Chapter. 3: Overhead- Absorption Costing Method

Part-I: Primary and Secondary Distribution

A. QUESTION FROM STUDY MATERIAL

Question- 1: (Direct Re-distribution Method)

XL Ltd., has three production departments and four service departments. The expenses for these departments as per Primary Distribution Summary are as follows:

Production Departments:	**(₹)**	**(₹)**
A	30,00,000	
B	26,00,000	
C	24,00,000	80,00,000
Service Departments:	**(₹)**	**(₹)**
Stores	4,00,000	
Time-keeping and Accounts	3,00,000	
Power	1,60,000	
Canteen	1,00,000	9,60,000

The following information is also available in respect of the production departments:

	Dept. A	**Dept. B**	**Dept. C**
Horse power of Machine	300	300	200
Number of workers	20	15	15
Value of stores requisition in (₹)	2,50,000	1,50,000	1,00,000

PREPARE a statement apportioning the costs of service departments over the production departments.

Hints: ₹34,20,000, ₹29,00,000, ₹26,40,000

Question- 2 (Step Method)

Suppose the expenses of two production departments A and B and two service departments X and Y are as under:

	Amount (₹)	Apportionment Basis		
		Y	A	B
X	2,00,000	25%	40%	35%
Y	1,50,000	—	40%	60%
A	3,00,000			
B	3,20,000			

Hints: ₹ 46,000, ₹ 5,10,000

Question- 3 (Reciprocal- Simultaneous Equation)

Service departments' expenses

	(₹)
Boiler House	3,00,000
Pump Room	60,000
	3,60,000

The allocation is :

	Production Departments		Boiler House	Pump Room
	A	B		
Boiler House	60%	35%	–	5%
Pump Room	10%	40%	50%	–

Hints: A = ₹2,10,769, B = ₹1,49,231

Question- 4 (Reciprocal- Trial and Error Method / Repeated Distribution Method)

Sanz Ltd., is a manufacturing company having three production departments, 'A', 'B' and 'C' and two service departments 'X' and 'Y'. The following is the budget for December 20X3:

	Total (₹)	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Direct material		1,00,000	2,00,000	4,00,000	2,00,000	1,00,000
Direct wages		5,00,000	2,00,000	8,00,000	1,00,000	2,00,000
Factory rent	4,00,000					
Power	2,50,000					
Depreciation	1,00,000					
Other overheads	9,00,000					
Additional information:						
Area (Sq. ft.)		500	250	500	250	500
Capital value of assets (₹ lakhs)		20	40	20	10	10
Machine hours		1,000	2,000	4,000	1,000	1,000
Horse power of machines		50	40	20	15	25

A technical assessment of the apportionment of expenses of service departments is as under:

	A	B	C	X	Y
Service Dept. 'X' (%)	45	15	30	–	10
Service Dept. 'Y' (%)	60	35	–	5	–

Required:

(i) PREPARE a statement showing distribution of overheads to various departments.

(ii) PREPARE a statement showing re-distribution of service departments expenses to production departments using Trial and error method.

Hints:

	A	B	C
Trial & Error	₹8,48,200	₹6,50,500	₹7,51,300
Repeated Distribution	₹8,48,177	₹6,50,541	₹7,51,282

Question- 5

A Ltd., manufactures two products A and B. The manufacturing division consists of two production departments P_1 and P_2 and two service departments S_1 and S_2.

Budgeted overhead rates are used in the production departments to absorb factory overheads to the products. The rate of Department P_1 is based on direct machine hours, while the rate of Department P_2 is based on direct labour hours. In applying overheads, the pre-determined rates are multiplied by actual hours.

For allocating the service department costs to production departments, the basis adopted is as follows:

(i) Cost of Department S_1 to Department P_1 and P_2 equally, and

(ii) Cost of Department S_2 to Department P_1 and P_2 in the ratio of 2 : 1 respectively.

The following budgeted and actual data are available:
Annual profit plan data:
Factory overheads budgeted for the year:

Departments	P_1	25,50,000	S_1	6,00,000
	P_2	21,75,000	S_2	4,50,000

Budgeted output in units:
Product A 50,000; B 30,000.

Budgeted raw-material cost per unit:
Product A ₹ 120; Product B ₹ 150.

Budgeted time required for production per unit:

Department P_1 : Product A : 1.5 machine hours
Product B : 1.0 machine hour
Department P_2 : Product A : 2 Direct labour hours
Product B : 2.5 Direct labour hours

Average wage rates budgeted in Department P_2 are:
Product A - ₹ 72 per hour and Product B – ₹ 75 per hour.

All materials are used in Department P_1 only.

Actual data: (for the month of July, 20X8)
Units actually produced: Product A : 4,000 units
Product B : 3,000 units

Actual direct machine hours worked in Department P1:
On product A 6,100 hours, Product B 4,150 hours.

Actual direct labour hours worked in Department P_2:
on product A 8,200 hours, Product B 7,400 hours.

Costs actually incurred:

		Product A		Product B
		₹		₹
Raw materials		4,89,000		4,56,000
Wages		5,91,900		5,52,000
		₹		₹
Overheads: Department	P_1	2,31,000	S_1	60,000
	P_2	2,04,000	S_2	48,000

You are required to :

(i) COMPUTE the pre-determined overhead rate for each production department.

(ii) PREPARE a performance report for July, 20X8 that will reflect the budgeted costs and actual costs.

Hints:

(i) P1 = ₹30, P2 = ₹15

(ii) Budgeted Cost = ₹25,71,000, Actual Cost = ₹26,31,861

Question- 6 (Overhead & Cost Sheet)

In an engineering company, the factory overheads are recovered on a fixed percentage basis on direct wages and the administrative overheads are absorbed on a fixed percentage basis on factory cost.

The company has furnished the following data relating to two jobs undertaken by it in a period:

	Job 101 (₹)	Job 102 (₹)
Direct materials	54,000	37,500
Direct wages	42,000	30,000
Selling price	1,66,650	1,28,250
Profit percentage on Total Cost	10%	20%

Required:

(i) COMPUTATION of percentage recovery rates of factory overheads and administrative overheads.

(ii) CALCULATION of the amount of factory overheads, administrative overheads and profit for each of the two jobs.

(iii) Using the above recovery rates FIX the selling price of job 103. The additional data being:

Direct materials	₹ 24,000
Direct wages	₹ 20,000
Profit percentage on selling price	12-½%

Hints:

(i) Factory overhead = 60%, Administrative overhead = 25%

(ii)

	Job 101 (₹)	Job 102 (₹)
SP	₹1,66,650	₹1,28,250
Profit	₹15,150	₹21,375

(iii) SP for Job 103 = ₹80,000

Question- 7 (Overhead & Cost Sheet)

A company which sells four products, some of them unprofitable, proposes discontinuing the sale of one of them. The following information is available regarding income, costs and activity for the year ended 31st March, 20X9.

	Products			
	A	B	C	D
Sales (₹)	30,00,000	50,00,000	25,00,000	45,00,000
Cost of sales (₹)	20,00,000	45,00,000	21,00,000	22,50,000
Area of storage (Sq.ft.)	50,000	40,000	80,000	30,000
Number of parcels sent	1,00,000	1,50,000	75,000	1,75,000
Number of invoices sent	80,000	1,40,000	60,000	1,20,000

Selling and Distribution overheads and the basis of allocation are:

	(₹)	Basis of allocation to products
Fixed Costs		
Rent & Insurance	3,00,000	Square feet
Depreciation	1,00,000	Parcel
Salesmen's salaries & expenses	6,00,000	Sales Volume
Administrative wages and salaries	5,00,000	No. of invoices
Variable Costs:		
Packing wages & materials	₹ 2 per parcel	
Commission	4% of sales	
Stationery	₹ 1 per invoice	

You are required to PREPARE Costing Profit & Loss Statement, showing the percentage of profit or loss to sales for each product.

Hints:

Product	A	B	C	D
% of Profit	9.5	(12.10)	(8.80)	26.4

TEST YOUR KNOWLEDGE

Question-1

The ABC Company has the following account balances and distribution of direct Charges on 31st March, 20X1.

	Total	Production Depts.		Service Depts.	
		Machine shop	Packing	Gen. Plant	Store & Maintenance
	(₹)	(₹)	(₹)	(₹)	(₹)
Allocated Overheads :					
Indirect labour	14,650	4,000	3,000	2,000	5,650
Maintenance material	5,020	1,800	700	1,020	1,500
Misc. supplies	1,750	400	1,000	150	200
Superintendent's salary	4,000	–	–	4,000	–
Cost & payroll salary	10,000	–	–	10,000	–
Overheads to be apportioned:					
Power	8,000				
Rent	12,000				
Fuel and heat	6,000				
Insurance	1,000				
Taxes	2,000				
Depreciation	1,00,000				
	1,64,420	6,200	4,700	17,170	7,350

The following data were compiled by means of the factory survey made in the previous year:

	Floor Space	Radiator Sections	No. of Employees	Investment ₹	H.P hours
MachineShop	2,000 Sq.ft.	45	20	640,000	3,500
Packing	800 ””	90	10	200,000	500
GeneralPlant	400 ””	30	3	10,000	–
Store&Maint.	1,600 ””	60	5	150,000	1,000
	4,800 ””	225	38	1,000,000	5,000

Expenses charged to the stores and maintenance departments are to be distributed to the other departments by the following percentages:

Machine shop 50%; Packing 20%; General Plant 30%; General Plant overheads is distributed on the basis of number of employees:

(a) PREPARE an overhead distribution statement with supporting schedules to show computations and basis of distribution including distribution of the service department expenses to producing department.

(b) DETERMINE the service department distribution by the method of continued distribution. Carry through 3 cycles. Show all calculations to the nearest rupees.

Hints:

	Machine	Packing	General	Stock
Primary Distribution	83,920	30,500	20,000	30,000
Secondary Distribution	1,18,396	46,024	-	-

Question-2

Modern Manufactures Ltd. has three Production Departments P1, P2, P3 and two Service Departments S1and S2 details pertaining to which are as under:

	P_1	P_2	P_3	S_1	S_2
Direct wages (₹)	3,000	2,000	3,000	1,500	195
Working hours	3,070	4,475	2,419	–	–
Value of machines (₹)	60,000	80,000	1,00,000	5,000	5,000
H.P. of machines	60	30	50	10	–

Light points	10	15	20	10	5
Floor space (sq. ft.)	2,000	2,500	3,000	2,000	500

The following figures extracted from the Accounting records are relevant:

	(₹)
Rent and Rates	5,000
General Lighting	600
Indirect Wages	1,939
Power	1,500
Depreciation on Machines	10,000
Sundries	9,695

The expenses of the Service Departments are allocated as under:

	P1	P2	P3	S1	S2
S1	20%	30%	40%	-	10%
S2	40%	20%	30%	10%	-

Find out the total cost of product X which is processed for manufacture in the depts. P1, P2 and P3 for 4,5 and 3 hours respectively, given that its direct material cost is ₹50 and Direct Labour cost is ₹30.

Hints:

	P1	P2	P3	S1	S2
Primary Distribution	7,700	7,300	9,800	4,700	929
Secondary Distribution	9,233.52	9,035.02	12,160.46	-	-

Question-3

Deccan manufacturing Ltd. Have three dept. which are regarded as production dept. Service departments' cost are distribution to these production departments using the "Step Ladder Method" of distribution. Estimates of factory overheads costs to be incurred by each department on the forthcoming year are as follow.

Data required for the distribution is also shown against each department.

Department	Factory overhead (₹)	Direct labour hours	No. of employees	Area in sq.m.
Production:				
X	1,93,000	4,000	100	3,000
Y	64,000	3,000	125	1,500
Z	83,000	4,000	85	1,500
Service:				
P	45,000	1,000	10	500
Q	75,000	5,000	50	1,500
R	1,05,000	6,000	40	1,000
S	30,000	3,000	50	1,000

The overhead costs of the four service departments are distributed in the same order, viz., P, Q, R and S respectively on the following basis.

Department	Basis
P	Number of employees
Q	Direct labour hours
R	Area in square metres
S	Direct labour hours

You are required to:

1. Prepare a schedule showing the distribution of overhead costs of the four service departments to the three production departments; and
2. Calculate the overhead recovery rate per direct labour hour for each of the three production departments.

Hints:

X = 3,00,000, 75

Y = 1,35,000, 45

Z = 1,60,000, 40

Question-4

The ABC Company has the following account balances and distribution of direct charges on 31st March.

	Total	Production Depts.		Service Depts.	
		Machine shop	Packing	Gen. Plant	Store & Maintenance
	(₹)	(₹)	(₹)	(₹)	(₹)
Allocated Overheads:					
Indirect labour	14,650	4,000	3,000	2,000	5,650
Maintenance material	5,020	1,800	700	1,020	1,500
Misc. supplies	1,750	400	1,000	150	200
Superintendent's salary	4,000	–	–	4,000	–
Cost & payroll salary	10,000	–	–	10,000	–
Overheads to be apportioned:					
Power	8,000				
Rent	12,000				
Fuel and heat	6,000				
Insurance	1,000				
Trade License fees	2,000				
Depreciation	1,00,000				
	1,64,420	6,200	4,700	17,170	7,350

The following data were compiled by means of the factory survey made in the previous year:

	Floor Space (Sqft)	Radiator Sections	No. of Employees	Investment (₹)	H.P hours
Machine Shop	2,000	45	20	6,40,000	3,500
Packing	800	90	10	2,00,000	500
General Plant	400	30	3	10,000	-
Store	1,600	60	5	1,50,000	1,000

& Maintenance					
	4,800	**225**	**38**	**10,00,000**	**5,000**

Expenses charged to the stores and maintenance departments are to be distributed to the other departments by the following percentages:

Machine shop 50%; Packing 20%; General Plant 30%; General Plant overheads is distributed on the basis of number of employees:

(a) PREPARE an overhead distribution statement with supporting schedules to show computations and basis of distribution including distribution of the service departments' expense to production departments.

(b) DETERMINE the service department distribution by the method of continued distribution (repeated distribution) through 3 cycles. Show all calculations to the nearest rupees.

Hints:

(a) Overhead Distribution Statement

Particulars	**Production Department**		**Service Department**	
	Machine	**Packing**	**General Plant**	**Stores & Maint.**
Total overheads	**83,920**	**30,500**	**20,000**	**30,000**

Schedule of Apportioned Expenses

Item	**Basis**	**Total Amount**	**Production Depts.**		**Service Depts.**	
			Machine shop	**Packing**	**Gen. Plant**	**Store & Maint.**
		(₹)	**(₹)**	**(₹)**	**(₹)**	**(₹)**
Total		1,29,000	77,720	25,800	2,830	22,650

(b) Distribution of Service Department Expenses

	Production Depts.		Service Depts.	
	Machineshop	Packing	Gen. Plant	Store & Maint.
	(₹)	(₹)	(₹)	(₹)
Total	1,18,397	46,023		

Question-5

A Ltd., manufactures two products A and B. The manufacturing division consists of two production departments P1 and P2 and two service departments S1 and S2. Budgeted overhead rates are used in the production departments to absorb factory overheads to the products. The rate of Department P1 is based on direct machine hours, while the rate of Department P2 is based on direct labour hours.

For allocating the service department costs to production departments, the basis adopted is as follows:

(i) Cost of Department S1 to Department P1 and P2 equally, and

(ii) Cost of Department S2 to Department P1 and P2 in the ratio of 2 : 1 respectively.

The following data relating to factory overheads budgeted for the year is available:

Production Departments		Service Departments	
P_1	P_2	S_1	S_2
₹ 25,50,000	₹ 21,75,000	₹ 6,00,000	₹ 4,50,000

Budgeted output in units:

Product A 50,000; B 30,000.

Budgeted time required for production per unit:

Department P1 : Product A : 1.5 machine hours
Product B : 1.0 machine hour

Department P2 : Product A : 2 Direct labour hours
Product B : 2.5 Direct labour hours

You are required to COMPUTE the pre-determined overhead rate for both the production departments.

Hints:

	P1	P2
Budgeted machine/ labour hour rate (₹)	30.00	15.00

B. PAST YEAR EXAM QUESTIONS

Nov.-20 Q2(b) 10 Marks

TEE Ltd. is a manufacturing company having three production departments 'P', 'Q' and 'R' and two service departments 'X' and 'Y' details pertaining to which are as under :

	P	Q	R	X	Y
Direct wages (₹)	5,000	1,500	4,500	2,000	800
Working hours	13,191	7,598	14,995	-	-
Value of machine (₹)	1,00,000	80,000	1,00,000	20,000	50,000
H.P. of machines	100	80	100	20	50
Light points (Nos.)	20	10	15	5	10
Floor space (sq. ft.)	2,000	2,500	3,500	1,000	1,000

The expenses are as follows:

	(₹)
Rent and Rates	10,000
General Lighting	600
Indirect Wages	3,450
Power	3,500
Depreciation on Machines	70,000
Sundries (apportionment on the basis of direct wages)	13,800

The expenses of Service Departments are allocated as under :

	P	Q	R	X	Y
X	45%	15%	30%	-	10%
Y	35%	25%	30%	10%	-

Product 'A' is processed for manufacture in Departments P, Q and R for 6, 5 and 2 hours respectively.

Direct Costs of Product A are:

Direct material cost is ₹ 65 per unit and Direct labour cost is ₹ 40 per unit.

You are Required to:

(i) Prepare a statement showing distribution of overheads among the production and service departments.

(ii) Calculate recovery rate per hour of each production department after redistributing the service departments costs.

(iii) Find out the Total Cost of a 'Product A'.

Solution:

(i) Statement showing distribution of Overheads

Primary Distribution Summary

Item of cost	Basis of apportionment	Total (₹)	P (₹)	Q (₹)	R (₹)	X (₹)	Y (₹)
Direct wages	Actual	2,800	--	--	--	2,000	800
Rent and Rates	Floor area (4:5:7:2:2)	10,000	2,000	2,500	3,500	1,000	1,000
General lighting	Light points (4:2:3:1:2)	600	200	100	150	50	100
Indirect wages	Direct wages (50:15:45:20:8)	3,450	1,250	375	1,125	500	200
Power	Horse Power ofmachines used(10:8:10:2:5)	3,500	1,000	800	1,000	200	500
Depreciation of machinery	Value of machinery (10:8:10:2:5)	70,000	20,000	16,000	20,000	4,000	10,000
Sundries	Direct wages (50:15:45:20:8)	13,800	5,000	1,500	4,500	2,000	800
Total		**1,04,150**	**29,450**	**21,275**	**30,275**	**9,750**	**13,400**

Secondary Distribution using simultaneous equation method:

Overheads of service cost centres

Let, X be the overhead of service cost centre X

Y be the overhead of service cost centre Y

X = 9,750 + 0.10 Y

Y = 13,400 + 0.10 X

Substituting the value of Y in X we get X = 9,750 + 0.10 (13,400 + 0.10 X)

X = 9,750 + 1,340 + 0.01 X

0.99 X = 11,090

∴ X = ₹ 11,202

∴ Y = 13,400 + 0.10 x 11,202

= ₹ 14,520.20

Secondary Distribution Summary

Particulars	Total (₹)	P (₹)	Q (₹)	R (₹)
Allocated and Apportioned over-heads as per primary distribution		29,450.00	21,275.00	30,275.00
X	11,202.00	5,040.90	1,680.30	3,360.60
Y	14,520.20	5,082.07	3,630.05	4,356.06
Total		39,572.97	26,585.35	37,991.66

(ii) Calculation of Overhead recovery rate per hour

	P (₹)	Q (₹)	R (₹)
Total overheads cost	**39,572.97**	**26,585.35**	**37,991.66**
Working hours	13,191	7,598	14,995
Rate per hour (₹)	**3**	**3.50**	**2.53**

(iii) Cost of Product A

	(₹)
Direct material	65.00
Direct labour	40.00
Prime cost	105.00
Production on overheads	
P 6 hours x ₹ 3 = ₹ 18	
Q 5 hours x ₹ 3.50 = ₹ 17.50	
R 2 hours x ₹ 2.53 = ₹ 5.06	40.56
Total cost	**145.56**

Note: Secondary Distribution can also be done using repeated distribution Method

Nov-18 Q5(b)(ii) 5Marks

M/s. NOP Limited has its own power plant and generates its own power. Information regarding power requirements and power used are as follows:

	Production Dept.		Service Dept.	
	A	B	X	Y
	(Horse power hours)			
Needed capacity production	20,000	25,000	15,000	10,000
Used during the quarter ended September 2018	16,000	20,000	12,000	8,000

During the quarter ended September 2018, costs for generating power amounted to ₹ 12.60 lakhs out of which ₹ 4.20 lakhs was considered as fixed cost.

Service department X renders services to departments A, B, and Y in the ratio of 6:4:2 whereas department Y renders services to department A and B in the ratio of 4: 1. The direct labour hours of department A and B are 67500 hours and 48750 hours respectively.

Required:

1. Prepare overheads distribution sheet.
2. Calculate factory overhead per labour hour for the dept. A and dept. B.

Solution:

1. Overheads distribution Sheet

Item	Basis	Total Amount (₹)	Production Departments		Service Departments	
			A (₹)	B (₹)	X (₹)	Y (₹)
Variable overheads (₹ 12.60 lakhs - ₹ 4.20 lakhs)	Horse Power hours used	8,40,000	2,40,000	3,00,000	1,80,000	1,20,000
Fixed Overheads	Horse power for Capacity production	4,20,000	1,20,000	1,50,000	90,000	60,000
Total Overheads		12,60,000	3,60,000	4,50,000	2,70,000	1,80,000
Service dept X allocated to A, B & Y	As per the ratio given 6:4:2	(2,70,000)	1,35,000	90,000		45,000
Service dept Y allocated to A & B	As per the ratio of 4:1	(1,80,000+ 4 5000 = 2,25,000)	1,80,000	45,000		
Total Overheads of Production departments			6,75,000	5,85,000		

2. Calculation of Factory overhead per labour hour

Item	Production Departments	
	A (₹)	B (₹)
Total overheads	6,75,000	5, 85,000
Direct labour hours	67,500	48,750
Factory overheads per hour	**10**	**12**

July-21 Q1(b)

SNS Trading Company has three Main Departments and two Service Departments. The data for each department is given below:

Departments Main Department:	Expenses (in ₹)	Area in (Sq. Mtr)	Number of Employees
Purchase Department	5,00,000	12	800
Packing Department	8,00,000	15	1700
Distribution Department	3,50,000	7	700
Service Departments:			
Maintenance Department	6,40,000	4	200
Personnel Department	3,20,000	6	250

The cost of Maintenance Department and Personnel Department is distributed on the basis of 'Area in Square Metres' and 'Number of Employees' respectively.

You are required to:

(i) Prepare a Statement showing the distribution of expenses of Service Departments to the Main Departments using the "Step Ladder method" of Overhead Distribution.

(ii) Compute the Rate per hour of each Main Department, given that, the Purchase Department, Packing Department and Distribution Department works for 12 hours a day, 24 hours a day and 8 hours a day respectively. Assume that there are 365 days in a year and there are no holidays.

Solution:

(i) Schedule Showing the Distribution of Expenses of Service Departments using Step ladder method.

	Main Department			Service Department	
	Purchase (₹)	Packing(₹)	Distribution (₹)	Maintenance (₹)	Personnel (₹)
Expenses	5,00,000	8,00,000	3,50,000	6,40,000	3,20,000
Distribution of Maintenance Department	1,92,000	2,40,000	1,12,000	(6,40,000)	96,000

(12:15:7:-:6)					
Distribution of Personnel Department (800:1700:700:-:-)	1,04,000	2,21,000	91,000	-	(4,16,000)
Total	7,96,000	12,61,000	5,53,000	-	-

(ii) Calculation of Expenses rate per hour of Main Department

	Purchase	Packing	Distribution
Total apportioned expenses (₹)	7,96,000	12,61,000	5,53,000
Total Hours worked	4,380 (12 x 365)	8,760 (24 x 365)	2,920 (8 x 365)
Expenses rate per hour (₹)	**181.74**	**143.95**	**189.38**

C. ADDITIONAL QUESTIONS FOR PRACTICE (PAST YEAR EXAM)

Question-1 (Old Course Practice Manual Q12)

E-books is an online book retailer. The Company has four departments. The two sales departments are Corporate Sales and Consumer Sales. The two support – departments are Administrative (Human Resources Accounting) and Information Systems each of the sales departments conducts merchandising and marketing operations independently.

The following data are available for October, 2013:

Departments	Revenues	Number of Employees	Processing time used (in minutes)
Corporate Sales	₹ 16,67,750	42	2,400
Consumer Sales	₹ 8,33,875	28	2,000
Administrative	--	14	400
Information system	--	21	1,400

Cost incurred in each of four departments for October, 2013 are as follow:

Corporate Sales	₹ 12,97,751
Consumer Sales	₹ 6,36,818
Administrative	₹ 94,510
Information systems	₹ 3,04,720

The company uses number of employees as a basis to allocate Administrative costs and processing time as a basis to allocate Information systems costs.

Required:

(i) Allocate the support department costs to the sales departments using the direct method.

(ii) Rank the support departments based on percentage of their services rendered to other support departments. Use this ranking to allocate support costs based on the step-down allocation method.

(iii) How could you have ranked the support departments differently?

(iv) Allocate the support department costs to two sales departments using the reciprocal allocation method.

Solution:

(i) Statement showing the allocation of support department costs to the sales departments (using the Direct Method)

Particulars	Basis of allocation	Sales department		Support department	
		Corporate sales (₹)	Consumer sales (₹)	Administrative (₹)	Informatio nsystems (₹)
Cost incurred		12,97,751	6,36,818	94,510	3,04,720
Re-allocation of cost of administrative department	Number of employees (6:4:–:–)	56,706	37,804	(94,510)	---

Re-allocation of costs of information systems department	Processing time (6:5:–:–)	1,66,211	1,38,509	---	(3,04,720)
Total		15,20,668	8,13,131		

(ii) Ranking of support departments based on percentage of their services rendered to other support departments

- Administration support department provides 23.077% ($\frac{21}{42 + 28 + 21} \times 100$) of its services to Information systems support department. Thus 23.077% of ₹94,510 = ₹ 21,810.

- Information system support department provides 8.33% ($\frac{400}{2,400 + 2,000 + 400} \times 100$) of its services to Administration support department. Thus 8.33% of ₹3,04,720 = ₹ 25,383.

Statement showing allocation of support costs
(By using step-down allocation method)

Particulars	Basis of allocation	Sales department		Support department	
		Corporate sales	Consumer sales	Administrative	Information systems.
		(₹)	(₹)	(₹)	(₹)
Cost incurred		12,97,751	6,36,818	94,510	3,04,720
Re-allocation of cost of administrative department	Number of employees (6:4:–:3)	43,620	29,080	(94,510)	21,810 3,26,530
Re-allocation of costs of information systems department	Processing time (6:5:–:–)	1,78,107	1,48,423		(3,26,530)
Total		15,19,478	8,14,321		

(iii) An alternative ranking is based on the rupee amount of services rendered to other service departments, using the rupee figures obtained under requirement (ii) This approach would use the following sequence of ranking.

- Allocation of information systems overheads as first (₹25,383 provided to administrative).
- Allocated administrative overheads as second (₹21,810 provided to information systems).

(iv) Working notes:

1. Percentage of services provided by each service department to other service department and sales departments.

Particulars	Service departments		Sale departments	
	Administrative	Information system	Corporate Sales	Consumer Sales
Administrative	–	23.08%	46.15%	30.77%
Information systems	8.33%	–	50%	41.67%

2. **Total cost of the support department:** (By using simultaneous equation method). Let AD and IS be the total costs of support departments Administrative and Information systems respectively. These costs can be determined by using the following simultaneous equations:

	AD	=	94,510 + 0.0833 IS
	IS	=	3,04,720 + 0.2308 AD
Or,	AD	=	94,510 + 0.0833 {3,04,720 + 0.2308 AD}
Or,	AD	=	94,510 + 25,383 + 0.01922 AD
Or,	0.98077AD	=	1,19,893
Or,	AD	=	₹1,22,243
and	IS	=	₹3,32,934

Statement showing the allocation of support department costs to the sales departments (Using reciprocal allocation method)

Particulars	Sales department	
	Corporate sales (₹)	Consumer sales (₹)
Costs incurred	12,97,751	6,36,818
Re-allocation of cost administrative department (46.16% and 30.77% of ₹1,22,243)	56,427	37,614
Re-allocation of costs of information systems department (50% and 41.67% of ₹3,32,934)	1,66,467	1,38,734
Total	15,20,645	8,13,166

Question-2 (Old Course Practice Manual Q13)

ABC Ltd. has three production departments P1, P2 and P3 and two service departments S1 and S2. The following data are extracted from the records of the Company for the month of October, 2013:

(₹)

Rent and rates	62,500
General lighting	7,500
Indirect Wages	18,750
Power	25,000
Depreciation on machinery	50,000
Insurance of machinery	20,000
Other Information:	

	P1	P2	P3	S1	S2
Direct wages (₹)	37,500	25,000	37,500	18,750	6,250
Horse Power of Machines used	60	30	50	10	
Cost of machinery (₹)	3,00,000	4,00,000	5,00,000	25,000	25,000

Floor space (Sq. ft)	2,000	2,500	3,000	2,000	500
Number of light points	10	15	20	10	5
Production hours worked	6,225	4,050	4,100	□	□

Expenses of the service departments S1 and S2 are reapportioned as below:

	P1	P2	P3	S1	S2
S1	20%	30%	40%	□	10%
S2	40%	20%	30%	10%	□

Required:

(i) Compute overhead absorption rate per production hour of each production department.

(ii) Determine the total cost of product X which is processed for manufacture in department P1, P2 and P3 for 5 hours, 3 hours and 4 hours respectively, given that its direct material cost is ₹ 625 and direct labour cost is ₹ 375.

Solution:

Primary Distribution Summary

Item of cost	Basis of apportionment	Total (₹)	P1 (₹)	P2 (₹)	P3 (₹)	S1 (₹)	S2 (₹)
Direct wages	Actual	25,000	--	--	--	18,750	6,250
Rent and Rates	Floor area (4 : 5 : 6 : 4 : 1)	62,500	12,500	15,625	18,750	12,500	3,125
General lighting	Light points (2 : 3 : 4 : 2 : 1)	7,500	1,250	1,875	2,500	1,250	625
Indirect wages	Direct wages (6 : 4 : 6 : 3 : 1)	18,750	5,625	3,750	5,625	2813	938
Power	Horse Power of machines used (6 : 3 : 5 : 1)	25,000	10,000	5,000	8,333	1,667	□

Depreciation of machinery	Value of machinery (12 : 16 : 20 : 1 : 1)	50,000	12,000	16,000	20,000	1,000	1,000
Insurance of machinery	Value of machinery (12 : 16 : 20 : 1 : 1)	20,000	4,800	6,400	8,000	400	400
		2,08,750	46,175	48,650	63,208	38,380	12,338

Overheads of service cost centres Let S1 be the overhead of service cost centre S1 and S2 be the overhead of service cost centre S2.

S1 = 38,380 + 0.10 S2

S2 = 12,338 + 0.10 S1

Substituting the value of S2 in S1 we get S1 = 38,380 + 0.10 (12,338 + 0.10 S1)

S1 = 38,380 + 1,233.80 + 0.01 S1

0.99 S1 = 39,613.80

∴S1 = ₹40,014.

∴S2 = 12,338 + 0.10 x 40,014.

= ₹16,339

Secondary Distribution Summary

Particulars	**Total (₹)**	**P1 (₹)**	**P2 (₹)**	**P3 (₹)**
Allocated and Apportioned over-heads as per primary distribution	1,58,033	46,175	48,650	63,208
S_1	40,014	8,003	12,004	16,006
S_2	16,339	6,536	3,268	4,902
		60,714	63,922	84,116

(i) Overhead rate per hour

	P1	*P2*	*P3*
Total overheads cost	₹60,714	₹63,922	₹84,116
Production hours worked	6,225	4,050	4,100
Rate per hour (₹)	₹9.75	₹15.78	₹20.52

(ii) Cost of Product X

	(₹)
Direct material	625.00
Direct labour	375.00
Prime cost	1,000.00
Production on overheads	
P_1 5 hours x ₹9.75 = 48.75	
P2 3 hours x ₹15.78 = 47.34	
P3 4 hours x ₹20.52 = 82.08 Factory cost	178.17
Factory cost	1,178.17

Question-3 (Old Course Practice Manual Q14)

A company has three production departments (M1, M2 and A1) and three service department, one of which Engineering service department, servicing the M1 and M2 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
A_1	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 of Machinery	7,200
-	Insurance of Building (Total building insurance cost for M1 is one third of annual premium)	3,240
-	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 at ₹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	05	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.

Solution:

(i) Summary of Apportionment of Overheads

(₹)

Items	Basis of Apportionment	Total Amount	Production Deptt.			Service Deptt.		
			M1	M2	A1	Store Service	Engineering Service	General Service
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	864	288

Insurance on Building	1/3rd to M1 Balance area basis (-:12:16:4:5:3)	3,240	1,080	648	864	216	270	162
Power	HP Hr% (10:7:1:-:2:-)	6,480	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.		
		M1	M2	A1	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 M1 and M2 (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

	M1	M2	A1
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	2.58	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

Question-4 (Old Course Practice Manual Q15)

The following account balances and distribution of indirect charges are taken from the accounts of a manufacturing concern for the year ending on 31st March, 2014:

Item	Total Amount	Production Departments			Service Departments	
	(₹)	X (₹)	Y (₹)	Z (₹)	A (₹)	B (₹)
Indirect Material	1,25,000	20,000	30,000	45,000	25,000	5,000
Indirect Labour	2,60,000	45,000	50,000	70,000	60,000	35,000
Superintendent's Salary	96,000	-	-	96,000	-	-
Fuel & Heat	15,000					
Power	1,80,000					
Rent & Rates	1,50,000					
Insurance	18,000					
Meal Charges	60,000					
Depreciation	2,70,000					

The following departmental data are also available:

	Production Departments			Service Departments	
	X	Y	Z	A	B
Area (Sq. ft.)	4,400	4,000	3,000	2,400	1,200
Capital Value of Assets (₹)	4,00,000	6,00,000	5,00,000	1,00,000	2,00,000
Kilowatt Hours	3,500	4,000	3,000	1,500	-

Radiator Sections	20	40	60	50	30
No. of Employees	60	70	120	30	20

Expenses charged to the service departments are to be distributed to other departments by the following percentages:

	X	Y	Z	A	B
Department A (%)	30	30	20	-	20
Department B (%)	25	40	25	10	-

Prepare an overhead distribution statement to show the total overheads of production departments after re-apportioning service departments' overhead by using simultaneous equation method. Show all the calculations to the nearest rupee.

Solution:

Primary Distribution of Overheads

Item	Basis	Total Amount (₹)	Production Departments			Service Departments	
			X (₹)	Y (₹)	Z (₹)	A (₹)	B (₹)

Indirect Material	Actual	1,25,000	20,000	30,000	45,000	25,000	5,000
Indirect Labour	Actual	2,60,000	45,000	50,000	70,000	60,000	35,000
Superintendent's Salary	Actual	96,000	-	-	96,000	-	-
Fuel & Heat	Radiator Sections {2:4:6:5:3}	15,000	1,500	3,000	4,500	3,750	2,250
Power	Kilowatt Hours {7:8:6:3:-}	1,80,000	52,500	60,000	45,000	22,500	-
Rent & Rates	Area (Sq. ft.) {22:20:15:12:6}	1,50,000	44,000	40,000	30,000	24,000	12,000
Insurance	Capital Value of Assets {4:6:5:1:2}	18,000	4,000	6,000	5,000	1,000	2,000
Meal Charges	No. of Employees {6:7:12:3:2}	60,000	12,000	14,000	24,000	6,000	4,000
Depreciation	Capital Value of Assets {4:6:5:1:2}	2,70,000	60,000	90,000	75,000	15,000	30,000
Total overheads		11,74,000	2,39,000	2,93,000	3,94,500	1,57,250	90,250

Re-distribution of Overheads of Service Department A and B

Total overheads of Service Departments may be distributed using simultaneous equation method

Let, the total overheads of A = a and the total overheads of B= b

a = 1,57,250 + 0.10 b (i)

or, 10a - b = 15,72,500 [(i) x10]

b = 90,250 + 0.20 a (ii)

or, -0.20a + b = 90,250

Solving equation (i) & (ii)

10a - b = 15,72,500

-0.20a + b = 90,250

9.8a = 16,62,750

a = 1,69,668

Putting the value of a in equation (ii), we get b = 90,250 + 0.20 x 1,69,668

b = 1,24,184

Secondary Distribution of Overheads

	Production Departments		
	X (₹)	Y (₹)	Z (₹)
Total overhead as per primary distribution	2,39,000	2,93,000	3,94,500
Service Department A (80% of 1,69,668)	50,900	50,900	33,934
Service Department B (90% of 1,24,184)	31,046	49,674	31,046
Total	3,20,946	3,93,574	4,59,480

Question-5 (Old Course Practice Manual Q16)

Arnav Ltd. has three production departments M, N and O and two service departments P and Q. The following particulars are available for the month of September, 2013:

	(₹)
Lease rental	35,000
Power & Fuel	4,20,000
Wages to factory supervisor	6,400
Electricity	5,600
Depreciation on machinery	16,100
Depreciation on building	18,000
Payroll expenses	21,000
Canteen expenses	28,000
ESI and Provident Fund Contribution	58,000

Followings are the further details available:

Particulars	M	N	O	P	Q
Floor space (square meter)	1,200	1,000	1,600	400	800
Light points (nos.)	42	52	32	18	16
Cost of machines (₹)	12,00,000	10,00,000	14,00,000	4,00,000	6,00,000
No. of employees (nos.)	48	52	45	15	25
Direct Wages (₹)	1,72,800	1,66,400	1,53,000	36,000	53,000
HP of Machines	150	180	120	-	-
Working hours (hours)	1,240	1,600	1,200	1,440	1,440

The expenses of service department are to be allocated in the following manner:

	M	N	O	P	Q
P	30%	35%	25%	-	10%
Q	40%	25%	20%	15%	-

You are required to calculate the overhead absorption rate per hour in respect of the three production departments.

Solution:

Primary Distribution Summary

Item of cost	Basis of apportionment	Total (₹)	Production Dept.			Service Dept.	
			M (₹)	N (₹)	O (₹)	P (₹)	Q (₹)
Lease rental	Floor space (6 : 5 : 8 : 2 : 4)	35,000	8,400	7,000	11,200	2,800	5,600
Power & Fuel	HP of Machines × Working hours (93: 144 : 72)	4,20,000	1,26,408	1,95,728	97,864	-	-
Supervisor's wages*	Working hours (31 : 40 : 30)	6,400	1,964	2,535	1,901	-	-

Electricity	Light points (21: 26: 16 : 9 : 8)	5,600	1,470	1,820	1,120	630	560
Depreciation on machinery	Value of machinery (6 : 5 : 7 : 2 : 3)	16,100	4,200	3,500	4,900	1,400	2,100
Depreciation on building	Floor space (6 : 5 : 8 : 2 : 4)	18,000	4,320	3,600	5,760	1,440	2,880
Payroll expenses	No. of employees (48: 52: 45: 15: 25)	21,000	5,448	5,903	5,108	1,703	2,838
Canteen expenses	No. of employees (48: 52: 45: 15: 25)	28,000	7,265	7,870	6,811	2,270	3,784
ESI and PF contribution	Direct wages (864: 832: 765: 180: 265)	58,000	17,244	16,606	15,268	3,593	5,289
		6,08,100	**1,76,719**	**2,44,562**	**1,49,932**	**13,836**	**23,051**

* Wages to supervisor is to be distributed to production departments only.

Let 'P' be the overhead of service department P and 'Q' be the overhead of service department Q.

P = 13,836 + 0.15 Q

Q = 23,051 + 0.10 P

Substituting the value of Q in P we get P = 13,836 + 0.15 (23,051 + 0.10 P)

P = 13,836 + 3,457.65 + 0.015 P

0.985 P = 17,293.65

$\therefore$ P = ₹ 17,557

$\therefore$ Q = 23,051 + 0.10 x 17,557

= ₹ 24,806.70 or ₹ 24,807

Secondary Distribution Summary

Particulars	Total (₹)	M (₹)	N (₹)	O (₹)
Allocated and Apportioned over-heads as per primary distribution	5,71,213	1,76,719	2,44,562	1,49,932
P (90% of ₹17,557)	15,801	5,267	6,145	4,389
Q (85% of ₹24,807)	21,086	9,923	6,202	4,961
		1,91,909	2,56,909	1,59,282

Overhead rate per hour

	M	N	O
Total overheads cost (₹)	1,91,909	2,56,909	1,59,282
Working hours	1,240	1,600	1,200
Rate per hour (₹)	154.77	160.57	132.74

Question-6 (Old Course Practice Manual Q18)

PQR Ltd has its own power plant, which has two users, Cutting Department and Welding Department. When the plans were prepared for the power plant, top management decided that its practical capacity should be 1,50,000 machine hours. Annual budgeted practical capacity fixed costs are ₹ 9,00,000 and budgeted variable costs are ₹ 4 per machine-hour. The following data are available:

	Cutting Department	Welding Department	Total
Actual Usage in 2012-13 (Machine hours)	60,000	40,000	1,00,000
Practical capacity for each department (Machine hours)	90,000	60,000	1,50,000

Required

(i) Allocate the power plant's cost to the cutting and the welding department using a single rate method in which the budgeted rate is calculated using practical capacity and costs are allocated based on actual usage.

(ii) Allocate the power plant's cost to the cutting and welding departments, using the dual - rate method in which fixed costs are allocated based on practical capacity and variable costs are allocated based on actual usage.

(iii) Allocate the power plant's cost to the cutting and welding departments using the dual- rate method in which the fixed-cost rate is calculated using practical capacity, but fixed costs are allocated to the cutting and welding department based on actual usage. Variable costs are allocated based on actual usage.

(iv) Comment on your results in requirements (i), (ii) and (iii).

Solution:

Working Notes:

1. Fixed practical capacity cost per machine hour:

Practical capacity (machine hours)	1,50,000
Practical capacity fixed costs (₹)	9,00,000
Fixed practical capacity cost per machine hour (₹ 9,00,000 ÷ 1,50,000 hours)	₹ 6

2. Budgeted rate per machine hour (using practical capacity):
= Fixed practical capacity cost per machine hour + Budgeted variable cost per machine hour
= ₹ 6 + ₹ 4 = ₹10

(i) Statement showing Power Plant's cost allocation to the Cutting & Welding departments by using single rate method on actual usage of machine hours.

	Cutting Department (₹)	Welding Department (₹)	Total (₹)

Power plants cost allocation byusing actual usage (machine hours) (Refer to Working Note 2)	6,00,000 (60,000 hours × ₹10)	4,00,000 (40,000 hours × ₹10)	10,00,000

(ii) Statement showing Power Plant's cost allocation to the Cutting & Welding departments by using dual rate method.

	Cutting Department (₹)	Welding Department (₹)	Total (₹)
Fixed Cost (Allocated on practical capacityfor each department i.e.): (90,000 hours : 60,000 hours)	5,40,000 ($\frac{₹\ 9,00,000 \times 3}{5}$)	3,60,000 ($\frac{₹\ 9,00,000 \times 2}{5}$)	9,00,000
Variable cost (Based on actual usage of machine hours)	2,40,000 (60,000 hours × ₹ 4)	1,60,000 (40,000 hours × ₹4)	4,00,000
Total cost	7,80,000	5,20,000	13,00,000

(iii) Statement showing Power Plant's cost allocation to the Cutting & Welding Departments using dual rate method

	Cutting Department (₹)	Welding Department (₹)	Total (₹)
Fixed Cost Allocation of fixed cost on actual usage basis (Refer to Working Note 1)	3,60,000 (60,000 hours × ₹ 6)	2,40,000 (40,000 hours × ₹ 6)	6,00,000
Variable cost (Based on actual usage)	2,40,000 (60,000 hours × ₹ 4)	1,60,000 (40,000 hours × ₹ 4)	4,00,000
Total cost	6,00,000	4,00,000	10,00,000

(iv) Comments:

Under dual rate method, under (iii) and single rate method under (i), the allocation of

fixed cost of practical capacity of plant over each department are based on single rate. The major advantage of this approach is that the user departments are allocated fixed capacity costs only for the capacity used. The unused capacity cost ₹ 3,00,000 (₹ 9,00,000 – ₹ 6,00,000) will not be allocated to the user departments. This highlights the cost of unused capacity.

Under (ii) fixed cost of capacity are allocated to operating departments on the basis of practical capacity, so all fixed costs are allocated and there is no unused capacity identified with the power plant.

Question-7 (Old Course Practice Manual Q19) (Overhead & Cost-Sheet)

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.

Solution:

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)	150 x	250 x

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

Total cost on the basis of sales is:

	Product A (₹)	**Product B (₹)**
Sales Less:	60,000	80,000
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

$150x + 340y + 1.5xy = 14,000$ … (i)

$\_150x \pm 240y \pm 1.5xy = \_ 12,000$ … (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%.

Question-8 (Old Course Practice Manual Q20) (Overhead & Budget)

Maximum production capacity of JK Ltd. is 5,20,000 units per annum. Details of estimated cost of production are as follows:

- Direct material ₹ 15 per unit.
- Direct wages ₹ 9 per unit (subject to a minimum of ₹ 2,50,000 per month).
- Fixed overheads ₹ 9,60,000 per annum.
- Variable overheads ₹ 8 per unit.
- Semi-variable overheads are ₹ 5,60,000 per annum up to 50 per cent capacity and additional ₹1,50,000 per annum for every 25 per cent increase in capacity or a part of it.

JK Ltd. worked at 60 per cent capacity for the first three months during the year 2013-14, but it is expected to work at 90 per cent capacity for the remaining nine months.

The selling price per unit was ₹ 44 during the first three months.

You are required, what selling price per unit should be fixed for the remaining nine months to yield a total profit of ₹15,62,500 for the whole year.

Solution:

Statement of Cost and Sales for the year 2013-14

(Maximum production capacity = 5,20,000 units per annum)

Particulars	First 3 months	Next 9 months	Total
Capacity utilized	60%	90%	
Production	$\frac{5,20,000 \times 3 \times 60\%}{12}$ = 78,000 units	$\frac{5,20,000 \times 9 \times 90\%}{12}$ = 3,51,000 units	4,29,000 units
	(₹)	(₹)	(₹)
Direct materials @ ₹15 per unit	11,70,000	52,65,000	64,35,000
Direct wages @ ₹ 9 per unit or ₹2,50,000 per month whichever ishigher.	7,50,000	31,59,000	39,09,000

Prime cost	(A)	19,20,000	84,24,000	1,03,44,000
Overheads				
Fixed		2,40,000	7,20,000	9,60,000
Variable @ ₹8 per unit		6,24,000	28,08,000	34,32,000
Semi Variable *(Refer to WorkingNote-1)*		1,77,500	6,45,000	8,22,500
Total overheads	(B)	10,41,500	41,73,000	52,14,500
Total Cost	(C) [(A + B)]	29,61,500	1,25,97,000	1,55,58,500
Profit during first 3 months(Bal. figure)		4,70,500		
Sales @ ₹44 per unit (78,000 x ₹ 44)		34,32,000		
Desired profit during next 9 months (₹15,62,500 – ₹4,70,500)	(D)		10,92,000	
Sales required for next 9 months ……	(E) [(C + D)]		1,36,89,000	
Total profit				15,62,500
Total Sales				1,71,21,000

Required selling price per unit for last 9 months = Total sales required for last 9 months / Units produced during last 9 months

= ₹1,36,89,000 = ₹39 per unit
3,51,000 units

Workings:

(1) Semi-variable overheads:

(a) For first 3 months at 60% capacity = ₹(5,60,000 + ₹1,50,000) x 3/12
= ₹7,10,000 x 3/12
= ₹1,77,500.

(b) For remaining 9 months at 90% capacity = ₹(5,60,000 + ₹3,00,000) x 9/12
= ₹8,60,000 x 9/12

= ₹ 6,45,000

Part-II: Machine Hour Rate

A. QUESTION FROM STUDY MATERIAL

Question- 8

A machine costing ₹ 1,00,00,000 is expected to run for 10 years. At the end of this period its scrap value is likely to be ₹ 9,00,000. Repairs during the whole life of the machine are expected to be ₹ 18,00,000 and the machine is expected to run 4,380 hours per year on the average. Its electricity consumption is 15 units per hour, the rate per unit being ₹ 5. The machine occupies one-fourth of the area of the department and has two points out of a total of ten for lighting. The foreman has to devote about one sixth of his time to the machine. The monthly rent of the department is ₹ 30,000 and the lighting charges amount to ₹ 8,000 per month. The foreman is paid a monthly salary of ₹ 19,200. FIND OUT the machine hour rate, assuming insurance is @ 1% p.a. and the expenses on oil, etc., are ₹ 900 per month.

Hints: MHR = ₹362.10

TEST YOUR KNOWLEDGE

Question-6

Gemini Enterprises undertakes three different jobs A, B and C. All of them require the use of a special machine and also the use of a computer. The computer is hired hired and the hire charges work out to ₹ 4,20,000 per annum. The expenses regarding the machine are estimated as follows:

	(₹)
Rent for the quarter	17,500
Depreciation per annum	2,00,000
Indirect charges per annum	1,50,000

During the first month of operation the following details were taken from the job register:

		Job		
		A	B	C
Number of hours the machine was used :				
(a)	Without the use of the computer	600	900	—
(b)	With the use of the computer	400	600	1,000

You are required to COMPUTE the machine hour rate:

(a) For the firm as a whole for the month when the computer was used and when the computer was not used.

(b) For the individual jobs A, B and C.

Hints: MHR = ₹27.5, ₹10

MHR for Job: A = ₹17, B = ₹17, C = ₹27.5

Question-7

A machine shop has 8 identical Drilling machines manned by 6 operators. The machine cannot be worked without an operator wholly engaged on it. The original cost of all these machines works out to ₹ 8 lakhs. These particulars are furnished for a 6 months period:

Normal available hours per month	208
Absenteeism (without pay) hours	18
Leave (with pay) hours	20
Normal idle time unavoidable-hours	10
Average rate of wages per worker for 8 hours a day.	₹ 20
Production bonus estimated	15% on wages
Value of power consumed	₹ 8,050
Supervision and indirect labour	₹ 3,300
Lighting and electricity	₹1,200

These particulars are for a year Repairs and maintenance including consumables 3% of value of machine, Insurance ₹4,000, Depreciation 10% of original cost, other sundry works expenses ₹12,000, General management expenses ₹54,530.

You are required to WORK OUT a comprehensive machine hour rate for the machine shop.

Hints: MRH = $\frac{₹1,37,480}{5760}$ = ₹23.87

Question-8

Job No. 198 was commenced on October 10, 20X8 and completed on November 1, 20X8. Materials used were ₹ 600 and labour charged directly to the job was ₹ 400. Other information is as follows:

Machine No. 215 used for 40 hours, the machine hour rate being ₹ 3.50.

Machine No. 160 used for 30 hours, the machine hour rate being ₹ 4.00. 6 welders worked on the job for five days of 8 hours each : the Direct labour hour per welder is ₹ 0.20.

Expenses not included for CALCULATING the machine hour or direct labour hour rate

total led ₹ 2,000, total direct wages for the period being ₹ 20,000. Ascertain the works costs of job No. 198.

Hints: Work Cost = ₹1,348

B. PAST YEAR EXAM QUESTIONS

Nov-22. 2(a)- 5 marks

USP Ltd. is the manufacturer of 'double grip motorcycle tyres'. In the manufacturing process, it undertakes three different jobs namely, Vulcanising, Brushing and Striping. All of these jobs require the use of a special machine and also the aid of a robot when necessary. The robot is hired from outside and the hire charges paid for every six months is₹ 2,70,000. An estimate of overhead expenses relating to the special machine is given below:

- Rent for a quarter is ₹ 18,000.
- The cost of the special machine is ₹ 19,20,000 and depreciation is charged @10% per annum on straight line basis.
- Other indirect expenses are recovered at 20% of direct wages.

The factory manager has informed that in the coming year, the total direct wages will be ₹ 12,00,000 which will be incurred evenly throughout the year.

During the first month of operation, the following details are available from the job book:

Number of hours the special machine was used

Jobs	Without the aid of the robot	With the of the robot
Vulcanising	500	400
Brushing	1000	400
Striping	-	1200

You are required to :

(i) Compute the Machine Hour Rate for the company as a whole for a month (A) when the robot is used and (B) when the robot is not used.

(ii) Compute the Machine Hour Rate for the individual jobs i.e. Vulcanising, Brushing and Striping.

Solution:

Working notes:

(I)	Total machine hours use (500 + 1,000 + 400 + 400 + 1,200)	3,500
(II)	Total machine hours without the use of robot (500 + 1,000)	1,500
(III)	Total machine hours with the use of robot (400 + 400 + 1,200)	2,000
(IV)	Total overheads of the machine per month	
	Rent (₹ 18,000 ÷ 3 months)	6,000
	Depreciation [(₹ 19,20,000 x 10%) ÷ 12 months]	16,000
	Indirect expenses [(₹ 12,00,000 x 20%) ÷ 12 months]	20,000
	Total	42,000
(V)	Robot hire charges for a month (₹ 2,70,000 ÷ 6 months)	₹ 45,000

(VI) Overheads for using machines without robot

= ₹42,000 / 3,500 hrs. x 1,500 hrs = 18,000

(VII) Overheads for using machines with robot

= ₹42,000 / 3,500 hrs. x 2,000 hrs + 45,000 = 69,000

(i) Computation of Machine hour rate for the firm as a whole for a month.

a. When the robot was used: ₹69,000 / 2,000 hrs = ₹34.50 per hours

b. When the robot was not used: ₹18,000 / 1,500 hrs = ₹12 per hours

(ii) Computation of Machine hour rate for the individual job

	Rate per hour	Job					
		Vulcanising		Brushing		Striping	
	(₹)	Hrs.	(₹)	Hrs.	(₹)	Hrs.	(₹)
Overheads							
Without robot	12.00	500	6,000	1,000	12,000	-	-
With robot	34.50	400	13,800	400	13,800	1,200	41,400
Total		900	19,800	1,400	25,800	1,200	41,400
Machine hour rate			22		18.43		34.50

Jan-21. 1(b)- 5 marks

A machine shop has 8 identical machines manned by 6 operators. The machine cannot work without an operator wholly engaged on it. The original cost of all the 8 machines works out to ₹ 32,00,000. The following particulars are furnished for a six months period:

Normal available hours per month per operator	208
Absenteeism (without pay) hours per operator	18
Leave (with pay) hours per operator	20
Normal unavoidable idle time-hours per operator	10
Average rate of wages per day of 8 hours per operator	₹ 100
Production bonus estimated	10% on wages
Power consumed	₹ 40,250
Supervision and Indirect Labour	₹ 16,500
Lighting and Electricity	₹ 6,000

The following particulars are given for a year:

Insurance	₹ 3,60,000
Sundry work Expenses	₹ 50,000
Management Expenses allocated	₹ 5,00,000
Depreciation	10% on the original cost

Repairs and Maintenance (including consumables): 5% of the value of all the machines.
Prepare a statement showing the comprehensive machine hour rate for the machine shop.

Solution:

Workings:

Particulars	Six months 6 operators (Hours)
Normal available hours per month (208 x 6 months x 6 operators)	7,488
Less: Absenteeism hours (18 x 6 operators)	(108)
Paid hours (A)	7,380
Less: Leave hours (20 x 6 operators)	(120)
Less: Normal idle time (10 x 6 operators)	(60)
Effective working hours	**7,200**

Computation of Comprehensive Machine Hour Rate

Particulars	Amount for six months (₹)
Operators' wages (7,380/8 x100)	92,250
Production bonus (10% on wages)	9,225
Power consumed	40,250
Supervision and indirect labour	16,500
Lighting and Electricity	6,000
Repair and maintenance {(5% × ₹ 32,00,000)/2}	80,000
Insurance (₹ 3,60,000/2)	1,80,000
Depreciation {(₹ 32,00,000 × 10%)/2}	1,60,000
Sundry Work expenses (₹ 50,000/2)	25,000
Management expenses (₹ 5,00,000/2)	2,50,000
Total Overheads for 6 months	**8,59,225**
Comprehensive Machine Hour Rate = ₹ 8,59,225/7,200 hours	**₹ 119.33**

(Note: Machine hour rate may be calculated alternatively. Further, presentation of figures may also be done on monthly or annual basis.)

May-19. 5(b)- 5 marks

M/s Zaina Private Limited has purchased a machine costing ₹ 29,14,800 and it is expected to have a salvage value of ₹ 1,50,000 at the end of its effective life of 15 years. Ordinarily the machine is expected to run for 4,500 hours per annum but it is estimated that 300 hours per annum will be lost for normal repair & maintenance. The other details in respect of the machine are as follows :

(i) Repair & Maintenance during the whole life of the machine are expected to be ₹ 5,40,000.

(ii) Insurance premium (per annum) 2% of the cost of the machine.

(iii) Oil and Lubricants required for operating the machine (per annum) ₹ 87,384.

(iv) Power consumptions: 10 units per hour @ ₹ 7 per unit. No power consumption during repair and maintenance. •

(v) Salary to operator per month ₹ 24,000. The operator devotes one third of his time to the machine.

You are required to calculate comprehensive machine hour rate.

Solution:

Effective machine hour = 4,500 – 300 = 4,200 hours

Calculation of Comprehensive machine hour rate

Elements of Cost and Revenue	Amount (₹) Per Annum
Repair and Maintenance (₹5,40,000 ÷15 years)	36,000
Power (4,200 hours × 10 units × ₹7)	2,94,000
Depreciation (₹29,14,800 - ₹1,50,000) / 15 years	1,84,320
Insurance (₹29,14,800 × 2%)	58,296
Oil and Lubricant	87,384
Salary to Operator {(₹24,000×12)/3}	96,000
Total Cost	7,56,000
Effective machine hour	4,200

Total Machine Rate Per Hour	180

C. ADDITIONAL QUESTIONS FOR PRACTICE(PAST YEAR EXAM)

Question-1

A manufacturing unit has purchased and installed a new machine of ₹ 12,70,000 to its fleet of 7 existing machines. The new machine has an estimated life of 12 years and is expected to realise ₹ 70,000 as scrap at the end of its working life. Other relevant data are as follows:

1. Budgeted working hours are 2,592 based on 8 hours per day for 324 days. This includes 300 hours for plant maintenance and 92 hours for setting up of plant.
2. Estimated cost of maintenance of the machine is ₹25,000 p.a.
3. The machine requires a special chemical solution, which is replaced at the end of each week (6 days in a week) at a cost of ₹400 each time.
4. Four operators control operation of 8 machines and the average wages per person amounts to ₹420 per week plus 15% fringe benefits.
5. Electricity used by the machine during the production is 16 units per hour at a cost of ₹ 3 per unit. No electricity is consumed during unproductive maintenance and setting up time.
6. Departmental and general works overhead allocated to the operation during last year was ₹ 50,000. During the current year it is estimated to increase by 10% of this amount.

Calculate machine hour rate, if (a) setting up time is unproductive; (b) setting up time is productive.

Solution :

Working Note:

1. Effective machine hour when set-up time is unproductive:

= Budgeted working hours – (Maintenance time + Setting-up time)

= [2,592 – (300 + 92)] hours. = 2,200 hours.

2. Effective machine hour when set-up time is productive:

= Budgeted working hours – maintenance time

= (2,592 - 300) hours. = 2,292 hours.

3. Operators' wages per annum

Basic wages (4 operators × ₹420 × 54 weeks)	= ₹ 90,720
Add: Fringe benefits (15% of ₹90,720)	= ₹ 13,608
	₹1,04,328

4. Depreciation per annum

$$\frac{₹12,70,000 - ₹70,000}{12 \text{ years}} = ₹1,00,000$$

5. Cost of special chemical solution

324 days ÷ 6 days × ₹ 400 = ₹ 21,600

Computation of Machine hour Rate

	Amount p.a. (₹)	Amount per hour (₹) (when set-up time is unproductive)	Amount per hour (₹) (when set-up time is productive)
Standing charges			
Operators wages	1,04,328		
$\left[\frac{₹1,04,328}{8 \text{machines}} \times \frac{1}{2,200 \text{hours}}\right]$		5.93	
$\left[\frac{₹1,04,328}{8 \text{ machines}} \times \frac{1}{2,292 \text{ hours}}\right]$			5.69

Departmental and general overhead (50,000 × 110%) [₹55,000/8 machines × 1/2,200 hours] [₹55,000/8machines x 1/2,292hours]	55,000	3.13	3.00
(A)	1,59,328	9.06	8.69
Machine Expenses Depreciation [₹1,00,000/2,200 hours] [₹1,00,000/2,292 hours]	1,00,000	45.45	43.63
Electricity (16 units x ₹3)		48.00	48.00
Special chemical solution [₹21,600/2,200 hours] [₹21,600/2,292 hours]	21,600	9.82	9.42
Maintenance [₹25,000/2,200 hours] [₹25,000/2,292 hours]	25,000	11.36	10.91
(B)		114.63	111.96
Machine Hour Rate (A + B)		123.69	120.65

Question-2

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

Original purchase price of the machine ₹ 3,24,000

(subject to depreciation at 10% per annum on original cost)

Normal working hours for the month 200 hours

(The machine works for only 75% of normal capacity)

Wages to Machine-man ₹ 125 per day (of 8 hours)

Wages to Helper (machine attendant)	₹ 75 per day (of 8 hours) Power
cost 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.

Solution:

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)	---	₹1,875.00
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

Question-3

A machine shop cost centre contains three machines of equal capacities. To operate these three machines nine operators are required i.e. three operators on each machine. Operators are paid ₹20 per hour. The factory works for fourtyeight hours in a week which includes 4 hours set up time. The work is jointly done by operators. The operators are paid fully for the forty eight hours. In additions they are paid a bonus of 10 per cent of productive time. Costs are reported for this company on the basis of thirteen four-weekly period.

The company for the purpose of computing machine hour rate includes the direct wages of the operator and also recoups the factory overheads allocated to the machines. The following details of factory overheads applicable to the cost centre are available:

- Depreciation 10% per annum on original cost of the machine. Original cost of the each machine is ₹52,000.
- Maintenance and repairs per week per machine is ₹60.
- Consumable stores per week per machine are ₹75.
- Power : 20 units per hour per machine at the rate of 80 paise per unit.
- Apportionment to the cost centre : Rent per annum ₹5,400, Heat and Light per annum ₹9,720, foreman's salary per annum ₹12,960 and other miscellaneous expenditure per annum ₹ 18,000.

Required:

(i) Calculate the cost of running one machine for a four week period.

(ii) Calculate machine hour rate.

Solution:

Effective Machine hour for four-week period
= Total working hours – unproductive set-up time
= {(48 hours × 4 weeks) – {(4 hours × 4 weeks)}
= (192 – 16) hours) =176 hours.

1. **Computation of cost of running one machine for a four week period**

		(₹)	(₹)
(A)	Standing charges (per annum)		
	Rent	5,400.00	
	Heat and light Forman's	9,720.00	
	salary	12,960.00	
	Other miscellaneous expenditure	18,000.00	
	Standing charges (per annum)	46,080.00	
	Total expenses for one machine for four week period [₹46,080 / 3machines x 13 four - week period]		1,181.54
	Wages (48 hours × 4 weeks × ₹ 20 × 3 operators)		11,520.00
	Bonus {(176 hours × ₹ 20 × 3 operators) x 10%}		1,056.00
	Total standing charges		13,757.54
(B)	Machine Expenses		400.00
	Depreciation = (₹52,000 x 10% x 1 / 13 four-week period)		
	Repairs and maintenance (₹60 x 4 weeks)		240.00
	Consumable stores (₹ 75 x 4 weeks)		300.00
	Power (176 hours x 20 units x₹ 0 .80)		2,816.00
	Total machine expenses		3,756.00
(C)	Total expenses (A) + (B)		17,513.54

2. Machine hour rate = ₹ 17,513.54 / 176 hours = ₹ 99.51

Question-4 (Old Course Practice Manual Q1)

In a factory, a machine is considered to work for 208 hours in a month. It includes maintenance time of 8 hours and set up time of 20 hours.

The expense data relating to the machine are as under:

- Cost of the machine is ₹ 5,00,000. Life 10 years. Estimated scrap value at the end of life is ₹ 20,000.

		(₹)
–	Repairs and maintenance per annum	60,480
–	Consumable stores per annum	47,520
–	Rent of building per annum (The machine under reference occupies 1/6 of the area)	72,000
–	Supervisor's salary per month (Common to three machines)	6,000
–	Wages of operator per month per machine	2,500
–	General lighting charges per month allocated to the machine	1,000
–	Power 25 units per hour at ₹ 2 per unit	

Power is required for productive purposes only. Set up time, though productive, does not require power. The Supervisor and Operator are permanent. Repairs and maintenance and consumable stores vary with the running of the machine.

Required

Calculate a two-tier machine hour rate for (a) set up time, and (b) running time

Solution:

Working Notes:

1. (i) Effective hours for standing charges (208 hours – 8 hours) = 200 hours
   (ii) Effective hours for variable costs (208 hours – 28 hours) = 180 hours

2. Standing Charges per hour

	Cost per month (₹)	Cost per hour (₹) (Cost per month ÷ 200 hours)
Supervisor's salary ₹6,000 / 3 machines	2,000	10.00

Rent of building $\frac{1}{6} \times \frac{72,000}{12 \text{ months}}$	1,000	5.00
General lighting	1,000	5.00
Total Standing Charges	4,000	20.00

Machine running expenses per hour

	Cost per month (₹)	*Cost per hour (₹)*
Depreciation $\frac{₹(5,00,000 - 20,000)}{10 \text{ years}} \times \frac{1}{12 \text{ months}}$	4,000	20.00 $\left(\frac{₹4,000}{200 \text{ hours}}\right)$
Wages	2,500	12.50 $\frac{₹2,500}{200 \text{ hours}}$
Repairs & Maintenance $\frac{₹ 60,480}{12 \text{ months}}$	5,040	28.00 $\frac{₹5,040}{180 \text{ hours}}$
Consumable stores $\frac{₹ 47,520}{12 \text{ months}}$	3,960	22.00 $\frac{₹3,960}{180 \text{ hours}}$
Power (25 units × ₹2 × 180 hours)	9,000	50.00
Total Machine Expenses	24,500	132.50

Computation of Two – tier machine hour rate

	Set up time rateper machine hour (₹)	**Running time rateper machine hour (₹)**
Standing Charges	20.00	20.00
Machine expenses :		

Depreciation	20.00	20.00
Repair and maintenance	–	28.00
Consumable stores	–	22.00
Power	–	50.00
Machine hour rate of overheads	40.00	140.00
Wages	12.50	12.50
Comprehensive machine hour rate	52.50	152.50

Question-5 (Old Course Practice Manual Q6)

You are given the following information of the three machines of a manufacturing department of X Ltd.:

	Preliminary estimates of expenses (per annum)			
	Total (₹)	Machines		
		A (₹)	B (₹)	C (₹)
Depreciation	20,000	7,500	7,500	5,000
Spare parts	10,000	4,000	4,000	2,000
Power	40,000			
Consumable stores	8,000	3,000	2,500	2,500
Insurance of machinery	8,000			
Indirect labour	20,000			
Building maintenance expenses	20,000			
Annual interest on capital outlay	50,000	20,000	20,000	10,000
Monthly charge for rent and rates	10,000			
Salary of foreman (per month)	20,000			
Salary of Attendant (per month)	5,000			

(The foreman and the attendant control all the three machines and spend equal time on them.) The following additional information is also available:

	Machines

	A	B	C
Estimated Direct Labour Hours	1,00,000	1,50,000	1,50,000
Ratio of K.W. Rating	3	2	3
Floor space (sq. ft.)	40,000	40,000	20,000

There are 12 holidays besides Sundays in the year, of which two were on Saturdays. The manufacturing department works 8 hours in a day but Saturdays are half days. All machines work at 90% capacity throughout the year and 2% is reasonable for breakdown.

You are required to :

Calculate predetermined machine hour rates for the above machines after taking into consideration the following factors:

•An increase of 15% in the price of spare parts.

•An increase of 25% in the consumption of spare parts for machine 'B' & 'C' only.

•20% general increase in wages rates.

Solution:

(a) Computation of Machine Hour Rate

	Basis of apportionment	Total (₹)	Machines		
			A (₹)	B (₹)	C (₹)
(A) Standing Charges					
Insurance	Depreciation Basis (3:3:2)	8,000	3,000	3,000	2,000
Indirect Labour	Direct Labour (2:3:3)	24,000	6,000	9,000	9,000
Building maintenance expenses	Floor Space (2:2:1)	20,000	8,000	8,000	4,000
Rent and Rates	Floor Space (2:2:1)	1,20,000	48,000	48,000	24,000
Salary of foreman	Equal	2,40,000	80,000	80,000	80,000
Salary of attendant	Equal	60,000	20,000	20,000	20,000
Total standing charges		4,72,000	1,65,000	1,68,000	1,39,000
Hourly rate for standing charges			84.70	86.24	71.36
(B) Machine Expenses:					

Depreciation	Direct	20,000	7,500	7,500	5,000
Spare parts	Final estimates	13,225	4,600	5,750	2,875
Power	K.W. rating (3:2:3)	40,000	15,000	10,000	15,000
Consumable Stores	Direct	8,000	3,000	2,500	2,500
Total Machine expenses		81,225	30,100	25,750	25,375
Hourly Rate for Machine expenses			15.45	13.22	13.03
Total (A + B)		553,225	1,95,100	1,93,750	1,64,375
Machine Hour rate			100.15	99.46	84.38

Working Notes:

(i) Calculation of effective working hours:

No. of full off-days = No. of Sunday + No. of holidays
= 52 + 12 = 64 days

No. of half working days = 52 days – 2 holidays = 50 days

No. of full working days = 365 days – 64 days – 50 days = 251 days Total working Hours = {(251 days × 8 hours) + (50 days × 4 hours)}
= 2,008 hours + 200 = 2,208 hours.

Total effective hours = Total working hours × 90% - 2% for break-down
= 2,208 hours × 90% - 2% (2,208 hours × 90%)
= 1,987.2 hours – 39.74 hours
= 1947.46 or Rounded up to 1948 hours.

(ii) Amount of spare parts is calculated as under:

	A (₹)	**B (₹)**	**C (₹)**
Preliminary estimates	4,000	4,000	2,000
Add: Increase in price @ 15%	600	600	300
	4,600	4,600	2,300
Add: Increase in consumption @ 25%	-	1,150	575
Estimated cost	4,600	5,750	2,875

(iii) Amount of Indirect Labour is calculated as under:

	(₹)
Preliminary estimates	20,000
Add: Increase in wages @ 20%	4,000

	24,000

(iv) Interest on capital outlay is a finance cost, therefore it has been excluded from the cost accounts.

Question-6 (Nov 20 Old Course Q2(a))

PQR Ltd. has provided the following information for Departments A and B of its factory:

Preliminary Estimates of expenses (Per Annum)			
	Total (₹)	Dept A (₹)	Dept B (₹)
Power	15,000	-	-
Spare parts	8,000	3,000	5,000
Consumable stores	5,000	2,000	3,000
Depreciation on machinery	30,000	10,000	20,000
Insurance on machinery	3,000	1,000	2,000
Indirect labour	40,000	-	-
Building maintenance	7,000	-	-

The final estimates of expenses are to be prepared on the basis of above figures after taking into consideration the following factors:

(a) An increase of 10 per cent in the price of spare parts.

(b) An increase of 20 per cent in the consumption of spare parts for Department B only.

(c) Increase in the straight line method of depreciation from 10 per cent on the original value of machinery to 12 per cent.

(d) 15 per cent increase in wage rates of Indirect Labour.

The following information is also available:

	Dept. A	Dept. B
Estimated Direct Labour hours	80,000	1,20,000
Ratio of K.W. Rating	3	2
Floor space (sq. ft.)	15,000	20,000

There are 12 holidays besides Sundays in the year. The manufacturing department works 8 hours in a day. All machines work at 90% capacity throughout the year. (Assume 365 days in a year).

You are required to work out the Machine Hour rates for Departments A and B.

Solution:

(a) Computation of Machine Hour Rate

	Basis of apportionment	Total (₹)	Department	
			A (₹)	B (₹)
(A) Standing Charges				
Insurance	Direct	3,000	1,000	2,000
Indirect Labour	Direct Labour (2:3)	46,000	**18,400**	**27,600**
Building maintenance expenses	Floor Space (3:4)	7,000	**3,000**	**4,000**
Total standing charges (A)		56,000	22,400	33,600
Hourly rate for standing charges (H1)			10.33	15.50
(B) Machine Expenses:				
Power	K.W. rating (3:2)	15,000	**9,000**	**6,000**
Spare parts	Final estimates	9,900	**3,300**	**6,600**
Consumable Stores	Direct	5,000	**2,000**	**3,000**
Depreciation on machinery	Final estimates	36,000	**12,000**	**24,000**
Total Machine expenses (B)		65,900	**26,300**	**39,600**
Hourly Rate for Machine expenses (H2)			12.13	18.27
Total Cost (A + B)		**1,21,900**	**48,700**	**73,200**
Machine Hour rate* (H1+H2)			**22.46**	**33.76**

*Alternatively, Machine Hour rate can be calculated as total Cost ÷ total effective hours.

Working Notes:

i. Calculation of effective working hours:

No. of off-days = No. of Sundays + No. of holidays

= 52 + 12 = 64 days
No. of working days = 365 days – 64 days = 301 days
Total working Hours = 301 days × 8 hours
= 2,408 hours
Total effective hours = Total working hours × 90%
= 2,408 hours × 90%
= 2,167.2 or Rounded up to 2,168 hours

ii. Amount of Indirect Labour is calculated as under:

Particulars	**(₹)**
Preliminary estimates	40,000
Add: Increase in wages @ 15%	6,000
Estimated total cost of Indirect labour	46,000

iii. Amount of spare parts is calculated as under:

Particulars	**A (₹)**	**B (₹)**
Preliminary estimates	3,000	5,000
Add: Increase in price @ 10%	300	500
	3,300	5,500
Add: Increase in consumption @ 20%	-	1,100
Estimated cost of spare parts	3,300	6,600

iv. Amount of Depreciation of machinery is calculated as under:

Particulars	**A (₹)**	**B (₹)**
Preliminary estimates	10,000	20,000
Add: Increase in depreciation {₹ 10,000 x 2 (12-10) /10}	2000	4000
Estimated Depreciation (Current depreciation x 12/10)	12,000	24,000

Question-7 (RTP May 21 Old Course)

A manufacturing unit has purchased and installed a new machine at a cost of ₹ 24,90,000

to its fleet of 5 existing machines. The new machine has an estimated life of 12 years and is expected to realise ₹ 90,000 as scrap value at the end of its working life.
Other relevant data are as follows:

(i) Budgeted working hours are 2,496 based on 8 hours per day for 312 days. Plant maintenance work is carried out on weekends when production is totally halted. The estimated maintenance hours are 416. During the production hours machine set -up and change over works are carried out. During the set-up hours no production is done. A total 312 hours are required for machine set-ups and change overs.

(ii) An estimated cost of maintenance of the machine is ₹ 2,40,000 p.a.

(iii) The machine requires a component to be replaced every week at a cost of ₹ 2,400.

(iv) There are three operators to control the operations of all the 6 machines. Each operator is paid ₹ 30,000 per month plus 20% fringe benefits.

(v) Electricity: During the production hours including set-up hours, the machine consumes 60 units per hour. During the maintenance the machine consumes only 10 units per hour. Rate of electricity per unit of consumption is ₹ 6.

(vi) Departmental and general works overhead allocated to the operation during last year was ₹ 5,00,000. During the current year it is estimated to increase by 10%.

Required:
Compute the machine hour rate.

Solution:

Working Note:

1. Effective machine hour:
   = Budgeted working hours – Machine Set-up time
   = 2,496 hours – 312 hours = 2,184 hours.

2. Operators' salary per annum:

Salary (3 operators × ₹ 30,000 × 12months)	₹ 10,80,000
Add: Fringe benefits (20% of ₹ 10,80,000)	₹ 2,16,000
	₹ 12,96,000

3. Depreciation per annum
   = $\frac{₹24,90,000 - ₹90,000}{12 \text{ Years}}$ = ₹ 2,00,000

Computation of Machine hour Rate

		Amount p.a. (₹)	Amount per hour (₹)
Standing charges Operators' Salary ₹12,96,000 / 6 machines × 1 / 2,184 hours		12,96,000	98.90
Departmental and general overheads: (₹ 5,00,000 × 110%) ₹5,50,000 / 6 machines x 1 / 2,184 hours		5,50,000	41.97
	(A)	18,46,000	140.87
Machine Expenses Depreciation ₹ 2,00,000 / 2,184 hours		2,00,000	91.58
Electricity:			
During working hours (2,496 hours × 60 units x ₹ 6)		8,98,560	411.43
During maintenance hours (416 hours × 10 units x ₹ 6)		24,960	11.43
Component replacement cost (2,400 × 52 weeks)		1,24,800	57.14
Machine maintenance cost		2,40,000	109.89
	(B)	14,88,320	681.47
Machine Hour Rate	(A + B)		822.34

Question-8 (RTP Jan 21 Old Course)

You are given the following information of the three machines of a manufacturing department of X Ltd.:

	Preliminary estimates of expenses (per annum)			
		Machines		
	Total (₹)	A (₹)	B (₹)	C (₹)
Depreciation	2,00,000	75,000	75,000	50,000
Spare parts	1,00,000	40,000	40,000	20,000
Power	4,00,000			

Consumable stores	80,000	30,000	25,000	25,000
Insurance of machinery	80,000			
Indirect labour	2,00,000			
Building maintenance expenses	2,00,000			
Annual interest on capital outlay	1,00,000	40,000	40,000	20,000
Monthly charge for rent and rates	20,000			
Salary of foreman (per month)	42,000			
Salary of Attendant (per month)	12,000			

(The foreman and the attendant control all the three machines and spend equal time on them.)
The following additional information is also available:

	Machines		
	A	B	C
Estimated Direct Labour Hours	1,00,000	1,50,000	1,50,000
Ratio of K.W. Rating	3	2	3
Floor space (sq. ft.)	40,000	40,000	20,000

There are 12 holidays besides Sundays in the year, of which two were on Saturdays. The manufacturing department works 8 hours in a day but Saturdays are half days. All machines work at 90% capacity throughout the year and 2% is reasonable for breakdown.

You are required to:
CALCULATE predetermined machine hour rates for the above machines after taking into consideration the following factors:

- An increase of 15% in the price of spare parts.
- An increase of 25% in the consumption of spare parts for machine 'B' & 'C' only.
- 20% general increase in wages rates.

Solution:
Computation of Machine Hour Rate

	Basis of apportionment	Total (₹)	Machines		
			A (₹)	B (₹)	C (₹)
(A) Standing Charges					
Insurance	Depreciation	80,000	30,000	30,000	20,000

		Basis (3:3:2)				
	Indirect Labour	Direct Labour (2:3:3)	2,40,000	60,000	90,000	90,000
	Building maintenance expenses	Floor Space (2:2:1)	2,00,000	80,000	80,000	40,000
	Rent and Rates	Floor Space (2:2:1)	2,40,000	96,000	96,000	48,000
	Salary of foreman	Equal	5,04,000	1,68,000	1,68,000	1,68,000
	Salary of attendant	Equal	1,44,000	48,000	48,000	48,000
	Total standing charges		14,08,000	4,82,000	5,12,000	4,14,000
	Hourly rate for standing charges			247.43	262.83	212.53
(B)	**Machine Expenses:**					
	Depreciation	Direct	2,00,000	75,000	75,000	50,000
	Spare parts	Final estimates	1,32,250	46,000	57,500	28,750
	Power	K.W. rating(3:2:3)	4,00,000	1,50,000	1,00,000	1,50,000
	Consumable Store	Direct	80,000	30,000	25,000	25,000
	Total Machine expenses					
	Hourly Rate for Machine expenses					
	Total (A + B)					
	Machine Hour rate					
	Stores					
	Total Machine expenses		8,12,250	3,01,000	2,57,500	2,53,750
	Hourly Rate for Machine expenses			154.52	132.19	130.26

Total (A + B)	22,20,250	7,83,000	7,69,500	6,67,750
Machine Hour rate		401.95	395.02	342.79

Working Notes:

(i) Calculation of effective working hours:

No. of full off-days = No. of Sunday + No. of holidays
= 52 + 12 = 64 days

No. of half working days = 52 days – 2 holidays = 50 days

No. of full working days = 365 days – 64 days – 50 days = 251 days Total working Hours = {(251 days × 8 hours) + (50 days × 4 hours)}
= 2,008 hours + 200 = 2,208 hours.

Total effective hours = Total working hours × 90% - 2% for break- down
= 2,208 hours × 90% - 2% (2,208 hours × 90%)
= 1,987.2 hours – 39.74 hours
= 1947.46 or Rounded up to 1948 hours.

(ii) Amount of spare parts is calculated as under:

	A (₹)	**B (₹)**	**C (₹)**
Preliminary estimates	40,000	40,000	20,000
Add: Increase in price @ 15%	6,000	6,000	3,000
	46,000	46,000	23,000
Add: Increase in consumption @ 25%	-	11,500	5,750
Estimated cost	46,000	57,500	28,750

(iii) Amount of Indirect Labour is calculated as under:

	(₹)
Preliminary estimates	2,00,000
Add: Increase in wages @ 20%	40,000
	2,40,000

(iv) Interest on capital outlay is a finance cost, therefore it has been excluded from the cost accounts.

Part-III: Treatment of under and over absorption of overhead

A. QUESTIONS FROM STUDY MATERIAL

TEST YOUR KNOWLEDGE

Question-9

In a factory, overheads of a particular department are recovered on the basis of ₹ 5 per machine hour. The total expenses incurred and the actual machine hours for the department for the month of August were ₹ 80,000 and 10,000 hours respectively. Of the amount of ₹ 80,000, ₹ 15,000 became payable due to an award of the Labour Court and ₹ 5,000 was in respect of expenses of the previous year booked in the current month (August). Actual production was 40,000 units, of which 30,000 units were sold. On analysing the reasons, it was found that 60% of the under-absorbed overhead was due to defective planning and the rest was attributed to normal cost increase. EXPLAIN how would you treat the under-absorbed overhead in the cost accounts?

Hints: Under absorption = 10,000, SR = ₹0.10 P.U.

Question-10 (Dec 21 Q5(b))

In a manufacturing unit, factory overhead was recovered at a pre-determined rate of ₹ 25 per man-day. The total factory overhead expenses incurred and the man-days actually worked were ₹ 41.50 lakhs and 1.5 lakh man-days respectively. Out of the 40,000 units produced during a period, 30,000 were sold.

On analysing the reasons, it was found that 60% of the unabsorbed overheads Were due to defective planning and the rest were attributable to increase in overhead costs.

EXPLAIN how would unabsorbed overheads be treated in Cost Accounts?

Hints: Under absorption = 4,00,000, SR = ₹4 P.U.

Question-11

A factory has three production departments. The policy of the factory is to recover the production overheads of the entire factory by adopting a single blanket rate based on the percentage of total factory overheads to total factory wages. The relevant data for a month are given below:

Department	Direct Materials (₹)	Direct Wages (₹)	Factory Overheads (₹)	Direct Labour hours	Machine hours
Budget:					
Machining	6,50,000	80,000	3,60,000	20,000	80,000
Assembly	1,70,000	3,50,000	1,40,000	1,00,000	10,000
Packing	1,00,000	70,000	1,25,000	50,000	-
Actual:					
Machining	7,80,000	96,000	3,90,000	24,000	96,000
Assembly	1,36,000	2,70,000	84,000	90,000	11,000
Packing	1,20,000	90,000	1,35,000	60,000	-

The details of one of the representative jobs produced during the month are as under:

Job No. CW 7083 :

Department	Direct Materials (₹)	Direct Wages (₹)	Direct Labour hours (₹)	Machine hours
Machining	1,200	240	60	180
Assembly	600	360	120	30
Packing	300	60	40	-

The factory adds 30% on the factory cost to cover administration and selling overheads and profit.

Required :

1. Calculate the overhead absorption rate as per the current policy of the company and determine the selling price of the Job No. CW 7083.

2. Suggest any suitable alternative method(s) of absorption of the factory overheads and Calculate the overhead recovery rates based on the method(s) so recommended by you.
3. Determine the selling price of Job CW 7083 based on the overhead application rates calculated in (ii) above.
4. Calculate the department wise and total under or over recovery of overheads based on the company's current policy and the method(s) recommended by you.

Hints:

(i) Over absorption rate = 125% of Direct Wages.
Selling price = ₹4,660.50

(ii)

Department	Recovery Rate
Machine	4.50 per machine hour
Assembly	1.40 per labour hour
Packing	2.50 per labour hour

(iii) Selling price = ₹4,989.40

(iv)

	Machine	Assembly	Packing
Current Policy	(2,70,000)	2,53,500	(22,500)
Proposed Policy	42,000	42,000	15,000

Question-12

The total overhead expenses of a factory are ₹4,46,380. Taking into account the normal working of the factory overhead war recovered in production at ₹ 1.25 per hour. The actual hours worked were 2,93,104. STATE how would you proceed to close the books of accounts, assuming that besides 7,800 units produced of which 7,000 were sold, there were 200 equivalent units in work-in- progress?

On investigation, it was found that 50% of the unabsorbed overhead was on account of increase in the cost of indirect materials and indirect labour and the remaining 50% was due to factory inefficiency. Also give the profit implication of the method suggested.

Hints: Under recovery = 80,000, SR = 5 P.U.

Question-13

ABC Ltd. manufactures a single product and absorbs the production overheads at a pre-determined rate of ₹ 10 per machine hour.

At the end of financial year 20X8-X9, it has been found that actual production overheads incurred were ₹ 6,00,000. It included ₹ 45,000 on account of 'written off' obsolete stores and ₹ 30,000 being the wages paid for the strike period under an award.
The production and sales data for the year 20X8-X9 is as under:

Production:

Finished goods	20,000 units
Work-in-progess (50% complete in all respects)	8,000 units

Sales:

Finished goods	18,000 units

The actual machine hours worked during the period were 48,000. It has been found that one-third of the under-absorption of production overheads was due to lack of production planning and the rest was attributable to normal increase in costs.

1. Calculate the amount of under-absorption of production overheads during the year 20x8-x9; and
2. Show the accounting treatment of under-absorption of production overheads.

Hints: Under recovery = 45,000, SR = ₹1.25 P.U.

Question-14

A light engineering factory fabricates machine parts to customers. The factory commenced fabrication of 12 Nos. machine parts to customers' specifications and the expenditure incurred on the job for the week ending 21st August, 20X8 is given below:

	(₹)	(₹)
Direct materials (all items)		780.00
Direct labour (manual) 20 hours @₹ 15 per hour		300.00
Machine facilities :		
Machine No. I : 4 hours @ ₹ 45	180.00	
Machine No. II : 6 hours @ ₹ 65	390.00	570.00
Total		1,650.00
Overheads @ ₹ 8 per hour on 20 manual hours		160.00
Total cost		1,810.00

The overhead rate of ₹ 8 per hour is based on 3,000 man hours per week; similarly, the machine hour rates are based on the normal working of Machine Nos. I and II for 40 hours

out of 45 hours per week.
After the close of each week, the factory levies a supplementary rate for the recovery of full overhead expenses on the basis of actual hours worked during the week. During the week ending 21st August, 20X8, the total labour hours worked was 2,400 and Machine Nos. I and II had worked for 30 hours and 32.5 hours respectively.

PREPARE a Cost Sheet for the job for the fabrication of 12 Nos. machine parts duly levying the supplementary rates.

Hints: Total amount = ₹2,000, Supplementary rate = ₹2,
Machine facilities (Supplementary rate): M1 = 15, M2 = 15

B. PAST YEAR EXAM QUESTIONS

Nov'19 Q2(b) 10 Marks

ABS enterprises produces a product and adopts the policy to recover factory overheads applying blanket rate based on mchine hours. The cost records of the concern reveal following information :

Budgeted production overheads	₹10,35,000
Budgeted machine hour rate	90,000
Actual machine hour worked	45,000
Actual production overheads	₹8,80,000
Production overheads (actual) include:-	
Paid to worker as per count's award	₹50,000
Wages paid for strike period	₹38,000
Stores written off	₹22,000
Expenses of previous year booked in C.Y.	₹18,500
Production-	
Finished goods	30,000 units
Sale of finished goods	27,000 units

The analysis of cost information reveals that 1/3 of the under absorption of overheads was due to defective production planning and balance was attributable to increase in costs.
You are required :

1. To find out the amount of under absorption of overheads.
2. To give the ways of treating it in cost accounts.
3. To apportion the under absorbed overheads over the items.

C. ADDITIONAL QUESTIONS FOR PRACTICE(PAST YEAR EXAM)

Question-1

PQR manufacturers – a small scale enterprise produces a single product and has adopted a policy to recover the production overheads of the factory by adopting a single blanket rate based on machine hours. The budgeted production overheads of the factory are ₹ 10,08,000 and budgeted machine hours are 96,000.

For a period of first six months of the financial year 2013-2014, following information were extracted from the books:

Actual production overheads	₹6,79,000
Amount included in the production overheads:	
Paid as per court's order	₹ 45,000
Expenses of previous year booked in current year	₹ 10,000
Paid to workers for strike period under an award	₹ 42,000
Obsolete stores written off	₹ 18,000

Production and sales data of the concern for the first six months are as under:

Production:	
Finished goods	22,000 units
Works-in-progress (50% complete in every respect)	16,000 units

Sale:

Finished goods	18,000 units

The actual machine hours worked during the period were 48,000 hours. It is revealed from the analysis of information that ¼ of the under-absorption was due to defective production policies and the balance was attributable to increase in costs.

You are required:

(i) to determine the amount of under absorption of production overheads for the period,
(ii) to show the accounting treatment of under-absorption of production overheads, and
(iii) to apportion the unabsorbed overheads over the items.

Solution:

Amount of under absorption of production overheads during the period of first six months of the year 2013-2014:

	Amount (₹)	Amount (₹)
Total production overheads actually incurred during the period		6,79,000
Less: Amount paid to worker as per court order	45,000	
Expenses of previous year booked in the current year	10,000	
Wages paid for the strike period under an award	42,000	
Obsolete stores written off	18,000	1,15,000
Less: Production overheads absorbed as per machine hour rate (48,000 hours × ₹10.50*)		5,64,000
Amount of under absorbed production overheads		5,04,000
		60,000

Budgeted Machine hour rate (Blanket rate) = ₹ 10,08,000 / 96,000 hours = ₹ 10.50 per hour

(ii) Accounting treatment of under absorbed production overheads: As, one fourth of the under absorbed overheads were due to defective production policies, this being abnormal, hence should be debited to Costing Profit and Loss Account.
Amount to be debited to Costing Profit and Loss Account = (60,000 * ¼) ₹ 15,000.
Balance of under absorbed production overheads should be distributed over Works in progress, Finished goods and Cost of sales by applying supplementary rate*.
Amount to be distributed = (60,000 * ¾) ₹45,000.

Supplementary rate = ₹ 45,000 / 30,000 units = ₹ 1.50 per unit

(iii) Apportionment of under absorbed production overheads over WIP, Finished goods and Cost of sales:

	Equivalent completed units	Amount (₹)
Work-in-Progress (16,000 units × 50% ×1.50)	8,000	12,000
Finished goods (4,000 units × 1.50)	4,000	6,000
Cost of sales (18,000 units × 1.50)	18,000	27,000
Total	30,000	45,000

Question-2 (Old Course Practice Manual Q9)

Your company uses a historical cost system and applies overheads on the basis of "pre determined" rates. The following are the figure from the Trial Balance as at 30th September, 2013:-

Manufacturing overheads	₹ 4,26,544 Dr.
Manufacturing overheads applied	₹ 3,65,904 Cr.
Work-in-progress	₹ 1,41,480 Dr.
Finished goods stocks	₹ 2,30,732 Dr.
Cost of goods sold	₹ 8,40,588 Dr.

Give two methods for the disposal of the unabsorbed overheads and show the profit implications of each method.

Solution:

Calculation of manufacturing overhead under absorbed	(₹)
Actual overheads	4,26,544
Overhead recovered (applied)	3,65,904
Under absorption (recovery) of overhead	60,640

The two methods for the disposal of the under-absorbed overheads in this problem may be:-

(1) Write off the under – absorbed overhead to Costing Profit & Loss Account.

(2) Use supplementary rate, to recover the under-absorbed overhead.

According to first method, the total unabsorbed overhead amount of ₹60,640 will be written off to Costing Profit & Loss Account. The use of this method will reduce the profits of the concern by ₹ 60,640 for the period.

According to second method, a supplementary rate may be used to adjust the overhead cost of each cost unit. The under-absorbed amount in total may, at the end of the accounting period, be apportioned on ratio basis to the three control accounts, viz, Work-in-progress,

Finished goods stock and Cost of goods sold account. Apportioning of under-absorbed overhead can be carried out by using direct labour hours/ machine hours/ the value of the balances in each of these accounts, as the basis. Prorated figures of under-absorbed overhead over Work-in-progress, Finished goods stock and Cost of goods sold in this question on the basis of values, of the balances in each of these accounts are as follows:-

	Additional Overhead (Under-absorbed) Total		
	(₹)	(₹)	(₹)
Work-in-progress	1,41,480	7,074*	1,48,554
Finished Goods Stock	2,30,732	11,537@	2,42,269
Cost of Goods Sold	8,40,588	42,029#	8,82,617
	12,12,800	60,640	12,73,440

By using this method, the profit for the period will be reduced by ₹42,029 and the value of stock will increase by ₹18,611. The latter will affect the profit of the subsequent period.
Working Notes
The apportionment of under-absorbed overhead over Work-in-progress, Finished goods stock and Cost of goods sold on the basis of their value in the respective account is as follows:-

*Overhead to be absorbed by work-in-progress = ₹60,640 / 12,12,800 x 1,41,480 = ₹7,074

@Overhead to be absorbed by finished goods = ₹60,640 / 12,12,800 x 2,30,732 = ₹11,537

#Overhead to be absorbed by cost of goods sold = ₹60,640 / 12,12,800 x 8,40,588 = ₹42,029

MISCELLANEOUS

Question-1

A machine was purchased from a manufacturer who claimed that his machine could produce 36.5 tonnes in a year consisting of 365 days. Holidays, break-down, etc., were normally allowed in the factory for 65 days. Sales were expected to be 25 tonnes during the year and the plant actually produced 25.2 tonnes during the year. You are required to state the following figures:

- Rated Capacity.
- Practical Capacity.
- Normal Capacity.
- Actual Capacity.

Solution:

(a) Rated capacity 36.5 tonnes

(Refers to the capacity of a machine or a plant as indicated by its manufacturer)

(b) Practical capacity 30.0 tonnes

[Defined as actually utilised capacity of a plant i.e. $\frac{36.5 \text{ tonnes}}{365 \text{ days}} \times (365 - 65)$ days]

(c) Normal capacity 25.0 tonnes

(It is the capacity of a plant utilized based on sales expectancy)

(d) Actual capacity 25.2 tonnes

(Refers to the capacity actually achieved)

Question-2

Following information is available for the first and second quarter of the year 2013-14 of ABC Limited:

	Production (in units)	**Semi-variable cost (₹)**
Quarter I	36,000	2,80,000
Quarter II	42,000	3,10,000

You are required to segregate the semi-variable cost and calculate:

(a) Variable cost per unit; and

(b) Total fixed cost.

Solution:

(a) Variable Cost per Unit = $\frac{\text{Change in Semi - variable cost under two production level}}{\text{Change in production quantity in two levels}}$

$= \frac{₹3,10,000 - ₹2,80,000}{42,000 \text{units} - 36,000 \text{units}}$

= ₹ 5 per units

(b) Total Fixed Cost= Semi Variable Cost for 36,000 units – Variable cost for 36,000 units

= ₹ 2,80,000 – (36,000 units × ₹ 5)

= ₹ 1,00,000