010) \div 2} \times 100 = \frac{50 \text{ workers}}{1{,}000 \text{ workers}} \times 100 = 5\%$$

(ii) Labour Turnover by Flux Method

$$= \frac{\text{No. of workers (Separated + Replaced + Fresh Recruiment) during the year}}{\text{Average no. of workers or roll during the quarter}} \times 100$$

$$= \frac{50 + 30 + 40}{(990 + 1{,}010) \div 2} \times 100 \qquad = \frac{120 \text{ workers}}{1{,}000 \text{ workers}} \times 100 = 12\%$$

Q. 3. Mr. Michael executes a piece of work in 120 hours as against 150 hours allowed to him. His hourly rate is ₹ 10 and he gets a dearness allowance @ ₹ 30 per day of 8 hours worked in addition to his wages. You are required to calculate total wages received by Mr. Michael under the following incentive schemes:

(i) Rowan Premium Plan, and

(ii) Emerson's Efficiency Plan

Ans. Time Allowed = 150 hours

Time Taken = 120 hours

Time Saved = 30 hours

(i)	Rown Premium Plan	(₹)
	Normal wages (₹ 10 x 120 hours)	1,200
	D.A.for 15 days i.e. $\frac{120 \text{ hours}}{8 \text{ hours}}$ (Rs.30 x 15 days)	450
	Bonus $\frac{\text{Time saved}}{\text{Time allowed}}$ x Time taken x Hourly rate	
	= $\frac{30 \text{ hours}}{150 \text{ hours}}$ x 12 hours x Rs.10	240
	Total Wages	**1,890**
(ii)	Emersion's Efficiency Plan	(₹)
	Normal wages (120 hours x ₹ 10)	1,200
	D.A. (15 days x ₹ 30)	450

	Bonus* = 45% x ₹ 1,200	540
	Total Wages	**2,190**
	* Efficiency $\frac{\text{Time Allowed}}{\text{Time Taken}}$ x 100 = $\frac{150}{120}$ x 100 = 125%	
	Rate of Bonus up to 100% =	20%
	From 101% to 125% =	25%
		45%

Q. 4. A skilled worker is paid a guaranteed wage rate of ₹ 120 per hour. The standard time allowed for a job is 6 hour. He took 5 hours to complete the job. He is paid wages under Rowan Incentive Plan.

(i) Calculate his effective hourly rate of earnings under Rowan Incentive Plan.

(ii) If the worker is placed under Halsey Incentive Scheme (50%) and he wants to maintain the same effective hourly rate of earnings, calculate the time in which he should complete the job.

Ans. (i) Effective hourly rate of earnings under Rowan Incentive Plan

Earnings under Rowan Incentive plan =

$$\text{(Actual time taken x wage rate)} + \frac{\text{TIme saved}}{\text{Time Allowed}} \text{ x Time taken x Wage rate}$$

$$= \text{(5 hoursx Rs.120)} \text{ x } \left(\frac{\text{1 hour}}{\text{6 hours}} \text{ x 5 hours x Rs.120} \right)$$

=₹ 600 + ₹ 100 = ₹ 700

Effective hourly rate = `700/5 hours = ₹ 140 / hour

(ii) Let time taken = X

$$\therefore \text{Effective hourly rate} = \frac{\text{Earnings under Halsay Scheme}}{\text{Time Taken}}$$

Or, Effective hourly rate under Rowan Incentive plan =

$$\frac{\text{(Time taken x Rate) + 50\% Rate x (Time allowed - Time taken)}}{\text{Time Taken}}$$

$$\text{Or, Rs.140} = \frac{\text{(X x Rs.120) + 50\% Rs.120 x (6 - X)}}{\text{X}}$$

Or, 140X = 120X + 360 – 60X

Or, 80X = 360

$$\text{Or, } X = \frac{360}{80} = 4.5 \text{ hours}$$

Therefore, to earn effective hourly rate of ₹ 140 under Halsey Incentive Scheme worker has to complete the work in 4.5 hours.

Q. 5. Calculate the earnings of A and B from the following particulars for a month and allocate the labour cost to each job X, Y and Z:

		A	B
(i)	Basic Wages	₹ 100	₹ 160
(ii)	Dearness Allowance	50%	50%
(iii)	Contribution to provident Fund (on basic wages)	8%	8%
(iv)	Contribution to Employees' State Insurance (on basic wages)	2%	2%
(v)	Overtime	10 hours	

The normal working hours for the month are 200. Overtime is paid at double the total of normal wages and dearness allowance. Employer's contribution to state Insurance and Provident Fund are at equal rate with employees' contributions. The two workers were employed on jobs X, Y and Z in the following proportions:

	Jobs		
	X	**Y**	**Z**
Worker A	40%	30%	30%
Worker B	50%	20%	30%

Overtime was done on job Y.

Ans. **Statement showing Earnings of Workers A and B**

Workers	**A (₹)**	**A (₹)**
Basic Wages	100.00	160.00
Dearness Allowance (50% of Basic Wages)	50.00	80.00
Overtime Wages (Refer to Working Note 1)	15.00	----
Gross Wages earned	165.00	240.00
Less: Provident Fund (8% × ₹100); (8% × ₹160)	(8.00)	(12.80)
– ESI (2% × ₹100); (2% × ₹160)	(2.00)	(3.20)
Net Wages paid	155.00	224.00

Statement of Labour Cost

	A (₹)	A (₹)
Gross Wages (excluding overtime)	150.00	240.00
Employer's contribution to P.F. and E.S.I.	10.00	16.00
	160.00	**256.00**
Ordinary wages Labour Rate per hour (₹ 160 ÷ 200 hours); (₹ 256 ÷ 200 hours)	0.80	1.28

Statement Showing Allocation of Wages to Jobs

	Total Wages	Jobs		
		X	Y	Z
Worker A				
Ordinary Wages (4:3:3)	160.00	64.00	48.00	48.00
Overtime	15.00	--	15.00	--
Worker B				
Ordinary Wages(5:2:3)	256.00	128.00	51.20	76.80
	431.00	**192.00**	**114.20**	**124.80**

Working Notes

1. Normal Wages are considered as basic wages

$$\text{Over time} = \frac{2 \times (\text{Basic wage + D.A.}) \times 10 \text{ hours}}{200 \text{ hours}}$$

$$= 2 \times \frac{150}{200} \times 10 \text{ hours}$$

$$= 1.50 \times 10 \text{ hours} = ₹ 15$$

Q. 6. If the 'activity ratio' and 'capacity ratio' of a company is 104% and 96% respectively, find out its 'efficiency ratio'.

Ans. Efficiency Ratio can be obtained by dividing the activity ratio by capacity ratio as follows:

$$\text{Efficiency Ratio} = \frac{\text{Activity Ratio}}{\text{Capacity Ratio}} \times 100$$

$$= \frac{104\%}{96\%} \times 100 = 108.33\%$$

The inter – relationship is shown below:

$$\text{Activity Ratio} = \frac{\text{Std. hours for actual production}}{\text{Budgeted Hours}} \times 100$$

$$\text{Capacity Ratio} = \frac{\text{Std. hours for actual production}}{\text{Actual hours worked}} \times 100$$

$$\text{i.e. Efficiency Ratio} = \frac{\text{Activity Ratio}}{\text{Capacity Ratio}}$$

$$= \frac{\text{Std. hours for actual production}}{\text{Budgeted Hours}} \times \frac{\text{Budgeted Hours}}{\text{Actual hours worked}}$$

$$= \frac{\text{Std. hours for actual production}}{\text{Actual hours worked}} \times 100$$

$$\text{Activity Ratio} = \text{Capacity Ratio} \times \text{Efficiency Ratio}$$

BUDGETS & BUDGETARY CONTROL

Q. 1. Calculate efficiency and activity ratio from the following data:

Capacity Ratio	=	75%
Budgetary output	=	6,000 units
Actual output	=	5,000 units
Standard Time per unit	=	4 hours

Ans.

$$\text{Capcity Ratio} = \frac{\text{Actual Hours}}{\text{Budgetary Hours}} \times 100$$

$$75\% = \frac{\text{Actual Hours}}{\text{6,000 units x 4 hour per unit}}$$

$$0.75 = \frac{\text{Actual hours}}{\text{24,000 hours}}$$

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

$$\text{EfficiencyRatio} = \frac{\text{Actual Output in terms of Standard Hours}}{\text{Actual Working Hours}} x100$$

$$= \frac{\text{5,000 units x 4 hours per unit}}{\text{1800 hours}} x100$$

$$= \frac{\text{20,000 Hours}}{\text{18,000 Hours}} x100 = 111.11\%$$

$$\text{Activity Ratio} = \frac{\text{Actual Output in terms of Standard Hours}}{\text{Budgeted Output in term of Standard Hours}} x100$$

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

$$= \frac{\text{20,000 Units}}{\text{24,000 Units}} x100$$

$$= 83.33\%$$

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

	(₹ 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	129

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

Ans. Expense Budget of M/s Pentax Ltd.

Particulars	20,000 Units (₹)	15,000 Units (₹)	18,000 Units (₹)
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 (18,000 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)* (3 x 20,000)	60,000	60,000	60,000
Factory Expenses (Fixed) (7 x 20,000)	1,40,000	1,40,000	1,40,000
Administration Expenses (Fixed) (4 x 20,000)	80,000	80,000	80,000
Distribution Expenses (Variable)**	2,04,000 (10.20 x 20,000)	1,53,000 (10.20 x 15,000)	1,83,600 (10.20 x 18,000)
Distribution Expenses (Fixed)** (1.80 x 20,000)	36,000	36,000	36,000
	25,80,000	20,14,000	23,53,600

*Selling Expenses: Fixed cost per unit = ₹15 x 20% =

₹ 3 Fixed Cost = ₹ 3 x 20,000 units = ₹ 60,000

Variable Cost Per unit = ₹ 15 – ₹ 3 = ₹ 12

**Distribution Expenses: Fixed cost per unit = ₹ 12 x 15% =

₹ 1.80

Fixed Cost = ₹ 1.80 x 20,000 units = ₹ 36,000

Variable cost per unit = ₹ 12 – ₹ 1.80 = ₹ 10.20

Q. 3. M/s NNSG Ltd, specialized in manufacturing of piston rings for motor vehicle. It has prepared budget for 8,000 units per annum at budgeted cost of ₹ 21,64,400 as detailed below:

	(₹)	(₹)
Fixed cost (Manufacturing)		2,28,000
Variable costs:		
Power	18,000	
Repairs, etc.	16,000	
Other variable cost	6,400	
Direct material	6,16,000	
Direct labour	12,80,000	19,36,400
		21,64,400

Considering the possible impact on sales turnover by market trends, the company decides to prepare flexible budget with a production target of 4,000 and 6,000 units. On behalf of the company you are required to prepare a flexible budget for production levels at 50% and 75%.

Assuming the selling price per unit is maintained at ₹ 400 as at present, indicate the effect on net profit. Administration, selling and distribution overheads continue at ₹ 72,000.

Ans. Flexible Budget

Activity Level	**50%**	**75%**	**100%**
Production (units)	**4,000**	**6,000**	**8,000**
	(₹)	**(₹)**	**(₹)**
Sales @ ₹ 400 per unit	16,00,000	24,00,000	32,00,000
Variable costs :			
Direct Materials	3,08,000	4,62,000	6,16,000
Direct Labour	6,40,000	9,60,000	12,80,000
Power	9,000	13,500	18,000
Repairs etc.	8,000	12,000	16,000
Other variable cost	3,200	4,800	6,400
Total Variable Costs:	9,68,200	14,52,300	19,36,400
Fixed costs :			
Manufacturing	2,28,000	2,28,000	2,28,000
Administration, Selling and Distribution	72,000	72,000	72,000
Total Fixed Costs:	3,00,000	3,00,000	3,00,000
Total Costs	12,68,200	17,52,300	22,36,400
Profit (Sales – Variable Cost) – Fixed Cost	3,31,800	6,47,700	9,63,600

Q. 4. 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 ₹ 2,85,700 is incurred and sold through dealers at an uniform selling price of ₹ 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)
	5,230	5,620	7,240
No. of units required for	20,920 (5,230 × 4 units)	22,480 (5,620 × 4 units)	28,960 (7,240 × 4 units)
production 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*	₹3,46,150	₹3,46,150	₹3,46,150	
Sales Revenue (₹ in lakh)	13,846	12,115.25	15,576.75	41,538
Less: Cost of Sales (₹ in lakh) (Sales unit × Cost per unit)	11,428	9,999.50	12,856.50	34,284
Gross Profit (₹ in lakh)	2,418	2,115.75	2,720.25	7,254

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

Q. 5 G Ltd. manufactures two products called 'M' and 'N'. Both products use a common raw material Z. The raw material Z is purchased @ ₹ 36 per kg from the market. The company has decided to review inventory management policies for the forthcoming year.

The following forecast information has been extracted from departmental estimates for the year ended 31st March 2016 (the budget period):

	Product M	Product N
Sales (units)	28,000	13,000
Finished goods stock increase by year-end	320	160
Post-production rejection rate (%)	4	6
Material Z usage (per completed unit, net of wastage)	5 kg	6 kg
Material Z wastage (%)	10	5

Additional information:

- Usage of raw material Z is expected to be at a constant rate over the period.
- Annual cost of holding one unit of raw material in stock is 11% of the material cost.
- The cost of placing an orders is ₹ 320 per order.
- The management of G Ltd. has decided that there should not be more than 40 orders in a year for the raw material Z.

Required:

(a) Prepare functional budgets for the year ended 31st March 2016 under the following headings:

(i) Production budget for Products M and N (in units).

(ii) Purchases budget for Material Z (in kgs and value).

(b) Calculate the Economic Order Quantity for Material Z (in kgs).

(c) If there is a sole supplier for the raw material Z in the market and the supplier do not sale more than 4,000 kg. of material Z at a time. Keeping the management purchase policy and production quantity mix into consideration, calculate the maximum number of units of Product M and N that could be produced.

Ans.

(a) (i) Production Budget (in units) for the year ended 31st March 2016

	Product M	Product N
Budgeted sales (units)	28,000	13,000
Add: Increase in closing stock No. good units to be produced Post production rejection rate No. of units to be produced	320	160
	28,320	13,160
	4%	6%
	29,500 $\left(\frac{28,320}{0.96}\right)$	14,000 $\left(\frac{13,160}{0.94}\right)$

(i) Purchase budget (in kgs and value) for Material Z

	Product M	Product N
No. of units to be produced	29,500	14,000
Usage of Material Z per unit of production Material needed for production	5 kg.	6 kg.
	1,47,500 kg.	84,000 kg.
Materials to be purchased	1,63,889 kg. $\left(\frac{1,47,500}{0.90}\right)$	88,421 kg. $\left(\frac{84,000}{0.95}\right)$
Total quantity to be purchased	2,52,310 kg.	
Rate per kg. of Material Z	₹ 36	
Total purchase price	₹ 90,83,160	

(b) Calculation of Economic Order Quantity for Material Z

$$EOQ = \sqrt{\frac{2 \times 2,52,310 \text{ kg} \times Rs.320}{Rs.36 \times 11\%}} = \sqrt{\frac{16,14,78,400}{Rs.3.96}} = 6,385.72 \text{ kg.}$$

(c) Since, the maximum number of order per year cannot be more than 40 orders and the maximum quantity per order that can be purchased is 4,000 kg. Hence, the total quantity of Material Z that can be available for production:

= 4,000 kg. × 40 orders = 1,60,000 kg.

	Product M	Product N
Material needed for production to maintain the same production mix	1,03,929 kg. $\left(1,60,000 \times \frac{1,63,889}{2,52,310}\right)$	56,071 kg. $\left(1,60,000 \times \frac{88,421}{2,52,310}\right)$
Less: Process wastage	10,393 kg.	2,804 kg.
Net Material available for production	93,536 kg.	53,267 kg.
Units to be produced	18,707 units $\left(\frac{93,536 \text{ kg}}{5 \text{ kg}}\right)$	8,878 units $\left(\frac{53,267 \text{ kg}}{6 \text{ kg}}\right)$

STANDARD COSTING

Q. 1. KPR Limited operates a system of standard costing in respect of one of its products which is manufactured within a single cost centre. The Standard Cost Card of a product is as under:

Standard		Unit cost (₹)
Direct material	5 kg. @ ₹ 4.20	21.00
Direct labour	3 hours @ ₹ 3.00	9.00
Factory overhead	₹ 1.20 per labour hour	3.60
	Total manufacturing cost	33.60

The production schedule for the month of June, 2013 required completion of 40,000 units. However, 40,960 units were completed during the month without opening and closing work-in- process inventories.

Purchases during the month of June, 2013, 2,25,000 kg. of material at the rate of ₹ 4.50 per kg. Production and Sales records for the month showed the following actual results.

Material used	2,05,600 kg.
Direct labour 1,21,200 hours; cost incurred	₹ 3,87,840
Total factory overhead cost incurred	₹ 1,00,000
Sales	40,000 units

Selling price to be so fixed as to allow a mark-up of 20 per cent on selling price.

Required:

(i) Calculate material variances based on consumption of material.

(ii) Calculate labour variances and the total variance for factory overhead.

(iii) Prepare Income statement for June, 2013 showing actual gross margin.

(iv) An incentive scheme is in operation in the company whereby employees are paid a bonus of 50% of direct labour hour saved at standard direct labour hour rate. Calculate the Bonus amount.

Ans. (i) Material variances:

(a) Direct Material Cost Variance = Standard Cost – Actual Cost

= (40,960 units × 5 kg.× ₹ 4.20) – (2,05,600 kg.× ₹ 4.50)

= ₹ 8,60,160 – ₹ 9,25,200 = ₹ 65,040 (A)

(b) Material Price Variance = Actual Qty. (Std. Price – Actual Price)

= 2,05,600* kg. (₹ 4.20 – ₹ 4.50) = ₹ 61,680 (A)

(*Material variances are calculated on the basis of consumption)

(c) Material Usages Variance = Std. Price (Std. Qty. – Actual Qty.)

= ₹ 4.20 (40,960 units x 5 kg. – 2,05,600 kg.)

= ₹ 3,360 (A)

(ii) Labour Variances and Overhead Variances:

(a) Labour Cost Variance = Standard cost – Actual cost

= (40,960 units × 3 hours × ` 3) – ₹ 3,87,840

= ₹ 19,200 (A)

(b) Labour Rate Variance = Actual Hours (Std. Rate – Actual Rate)

= 1,21,200 hours (₹ 3 – ₹ 3.20)

= ₹ 24,240 (A)

(c) Labour Efficiency Variance = Std. Rate (Std. Hour – Actual Hour)

= ₹ 3 (40,960 units × 3 hour – 1,21,200 hour)

= ₹ 5,040 (F)

(d) Total Factory Overhead Variance

= Factory Overhead Absorbed – Actual Factory Overhead

= (Actual Hours × Std. Rate) – Actual Factory Overhead

= (40,960 units × 3 hours ×₹ 1.20) – ₹ 1,00,000

= ₹ 47,456 (F)

(iii) Preparation of Income Statement

Calculation of unit selling price	**(₹)**
Direct material	21.00
Direct labour	9.00
Factory overhead	3.60
Factory cost	33.60
Margin 25% on factory cost	8.40
Selling price	42.00

Income Statement

	(₹)	(₹)
Sales (40,000 units × ₹ 42)		16,80,000
Less: Standard cost of goods sold (40,000 units × ₹ 33.60)		13,44,000
		3,36,000
Less: Adverse Variances:		
Material Price variance	61,680	
Material Usage variance	3,360	

Labour Rate variance	24,240	89,280
		2,46,720
Add: Favourable variances:		
Labour efficiency variance	5,040	
Factory overhead	47,456	52,496
Actual gross margin		2,99,216

(Iv)

Labour hour saved	**(₹)**
Standard labour hours (40,960 units x 3 hours)	1,22,880
Actual labour hour worked	1,21,200
Labour hour saved	1,680

Bonus for saved labour = 50% (1,680 hours x ₹ 3) = ₹ 2,520.

Q. 2. Gama Ltd. has furnished the following standard cost data per' unit of production: Material 10 kg @ ₹ 10 per kg.

Labour 6 hours @ ₹ 5.50 per hour

Variable overhead 6 hours @ ₹10 per hour.

Fixed overhead ₹ 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 ₹ 5,25,000.

Labour paid ₹ 1,55,000 for 31,000 hours worked

Variable overheads ₹ 2,93,000

Fixed overheads ₹ 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.

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

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

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

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

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

= ₹ 4.80,000 – ` 5,25,000

= ₹ 45,000 (A)

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

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

= ₹ 1,58,400 – ` 1,55,000

= ₹ 3,400 (F)

(iii) Fixed Overhead Cost Variance = (Budgeted Rate × Actual Qty) – Actual Overhead

= (₹ 90 x 4,800 units) – ₹ 4,70,000

= ₹ 38,000 (A)

OR = (Budgeted Rate × Std. Hours) – Actual Overhead

= (₹ 15 x 4,800 units × 6 hours) – ₹ 4,70,000

= ₹ 38,000 (A)

(iv) Variable Overhead Cost Variance= (Std. Rate × Std. Hours) – Actual Overhead

= (4,800 units × 6 hours × ₹ 10) - ₹ 2,93,000

= ₹ 2,88,00 - ₹ 2,93,000

= ₹ 5,000 (A)

Q. 3. Following are the details of the product Phomex for the month of April 2013:

Standard quantity of material required per unit	5 kg
Actual output	1000 units
Actual cost of materials used	₹ 7,14,000
Material price variance	₹ 51,000 (Fav)

Actual price per kg of material is found to be less than standard price per kg of material by ` 10. You are required to calculate:

(i) Actual quantity and Actual price of materials used.

(ii) Material Usage Variance

(iii) Material Cost Variance.

Ans. (i) Actual Quantity and Actual Price of material used

Material Price Variance = Actual Quantity (Std. Price – Actual Price) = ₹ 51,000

Or, AQ (SP – AP) = ₹ 51,000

Or, 10 AQ = ₹ 51,000

Or, AQ = 5,100 kgs

Actual cost of material used is given i.e.

AQ x AP = ₹ 7,14,000

Or, 5,100 AP = ₹ 7,14,000

AP = ₹ 140

∵ Actual price is less by ` 10

So, Standard Price = ₹ 140 + ₹ 10 = ₹ 150 per kg

Actual Quantity = 5,100 kgs

Actual Price = ₹ 140/kg

(ii) Material Usage Variance

Std. Price (Std. Quantity – Actual Quantity)

Or, SP (SQ – AQ) = ₹ 150 (1,000 units x 5 kg – 5,100 kg)

= ₹ 15,000 (A)

(iii) Material Cost Variance = Std. Cost – Actual Cost

= (SP x SQ) – (AP x AQ)

= ₹ 150 x 5,000 – ₹ 140 x 5,100

= ₹ 7,50,000 – ₹ 7,14,000

= ₹ 36,000 (F)

OR

Material Price Variance + Material Usage Variance

₹ 51,000 (F) + ₹ 15,000 (A)= ₹ 36,000 (F)

MARGINAL COSTING

Q. 1. A company produces single product which sells for ₹ 20 per unit. Variable cost is ₹ 15 per unit and Fixed overhead for the year is ₹ 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 ₹ 60,000.

Ans. (a) Suppose Sales units are x then S = V + F + P

S = V + F + P

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

₹ 20x = ₹ 15x + ₹ 6,30,000 + ₹ 2x

₹ 20x – ₹17x = ₹ 6,30,000

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

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

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

$$\text{BEP (Units)} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

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

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

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

$$\frac{\text{Rs.5}}{\text{Rs.20}} \text{ x } 100 = 25\%$$

$$\text{Where. P/V Ratio} = \frac{\text{Contribution per unit}}{\text{Sales Price}} \text{ x } 100 \text{ Cr.}$$

$$\text{Margin of Safety Sales} = \frac{\text{Rs.50,000}}{25\%} = \text{Rs.2,40,000}$$

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

Q. 2. A company has fixed cost of ₹ 90,000, Sales ₹ 3,00,000 and Profit of ₹ 60,000

Required:

(i) Sales volume if in the next period, the company suffered a loss of ₹ 30,000.

(ii) What is the margin of safety for a profit of ₹ 90,000?

Ans.

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{P/V Ratio}} \times 100 \left(\frac{\text{Rs.1,50,000}}{\text{Rs.3,00,000}} \times 100\right) = 50\%$$

(i) If in the next period company suffered a loss of ₹ 30,000, then Contribution = Fixed Cost + Profit

= ₹ 90,000 – ₹ 30,000 (as it is a loss) = ₹ 60,000.

$$\text{Then Sales} = \frac{\text{Contribution}}{\text{P/V Ratio}} \text{ or } \frac{60,000}{50\%} = \text{Rs,1,20,000}$$

So, there will be loss of ₹ 30,000 at sales of ₹ 1,20,000.

(ii) $$\text{Marginof Safety} = \frac{\text{Profit}}{\text{P/V Ratio}} \quad \text{Or,} \quad \frac{\text{Rs.90,000}}{50\%} = \text{Rs.1,80,00}$$

Alternative solution of this part:

$$\text{Break even Sales} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{\text{Rs.90,000}}{50\%} = \text{Rs.1,80,000}$$

$$\text{Sales of Profit of Rs.90,000} = \frac{\text{Fixed Cost + Profit}}{\text{PV Ratio}}$$

$$= \frac{\text{Rs.90,000 + Rs.90,000}}{50\%} = \frac{\text{Rs.1,80,000}}{50\%} = \text{Rs.3,60,000}$$

Margin of Safety = Sales – Break-even Sales

= 3,60,000 – 1,80,000 = ₹ 1,80,000

Q. 3. PQ Ltd. reports the following cost structure at two capacity levels:

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

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

Ans. Computation of Break-even point in units:

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

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

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

Sales - 24,000 units @ ₹ 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 ₹ 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.

Ans. 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 ₹ 200 = ₹ 24,00,000

(i) We know that Break even sales $= \frac{\text{Fixed Cost}}{\text{PVRatio}}$

Or, Rs.2,40,000 $= \frac{\text{Fixed Cost}}{25\%}$

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

= Rs.6,00,000

(ii) Contribution for the year = (24,000 units x Rs.200) x 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 ₹11,00,000

Hence, Target contribution = Target Profit + Fixed Cost

= ₹ 11,00,000 + ₹ 6,00,000

= ₹ 17,00,000

Contribution per unit = 25% of ₹ 200 = ₹ 50 per unit

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

So, 34,000 units to be sold to earn a target net profit of ₹ 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

$$\text{Desired Sales} = \frac{\text{Fixed Cost + Desired Profit}}{\text{PV Ratio}}$$

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

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

or, 0.05 x = 6,00,000

or, x = ₹ 1,20,00,000

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

(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 ₹ x and fixed cost and variable cost per unit remain unchanged i.e. ₹ 6,00,000 and ₹ 150 respectively.

Break - even point: Sales revenue = Total cost

8,000 x = 8,000 × ₹ 150 + ₹ 6,00,000

Or, 8,000 x = ₹ 12,00,000 + ₹ 6,00,000

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

∴ Selling Price should be ₹ 225

Hence, selling price per unit shall be ₹ 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	₹ 2,30,000
General & Administration Overhead	2% of Cost of Goods Sold	₹ 71,000
Selling & Distribution Overhead	4% of Cost of Sales	₹ 68,000

Last Year 5,000 units were sold at ₹ 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

Ans. Working Notes:

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

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

Or COGS = 0.57 COGS + ₹ 3,01,000

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

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

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

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

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

(ii) Calculation of Variable Costs:

Direct Material-	(0.3 × ₹ 7,00,000)	₹ 2,10,000
Direct Labour-	(0.15 × ₹ 7,00,000)	₹ 1,05,000
Factory Overhead-	(0.10 × ₹ 7,00,000)	₹ 70,000

General & Administration OH-	(0.02 × ₹ 7,00,000)	₹ 14,000
Selling & Distribution OH	(0.04 × ₹ 8,00,000)	**₹ 32,000**
		₹ 4,31,000

(iv) Calculation of total Fixed Costs:

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

(v) Calculation of PV Ratio:

$$\text{PV Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Sales - Variables Costs}}{\text{Sales}} \times 100$$

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

(a) $\text{Break-EvenSales} = \frac{\text{Fixed Cost}}{\text{PV Ratio}} = \frac{\text{Rs.3,69,000}}{53.41\%} = \text{Rs.6,90,882}$

(b) Profit earned during the last year

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

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

= ₹ 1,25,000

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

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

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

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

= ₹ 4,44,600 - ₹ 3,69,000 = ₹ 75,600

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

Break-even Sales ₹ 400 crores

P/V Ratio 30 %

Margin of Safety ₹ 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 ₹ 50 crores, including depreciation on additions, but excluding interest on additional capital.

Additional capital of ₹ 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 ₹ 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

Ans. Working Notes:

1. Total Sales = Break -even Sales + Margin of Safety
   = ₹ 400 crores + ₹ 120 crores
   = ₹ 520 crores

2. Variable Cost = Total Sales × (1- P/V Ratio)
   = ₹ 520 crores × (1 – 0.3)
   = ₹ 364 crores

3. Fixed Cost = Break-even Sales × P/V Ratio
   = ₹ 400 crores × 30%
   = ₹ 120 crores

4. Profit = Total Sales – (Variable Cost + Fixed Cost)
   = ₹ 520 crores – (₹ 364 crores + ₹ 120 crores)
   = ₹ 36 crores

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

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

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

$$= \text{Rs.86071Crores}$$

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

= ₹ 120 crores + ₹ 50 crores + 15% of ₹ 100 crores

= ₹ 185 crores

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

Reduced selling price per unit = ₹ 100 × 90% = ₹ 90 Revised Variable Cost on Sales = 70%+ 2% = 72%

Variable Cost per unit= ₹ 90 × 72% = ₹ 64.80

Contribution per unit = ₹ 90 - ₹ 64.80 = ₹ 25.20

$$\text{Revised PV Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100$$

$$= \frac{25.2}{\text{Rs.90}} \times 100 = 28\%$$

(ii) (a) $$\text{Revised Break even Sales} = \frac{\text{Fixed Cost}}{\text{PV Ratio}} \times 100$$

$$= \frac{\text{Rs.185 Crores}}{28\%} \times 100 = \text{Rs.660.71 Crores}$$

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

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

= ₹ 860.71 crores - ₹ 660.71 crores

= ₹ 200 crores

Q. 7. SK Lit. is engaged in the manufacture of tyres. Analysis of income statement indicated a profit of ₹ 150 lakhs on a sales volume of 50,000 units. The fixed

costs are ₹ 850 lakhs which appears to be high. Existing selling price is ₹ 3,400 per unit. The company is considering to revise the profit target to ₹ 350 lakhs. You are required to compute –

(i) Break- even point at existing levels in units and in rupees.

(ii) The number of units required to be sold to earn the target profit.

(iii) Profit with 15% increase in selling price and drop in sales volume by 10%.

(iv) Volume to be achieved to earn target profit at the revised selling price as calculated in (ii) above, if a reduction of 8% in the variable costs and ₹ 85 lakhs in the fixed cost is envisaged.

Ans. Sales Volume 50,000 Units

Computation of existing contribution

Particulars	Per unit (₹)	Total (₹ In lakhs)
Sales	3,400	1,700
Fixed Cost	1,700	850
Profit	300	150
Contribution	2,000	1,000
Variable Cost	1,400	700

(i) Break even sales in units =

$$\frac{\text{Fixed Cost}}{\text{Contribution per unit}} = \frac{8,50,00,000}{2,000} = 42,500 \text{ units}$$

Break even sales in rupees = 42,500 units × ₹ 3,400 = ₹ 1,445 lakhs

OR

$$\text{P/V Ratio} = \frac{2,000}{3,400} \times 100 = 58.82\%$$

$$\text{BEP (Rupees)} = \frac{\text{FC}}{\text{P/V Ratio}} = \frac{8,50,00,000}{58.82\%} = \text{Rs.1.445 lakhs (approx.)*}$$

(ii) Number of units sold to achieve a target profit of ₹ 350 lakhs

Direct Contribution = Fixed Cost – Target Profit

= 850 L + 350 L = 1,200 L

$$\text{Number of units to be sold} = \frac{\text{Desired Combination}}{\text{Contribution per unit}} = \frac{12.00.00.000}{2,000} = 60,000 \text{units}$$

(iii) Profit if selling price is increased by 15% and sales volume drops by 10%:

Existing Selling Price per unit = ₹ 3,400

Revised selling price per unit = ₹ 3,400 x 115% = ₹ 3,910

Existing Sales Volume = 50,000 units

Revised sales volume = 50,000 units – 10% of 50,000 = 45,000 units.

Statement of profit at sales volume of 45,000 units @ ₹ 3910 per unit

Particulars	**Per unit (₹)**	**Total (₹ in lakhs)**
Sales	3,91,000	1,759.50
Less: Variable Costs	1,400.00	630.00
Contribution	2,510.00	1,129.50
Less: Fixed Cost		850.00
Profit		279.50

(iv) Volume to be achieved to earn target profit of ₹350 lakhs with revised selling price and reduction of 8% in variable costs and ₹85 lakhs in fixed cost:

Revised selling price per unit = ₹ 3,910

Variable costs per unit existing = ₹ 1,400

Revised Variable Costs

Reduction of 8% in variable costs = ₹ 1,400 – 8% of 1,400

= ₹ 1,400 – ₹ 112

= ₹ 1,288

Total Fixed Cost (existing) = ₹ 850 lakhs

Reduction in fixed cost = ₹ 85 lakhs

Revised fixed cost = ₹ 850 lakhs – ₹ 85 lakhs = ₹ 765 lakhs

Revised Contribution (unit) = Revised selling price per unit – Revised Variable Costs per units Revised Contribution per unit = ₹ 3,910 – ₹ 1,288 = ₹ 2,622

Desired Contribution = Revised Fixed Cost + Target Profit

= ₹ 765 lakhs + ₹ 350 lakhs = ₹ 1,115 lakhs

$$\text{No.of units to be sold} = \frac{\text{Desired Contribution}}{\text{Contribution per unit}} = \frac{\text{Rs.1.115 lakh}}{\text{Rs.2.622}} = 42{,}525 \text{ units}$$

Q. 8. A company gives the following information:

Margin of Safety	₹ 3,75,000
Total Cost	₹ 3,87,500
Margin of Safety (Qty.)	15,000 units
Break Even Sales in Units	5,000 units

You are required to calculate:

(i) Selling price per unit

(ii) Profit

(iii) Profit/ Volume Ratio

(iv) Break Even Sales (in Rupees)

(v) Fixed Cost

Ans. (i) $\text{Selling Price per unit} = \frac{\text{Marginal Safety in Rupee Value}}{\text{Margin of Safety in Quality}}$

$= \frac{\text{Rs.3,75,000}}{\text{15,000 units}} = \text{Rs.25}$

(ii) Profit = Sales Value – Total Cost

= Selling price per unit × (BEP units + MoS units) – Total Cost

= ₹ 25 × (5,000 + 15,000) units – ₹ 3,87,500

= ₹ 5,00,000 – ₹ 3,87,500 = ₹ 1,12,500

(iii) $\text{Profit Volume (PV) Ratio} = \frac{\text{Profit}}{\text{Margin of Safety in Rupee Value}} x100$

$= \frac{\text{Rs.1,12,500}}{Rs.3,75,000} \times 100 = 30\%$

(iv) Break Even Sales (in Rupees) = BEP units × Selling Price per unit

= 5,000 units × ₹ 25 = ₹ 1,25,000

(v) Fixed Cost = Contribution – Profit

= Sales Value × P/V Ratio – Profit

= (₹ 5,00,000 × 30%) – ₹ 1,12,500

= ₹ 1,50,000 – ₹ 1,12,500 = ₹ 37,500