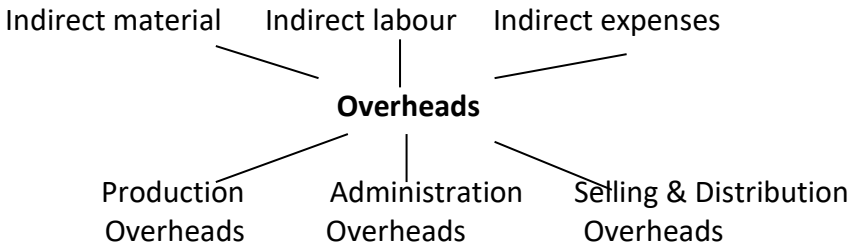
Chapter 6 OVERHEADS



ACCOUNTING & PROCEDURE

Standing Order: Overheads are to be analysed into Production, Administration & Selling & Distribution using some predetermined ratios/ basis, such ratios/basis are predetermined at the beginning of the period and called as standing orders.

CONTROL

Compare the following with actual expenses.

Production Overheads	Administration Overheads	Selling & Distribution Overheads
a] Past Expenses	a] Performance	a] Past Expenses
b] Budget	b] Budget	b] Budget
c] Standard	c] Standard	c] Standard

CHARGING

Estimated overheads Charging / Recovery / Absorption rate = Estimated Overheads / Estimated Base

Charging = Base x Estimated OH Recovery Rate

Production Overheads	Administration Overheads	Selling & Distribution Overheads
Charge to Product a) Blanket Rate **b)** Departmental Rate **(For detailed steps refer below)**	Alternative treatment of charging a) Charge to Cost P/L **b)** Divide between Production & Selling **c)** Charge to Product i) Per unit of production ii) **% of Factory Cost**	Charge to product i) **Per unit of unit sold** a) Fixed portion b) Variable Portion ii) **% of Sales**

Production Overheads

Steps for charging Overheads:

i) Estimation of Overheads
ii) Departmentalization of Overheads
  a) Primary distribution of overheads
    I) Allocation of Overheads
    II) Apportionment of Overheads
  b) Secondary / Redistribution of Overheads
iii) Calculation of Overheads Charging, Recovery, Absorption Rate
  a) Blanket rate
  b) Departmental rate
iv) Absorption of Overheads
v) Treatment of under/over absorption

- **Estimation of Overheads:**
  At the beginning of the period, the factory overheads are estimated on the basis of past experience & future expected changes & classified using standing orders.

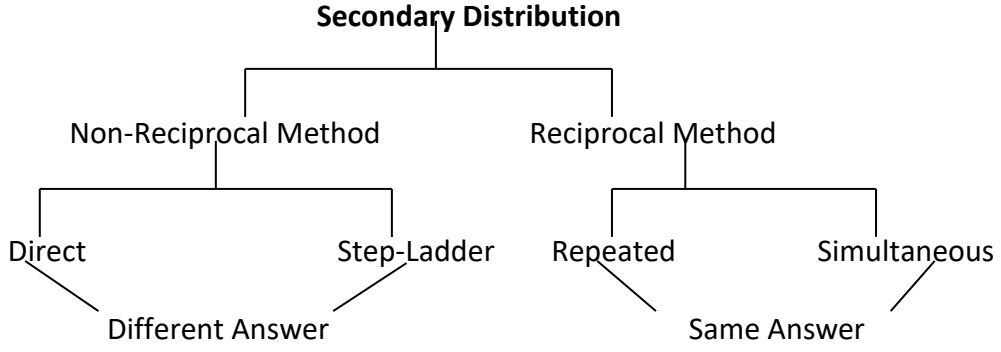
- **Departmentalization of Overheads:**
  The process of charging the overheads to the various departments on the factory is called as departmentalization of overheads.
  Advantages of Departmentalization of Overheads:
  1. For the purpose of control of the expenses of each department it is necessary to find out expenses of each department.
  2. For precise charging of overheads to the product
  3. Different methods & bases can be used for each dept separately depending upon the nature of type of each department.

- **Primary Distribution of Overheads:**
  The process of charging the overheads initially to see the departments in the factory whether production departments or service departments is called primary distribution.
  For this purpose there are 2 methods.
  a. Allocation of Overheads: Charging the overheads of a particular department directly to that department is called allocation of overheads.
  b. Apportionment of Overheads: The process of dividing (apportioning) common overheads to different departments using proper bases is called apportionment of overheads.

Overheads	Bases of Apportionment
1. Rent, Repairs & Maintenance of Building	Area, Value
2. Depreciation on Assets & Insurance	Book value of asset
3. Indirect Wages	Direct wages
4. Indirect Material	Direct material
5. Supervision Charges, canteen expenses	No. of employees
6. Material Handling Charges	Cost of material / quantity of material
7. Power expenses	(Horse Power of Machine x Machine Hour) or Only HP of machine or Only machine hours
8. Light & Power	light points, Area
9. Miscellaneous Expenses	Direct Wages/Labour hours/Machine Hours
10.	
11.	

Note: If no proper base is available, overheads are to be apportioned in the ratio of Direct wages or Direct Labour hours.

- **Secondary Distribution of Overheads:** The process of charging overheads of service departments to other departments is called as secondary distribution**.** The different situation for this are



  - **Non-Reciprocal Method**: Under this category come those cases where the service departments **do not** provide services to each other reciprocally. There are two possibilities as under:

- **Direct Method:**
  Where service department do not provide service to other service department but only to production departments it is the case of Direct Method.

- **Step Ladder Method**
  Where one service department provides service to another service department but the latter do not provide to the former.

- **Reciprocal Method** Under this category come those cases where the service departments **provides** services to each other reciprocally.
  - **Repeated Distribution Method**
    Under this method cost of any one-service department is first allocated to all department (including other service departments). Then the cost of the next service department is allocated to all department (including earlier service department). The process is continued till cost of all service departments is fully exhausted.

  - **Simultaneous Method**
    Under this method the result is the same as the above method but there is a short cut mathematical process.

- **Absorption of Overheads:** For the purpose of charging overheads we need to calculate overheads recovery rate (as discussed in the beginning). For this purpose estimation of overheads is done as per the above steps. Now we need to find out the **Estimated Base.**
  Base means any such factor, which can be associated with the cost object (product/services). This can be any of the following:

Volume Bases	Cost Bases (calculated as a % of)
Units of product	Material cost
Hours	Labour Cost
Labour Hours	Prime Cost
Machine hours	

- **Which of these methods is considered as more suitable?**
- Of these Hourly method and % Labour Cost is considered as more suitable due to the following reasons:
  a) Production overheads are mainly a function of time.
  b) Overheads are not much dependent on material (except material handling cost & stores overheads) or prime cost.
  c) Since material prices may fluctuate from period to period it may lead to charging of different amount of overheads to the same product produced at different points of time.
  d) Skill of workers and usage of machine also affect the overheads.

- **What are the criteria for selection of a base?**
- The base should ensure that:
  a) There is not much over or under absorption
  b) The base should be equitable & appropriate considering the nature of overheads and the department concerned. This could be ensured if the following conditions are fulfilled:
     i) Time spent on completion should be considered
     ii) Distinction should be made between work done by skilled and unskilled workers.
     iii) Distinction should be made between work done by manual labour & machines.
  c) It should be capable of being used conveniently.
  d) It should yield uniform results from period to period.

- **What are the different bases for estimating the overhead rate?**

- The overhead recovery rate may be estimated on following basis:
  a) The figures of previous year may be adopted as the overhead recovery rate.
  b) Normal production volume may be adopted
  c) Anticipated production volume may be adopted

  Of these Normal volume is to be preferred due to the following reasons:

  i) Past year rate should not be used because the current year figures may be different.

  ii) Using normal volume as the base may lead to under/over absorption but it would reflect the extent to which the actual operations are under or over the normal level of volume.

  i) Using anticipated volume as the base may give drastic results as during the period of recession (the anticipated volume being less) the cost per unit would be more leading to charging higher prices and conversely during period of boom the prices would be low. Using normal volume, the price per unit would remain unaffected by market trends.

  ii) Using normal volume as base, the price per unit would remain same from period to period.

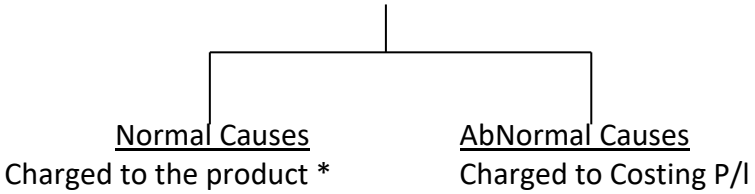
- **What are the different types of capacity estimates?**
- The capacity may be estimated on the basis of any of the following criteria:
  a) Rated/Theoretical Capacity: It is the maximum possible capacity of any plant/equipment.
  b) Practical/Operating Capacity: It is the capacity for which the plant/equipment can be sed practically. It is calculated as follows:-
  maximum capacity – normal losses (like idle time due to repair, maintenance, minor breakdown, set-up time, normal delays, holidays, stock taking)
  c) Normal/Average Capacity: It is the capacity for which the plant/equipment can be utilised over a long period of time. It is based on the average utilisation of a long period.
  d) Anticipated capacity: It is the expected capacity based on the current year's sales expectancy.
  e) Actual Capacity: It is the actual capacity utilised during the period.
  f) Idle Capacity: Practical/Normal Capacity – Actual Capacity

- **<u>Under/Over Absorption of Overheads</u>**

  Through the period the overheads are charged using the estimated rate as calculated above. At the end of the period the Overheads charged are compared with that actually incurred. There would be some difference between the two called as under/over absorption.

  (Under)/Over Absorption = Overheads Absorbed – Overheads incurred

<u>Treatment of Under/ Over Absorbed of Overheads</u>



* <u>Distributed to the following in the ratio of Equivalent units or Account Balances</u>

- Work in progress A/c - Closing balance/units
- Finished Goods A/c - Closing balance/units
- Cost of Sales A/c - Total balance/units

PRODUCTION OVERHEADS

Primary Distribution

1] A manufacturing company has 3 production departments (labour intensive) A, B & C and 2 service departments X & Y. The budgeted information for the year 2021-21 is as under:-

Particulars	A	B	C	X	Y
Direct Material (Rs)	20,000	70,000	40,000	10,000	7,000
Direct Labour (Rs)	50,000	30,000	50,000	20,000	13,000
Indirect Material (Rs)	8,000	5,000	6,000	3,000	1,400
Indirect Labour (Rs)	11,000	6,000	7,000	5,000	4,000
Area (sq.ft)	800	300	600	200	150
Horse Power (Kilo Wattt)	200	800	500	-	-
Value of Plant (Rs in lakhs)	850	650	900	80	100
Light points	45	20	35	15	20
Number of employees	28	42	30	12	18
Machine hours	50,000	30,000	40,000	-	-

Other expenses were (in Rs): Rent – 30,000; Lighting – 12,000; Repairs to Plant – 8,000; Power – 15,000, Depreciation of plant – 50,000, Repairs to building – 15,000; Canteen Expenses – 24,000; Sundries – 25,000. Prepare a statement of primary distribution of overheads.

2] A manufacturing company has 3 production machine departments P, Q & R and 2 service departments S & T. The budgeted information for the year 2021-21 is as under:-

Particulars	P	Q	R	S	T
Direct Material (Rs)	2,50,000	3,70,000	2,40,000	80,000	75,000
Direct Labour (Rs)	5,00,000	3,50,000	3,50,000	1,20,000	1,30,000
Indirect Material (Rs)	48,000	75,000	65,000	35,000	45,500
Indirect Labour (Rs)	1,15,000	60,000	75,000	55,000	45,000
Salaries (Rs)	50,000	45,000	30,000	20,000	15,000
Area (sq.ft)	400	300	450	300	250
Horse Power (Kilo Wattt)	300	500	400	100	50
Value of Plant (Rs. in lakhs)	1200	700	450	250	400
Number of employees	60	30	90	25	45
Machine hours	50,000	30,000	40,000	10,000	20,000

Other expenses were (in Rs): Depreciation of building – 70,000; Lighting – 45,000; Municipal Tax – 24,000; Repairs to Plant – 15,000; Power – 45,000, Depreciation of plant – 25,000, Repairs to building – 15,000; Labor welfare – 24,000; Sundries – 20,000. Prepare a statement of primary distribution of overheads.

3] The following data pertains to the machine shop of an engineering company, relating to the year 2021. The machine shop has 3 cost centers, A, B, and C each having 3 distinct set of machines.

	A	B	C	Total
1. No. of workers	400	400	800	1,600
2. No. of machine-hours	50,000	50,000	60,000	1,60,000
3. Percentage of H.P.	40	25	35	100
4. Value of assets (Rs In lakhs)	20	35	30	85.00
5. Direct wages (Rs in lakhs)	16	20	24	60.00
6. Indirect wages (Rs In. lakhs)				18.00
7. Supervisor's salaries (RsIn lakhs)				7.00
8. Depreciation (Rs In lakhs)				8.50
9. Insurance (Rs in lakhs)				4.25
10.Electricity charges (Rs in lakhs)				12.00
11.Welfare expenses (Rs in lakhs)				9.00
12.Office and other expenses (Rs in lakhs)				16.00

Work out a composite machine-hour rate for each of the cost centers, showing the basis of apportionment of expenses amongst the cost centers.

Secondary Distribution

4] X, Y and Z has two production departments and three service departments. Expenses incurred for these departments and other available information is given below.

Particulars	Prod. Dept. A	Prod. Dept. B	Service Dept. Maintenance	Service Dept. Power	Service Dept. Personnel

Overheads As per Primary Distribution	1,20,000	1,50,000	20,000	48,000	40,000
Allocation Basis					
Maintenance Hours	80	20	—	40	20
KWH Consumed	4	16	2	—	2
Number of employees	60	30	30	18	

Allocate the cost of service departments to the production departments using the direct method.

5] A company has three production dept. and two service dept. Distribution summary of overheads is as follows.
Prepare statement of secondary distribution: (All Methods)

Production Departments		*Service Departments*	
A	Rs13,600	X	Rs 9,000
B	Rs14,700	Y	Rs 3,000
C	Rs12,800		

The expenses of service dept. are charged on a percentage basis which is as follows:

	A	B	C	X	Y
X Dept.	40%	30%	20%	-	10%
Y Dept.	30%	30%	20%	20%	-

6] From the following prepare statement of secondary distribution. (All Methods)

Department	A	B	C	X	Y
Overheads as per Primary Distribution statement (in Rs)	80,000	90,000	1,20,000	40,000	30,000
X	20%	25%	35%	-	20%
Y	50%	25%	15%	10%-	

7] A company has three production departments, A, B and C and two service departments, P and Q. The following figures are available from the primary distribution summary.

Department	Dept A	Dept B	Dept C	Dept P	Dept Q
From Primary Distribution (Rs)	3,150	3,700	1,400	2,250	1,000

The expenses of the service departments are to be apportioned on a percentage basis as follows.

Department	Dept A	Dept B	Dept C	Dept P	Dept Q
P (%)	40	30	20	—	10
Q (%)	30	30	20	20	—

Prepare Secondary Distribution Summary as per the Simultaneous Equations Method.

8] A manufacturing company has two production dept. X & Y and 3 service dept: time keeping, stores and maintenance. The departmental summary showed the following expenses for October 2021:

	Rs.	Rs.
Production dept:		
X	16,000	
Y	10,000	26,000
Service dept:		
Time keeping	4,000	
Stores	5,000	
Maintenance	3,000	12,000
	Total	38,000

The other information is:

Particulars	*Production dept*		*Time Keeping*	*Stores*	*Maintenance*
	X	*Y*			
No. of employees	40	30	20	16	10
No. of stores requisition	24	20	-	-	6
Machine hours	2,400	1,600	-	-	-

You are required to make departmental allocation of expenses. (Starting from time-keeping & using step-ladder)

9] A company has 4 dept. L,M,& N which are production dept. and K which is service dept. Cost of dept. K is apportioned on the basis of wages paid.

The costs for the year 2021 were:

	Rs
Rent	21,000
Repairs to plant	1,26,000
Depreciation of plant	9,450
Light and power	2,100
Supervision, etc.	31,500
Repairs to building	8,400

The following information about these dept. is available and is used as a basis for distribution:

Departments	*Area Sq. meters*	*No. of employees*	*Wages paid* Rs	*Value of plant* Rs
L	1,500	20	1,26,000	3,15,000
M	1,100	55	84,000	1,89,000
N	900	10	63,000	1,26,000
K	500	5	42,000	-

Apportion these costs to Production Departments.

Comprehensive

10] PHC Ltd is a manufacturing Company having three Production Departments, 'A', 'B' and 'C and two Service Departments 'X' and T. The following is the budget for December 2021 -

Particulars	A	B	C	X	Y
Direct Material Rs.	1,000	2,000	4,000	2,000	1,000
Direct Wages Rs.	5,000	2,000	8,000	1,000	2,000
Area in Square feet	500	250	500	250	500
Cost of Assets Rs. lakhs	20.00	40.00	20.00	10.00	10.00
HP of Machines	50	40	20	15	25
Machine Hours	1,000	2,000	4,000	1,000	1,000

Overheads to be apportioned among the various departments are -
Factory Rent - Rs 40,000, Power - Rs 25,000, Depreciation - Rs 10,000, - Sundries Rs 90,000
Technical assessment for the apportionment of expense of Service Departments is as under

Department	A	B	C	X	Y
X		15%	75%	-	10%
Y	60%	35%	-	5%-	

1. Prepare a statement showing distribution of overheads to various departments.
2. Prepare a statement showing re-distribution of Service Department's Expenses to Production Departments.
3. Compute the Machine Hour Rates of the Production Departments 'A'.'B' and 'C.

11] In the above sum assuming that the primary distribution is same & secondary distribution is as follows

Department	A	B	C	X	Y
X	45%	15%	30%	—	10%
Y	60%	25%	10 %	5%	—

You are required to prepare
(i) A statement showing distribution of overheads to various departments.
(ii) A statement showing re-distribution of service department's expenses to production departments.
(iii) Machine hour rates of the production departments 'A','B' and 'C'.

12] The company has two production dept. and two service depts. The data relating to period are as under.

	Production Departments.		*Service Departments*	
	PD1	*PD2*	*SD1*	*SD2*
Direct materials (Rs)	80,000	40,000	10,000	20,000
Direct wages (Rs)	95,000	50,000	20,000	10,000
Overheads (Rs)	80,000	50,000	30,000	20,000
Power requirement at normal capacity operations. (KwH)	20,000	35,000	12,500	17,500
Actual power consumption during the period (KwH)	13,000	23,000	10,250	10,000

The power requirements of these dept are met by the power generation plant. The said plant incurred an expenditure, which is not included above, of Rs 1,21,875 out of which a sum of Rs 84,375 was variable and the rest fixed.

After apportionment of power generation plant costs to the four dept., the service dept. overheads are to be redistributed on the following bases:

	PD1	PD2	SD1	SD2
SD1	50%	40%	-	10%
SD2	60%	20%	20%	-

You are required to :

i. Apportion the power generation plant costs to the four departments.
ii. Re-apportion service depts. cost to production depts.
iii. Calculate the overheads rates per direct labour hour of production depts., given that the direct wages rates of PD1 and PD2 are Rs 5 & Rs 4/hour respectively.

13] A company has three production departments A, B and C and two service departments, X and Y. The following data are extracted from the records of the company for a particular period.

Sr. No.	Particulars	Amount (Rs)
01	Rent and Taxes	25,000
02	General lighting	3,000
03	Indirect Wages	7,500
04	Power	7,500
05	Depreciation of Machinery	50,000
06	Sundries	50,000

Additional Data

Particulars	Total	Dept. A	Dept. B	Dept. C	Dept. X	Dept. Y
Direct Wages (Rs)	50,000	15,000	10,000	15,000	7,500	2,500
Horsepower of Machines	150	60	30	50	10	—
Cost of Machinery (Rs)	12,50,000	3,00,000	4,00,000	5,00,000	25,000	25,000
Production hrs worked	—	6226	4028	4066	—	—
Floor space (sq.mtrs)	10,000	2,000	2,500	3,000	2,000	500
Lighting points (Nos.)	60	10	15	20	10	05

Service Departments' Expenses Allocation :-

Department	A	B	C	X	Y
X (%)	20	30	40	—	10
Y (%)	40	30	20	10	—

You are required to prepare primary and secondary distribution summary according to repeated distribution system.

14] In an Engineering Factory, the following particulars have been extracted for the quarter ended 31st December, 2021. Compute the departmental overhead rate for each of the production departments, assuming that overheads are recovered as a percentage of direct wages.

	Production Depts.			**Service Depts.**	
	A	**B**	**C**	**X**	**Y**
Direct Wages (Rs)	30,000	45,000	60,000	15,000	30,000
Direct Material	15,000	30,000	30,000	22,500	22,500
No. of workers	1,500	2,250	2,250	750	750
Electricity KWH	6,000	4,500	3,000	1,500	1,500
Assets Value	60,000	40,000	30,000	10,000	10,000
No. of Light points	10	16	4	6	4
Area Sq. Yards	150	250	50	50	50

The expenses for the period were:

	Rs
Power	1,100

Lighting	200
Stores Overhead	800
Welfare of Staff	3,000
Depreciation	30,000
Repairs	6,000
General Overheads	12,000
Rent and Taxes	550

Apportion the expenses of Service Dept. Y according to direct wages and those of Service Department X in the ratio of 5: 3 : 2 to the production departments.

Machine Hour Rate

15] The budgeted working conditions of a Cost Centre are as follows:

Normal working per week	42 hrs.
No. of machines	14
Normal weekly loss of hours on maintenance etc.	5 hrs./machine
No. of weeks worked per year	48
Estimated annual overheads	Rs 1,24,320

You are required to Calculate the overheads rate per machine hour; and

16] A machine was purchased on 1st January, 2021 for Rs5 lakhs. The total cost of all machinery inclusive of the new machine was Rs 75 lakhs. The following further particulars were available.
Expected life of the machine – 10 years
Scrap value at the end of the life – Rs.50,000
Repairs and maintenance for the machine during the year Rs.28,000
Expected number of working hours of the machine per year 4,000
Insurance premium annually for all machines Rs. 12,00,000
Power consumption for the machine per hour = 25 units @ Rs 5 per unit
Area occupied by the machine – 100 sq feet
Area occupied by other machines – 1,500 sq. feet
Rent per month of the department Rs. 80,000
Lighting charges for 20 points for the whole department out of which three points are for the new machine – Rs.12,000 per month
Compute the machine hour rate for the machine.

17] A manufacturing unit has added a new machine to its fleet of five existing machines. The total cost of purchase and installation of the machine is Rs 7,50,000. The machine has an estimated life of 15 years and is expected to realise Rs 30,000 as scrap at the end of its working life.
Other relevant data are as follows:

i. Budgeted working-hours are 2,400 based on 8 hours per day for 300 days. This includes 400 hours for plant maintenance.
ii. Electricity used by the machine is 15 units/hour at a cost of Rs 8.00/unit. No current is drawn during maintenance.
iii. The machine required special oil for heating which is replaced once in every month at a cost of Rs 2,500 on each occasion.
iv. Estimated cost of maintenance of the machine is Rs 500/week of 6 working days.
v. 3 operators control the operations of the entire battery of 6 machines and the average wage per person amounts to Rs 450/week plus 40% fringe benefits.
vi. Departmental and general works overheads allocated to the machine shop during the last year were Rs 60,000. During the current year it is estimated that there will be an increase of 12.5% of this amount. No incremental overheads are envisaged for the installation of the new machine.

You are required to compute the machine hour rate for recovery of the running cost of the machine.

18] A machine costs Rs2,00,000 and is deemed to have a scrap value of 5% at the end of its effective life of 19 years. Ordinarily the machine is expected to run for 2,400 hours per annum, but it is estimated that 150 hours will be lost for normal repairs and maintenance and a further 750 hours will be lost in normal shut-down. The other details for the machine shop are –

Wages, Bonus and PF Contribution for each of two operators (each operator is in charge of 2 machines)	Rs60,000 per annum
Rent and Rates for the shop	Rs30,000 per annum

General Lighting of the shop	Rs2500 per month
Quarterly Insurance Premium for the machine	Rs2000
Repairs and Maintenance - average - for a machine	Rs2500per month
Shop Supervisor's Salary	Rs25000 per month
Power Consumption of machine per hour	2 units [Cost of Power = Rs 450 per 100 units]
Other Factory Overheads attributable to the shop	Rs42,000 per annum

Compute the comprehensive machine hour rate on the basis of the following additional information -

- There are 4 identical machines in the Shop,
- The Supervisor is expected to devote 1/5th of his time towards this Shop.

19] Calculate the machine hour rate of a machine with information given below:

Operating data:	
Total no. of weeks per quarter	13
Total no. of hours per week	48
Stoppage due to maintenance	8hrs.p.m.
Time taken for set-up	2hrs/week
Cost details:	
Cost of machine	Rs 2,00,000
Repair and maintenance	Rs 24,000 p.a.
Consumable stores	Rs 30,000 p.a.
Rent, rates and taxes	Rs 8,000/quarter
Operator's wages	Rs 3,000 p.m.
Supervisor's salary	Rs 5,000 p.m.
Cost of power	15 units/hour at Rs 3/unit

Notes:

i. Life of the machine is 10years. Depreciation is provided on straight line basis and is treated as variable cost.
ii. Repairs and maintenance and consumable stores are variable cost.
iii. Power is consumed for production runs only and not for set-up & maintenance.
iv. The supervisor is supervising work on five identical machines including the one now considered.

20] In Rajni Ltd, Machine Hour Rate is worked out at the beginning of the year on the basis of 13-week period, which is equivalent to 3 calendar months. The following estimates for operating a machine are provided to you.

1.	Total hours available per week:	45 hours
2.	Maintenance Time included in above:	2 hours
3.	Setting-up Time included in above:	2 hours
4.	Operator's Wages per month:	Rs 10,500
5.	Supervisor's Salary per month:	Rs 36,000 (common supervisor for 3 machines)
6.	WDV of machine	Rs 3,80,000 (depreciation at 10% p.a.)
7.	Repairs and Maintenance per annum:	Rs 24,000
8.	Consumable Stores per annum:	Rs 36,000
9.	Rent & Rates for the quarter (apportioned):	Rs 9,000

Power is consumed at the rate of 10 units per hour at the rate of Rs 5.50 per unit. Power is required for productive hours only. You are required to determine the machine hour rate.

Special

21] From the following data of textile machine room, Compute the hourly machine rate, assuming that the machine room will work on 90%capacity throughout the year and that a breakdown allowance of 10% is reasonable.

There are 3 holidays at Deepavali, 2 holidays at Holi, 2 holidays at X-mas, exclusive of Sundays. The factory works 8 hours a day on 5-days and 4 hours on Saturdays. There are 40 machines in a room. Following is the total Cost of the shop (in '000)

	Per annum
Power	Rs 3,120
Lighting	640
Salaries of foremen	1,200
Lubricating oil	66
Repairs of machines	1,446
Depreciation	785
Total	7,257

22] A manufacturing unit has purchased and installed a new machine of Rs 12,70,000 to its fleet of 7 existing machines. The new machine has an estimate life of 12 years and is expected to realise Rs 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 300 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 Rs 25,000 p.a.
3. The machine requires a special chemical solution, which is replaced at the end of every week (6 days in a week) at a cost of Rs 4000 each time.
4. Four Operators control operation of 8 machines and the average wages per person amounts to Rs420 per week plus 15% fringe benefits.
5. Electricity used by the machine during production is 16 units per hour at a cost of Rs 5 per unit. No current is taken during maintenance and set up.
6. Departmental and General Works Overhead allocated to the operation during last year was Rs 50,000. During the current year, it is estimated to increase by 10% of this amount.

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

Treatment of Under/Over-Absorbed Overhead.

23] The overheads absorbed were Rs 6,25,000 while the overheads incurred were Rs 7,50,000. The balances on 31st March were WIP A/c - Rs 2,25,000, FG A/c - Rs 2,50,000 & COS A/c Rs 45,00,000.
It is estimated that 40% of the difference is due to abnormal reasons. Give the treatment of the difference in the cost accounts. Show journal entry. What will be the impact on the profits of the year of the above treatment?

24] A company has estimated its overhead absorption rate @ Rs 6 per machine hour. During the year the overheads incurred were Rs 3,95,000 and the hours worked were 70,000 machine hours. The cost records showed the following units :- WIP closing balance – 8,000 units (estimated to be 60% complete), FG closing balance – 10,000, Units sold – 35,200. It is estimated that 50% of the difference is due to abnormal reasons. Give the treatment of the difference in the cost accounts. Show journal entry. What will be the impact on the profits of the year of the above treatment?

25] A Company uses a historical cost system and applies overheads on the basis of predetermined rates. The following are the figures from the Trial Balance as at 30* September.

Factory OH - Rs 4,26,544 (Dr.); WIP Stock-Rs 1,41,480 (Dr.)
Factory OH absorbed - Rs 3,65,904 (Cr.); Finished Goods Stock - Rs 2,30,732 (Dr.);
Cost of Goods Sold - Rs 8,40,588 (Dr.)

Give disposal of under-absorbed OH and show the profit implication under two methods viz

a) Entire amount of under-absorbed OH is abnormal
b) Entire amount of under-absorbed OH is normal

26] The cost accounts of ABC Chemicals Ltd., determined the overhead recovery rate for the year 2021 –21 (based on direct labor hours) with the following estimates.
Indirect labor Rs1,15,000
Inspection Rs70,000
Factory supervision Rs50,000
Depreciation and maintenance Rs1,25,000
Total Factory Overheads Rs3,60,000
Direct labor hours - 75,000
The actual results for the year are as follows

Particulars	Amount in Rs
Indirect labor	99,000
Inspection	73,000
Factory supervision	51,000

Depreciation and maintenance	1,15,000
Total actual factory overheads	3,38,000
Direct labor hours	Hrs 67,600

Calculate the predetermined overhead recovery rate and find out the amount of over/under absorption if any. How will you treat the over/under absorption amounts in Cost Accounts?

27] XYZ Ltd., uses a historical cost accounting system and absorbs overheads on the basis of predetermined rates. The following data are available for the year ended 31st March, 2021.

Particulars	Amount in
Manufacturing overheads	
Amount actually spent	1,70,000
Amount absorbed	1,50,000
Cost of goods sold	3,36,000
Stock of finished goods	96,000
Work in progress	48,000

Using two methods of disposal of under/absorbed overheads show the implication on the profits of the company under each method.

28] The total overhead expenses of a factory are Rs 4,46,380. Taking into account, the normal working of the factory, overhead was recovered in production at Rs 1.25 per hour. The actual hours worked were 2,93,104. 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 labor and the remaining 50% was due to factory inefficiency. Also give the profit implication of the method suggested.

29] In a manufacturing unit overhead was recovered at a pre-determined rate of Rs 20 per labour hour. The total factory overhead incurred and the labour-hours actually worked were Rs 45,00,000 and 2,00,000 labour-hours respectively. During this period 30,000 units were sold. At the end of the period 5,000 units were held in stock while there was no opening stock of finished goods. Similarly, though there was no stock of uncompleted units at the beginning of the period, at the end of the period there were 10,000 uncompleted units, which may be reckoned at 50% complete. On analysing the reasons, it was found that 60% of the unabsorbed over-heads were due to defective planning and rest were attributable to increase in overhead costs. How would unabsorbed overheads be treated in cost accounts?

<u>Special</u>

30] ABC Ltd. manufactures a single product and absorbs the production overheads at a predetermined rate of Rs 10/machine hour.

At the end of financial year 2021-21, it has been found that actual production overheads incurred were Rs 6,00,000. It included Rs 45,000 on account of 'Written off' obsolete stores and Rs 30,000 being the wages paid for the strike period under an award.

The production and sales data for the year 2021-22 is as under:

Production:

Finished goods 20,000 units

Work-in-progress (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 1/3rd of the under-absorption of production overheads was due to lack of production planning and the rest were attributable to normal increase in costs.

You are required to:

i. calculate the amount of under-absorption of production overheads during the year 2021-22; and
ii. Show the accounting treatment of under-absorption of production overheads.

<u>Missing Values In Overhead Rates</u>

31] A manufacturing company has three production dept. (A,B & C) and 1 service dept. in its factory. A predetermined overheads absorption rate is established for each of the production dept. on the basis of machine hours at normal capacity. The overheads of each production dept. comprise of directly allocated expenses and a share of the overheads of the service dept., apportioned in the ratio 3:2:5 to depts. A,B,C respectively. All overheads are classified as fixed. Actual overheads incurred in each dept. was as per budget. Calculate the missing figures from (i) to (viii) in the table below.(Working should be clearly shown).

The following incomplete information is available concerning the apportionment and absorption of production overheads for a period:

	Production Department		
	A	B	C
Budgeted allocated expenses (Rs)	1,43,220	1,25,180	2,13,700
Budgeted service dept apportionment (Rs)	i	ii	66,300
Normal machine capacity (hours)	15,000	iii	iv
Predetermined absorption rate (Rupees per machine hours)	v	8.2	vi
Actual machine utilization (hours)	vii	19,050	19,050
Over/under absorption of overheads (Rs)	(3,660)	viii	(6,720)

SELLING & DISTRIBUTION OVERHEADS

32] Marketing Division of a Company wishes to discontinue the sales of the one of the products in view of unprofitable operations. Following details are available with regards to turnover costs and activity for the year ending 30 June 2021:

Products				
	P Rs	Q Rs	R Rs	S Rs
Sales Turnover	6,00,000	10,00,000	5,00,000	9,00,000
Cost of sales	3,50,000	8,00,000	3,70,000	1,80,000
Storage Area (Sq. m.)	40,000	60,000	70,000	30,000
No. of Cartons sold	2,00,000	3,00,000	1,50,000	3,50,000
No. of Bills Raised	1,00,000	1,20,000	80,000	1,00,000

Overhead costs and basis of apportionment are:

Fixed Expenses:	Rs	*Basis of apportionment.*
Administrative Wages and Salaries	1,00,000	No. of Bills raised
Salesmen's Salaries and Expenses	1,20,000	Sales Turnover
Rent and Insurance	60,000	Storage area
Depreciation	20,000	No. of Cartons
Variable Costs:		
Commission	4% of sales	
Packing materials and wages	50 paise per carton	
Stationery	20 paise per Bill	

Based on the above data you **are required to:**

i. Prepare a statement showing summary of Selling and Distribution Costs to the products, and
ii. Prepare a Profit and Loss statements showing contribution and profit or loss on sale of each of the products to enable the marketing dept. taken an appropriate decision on discontinuance of the sale of a product.

33] A company produces a single product in three sizes, A, B and C. Prepare a statement showing the selling and distribution expenses apportioned over three sizes on the basis indicated and express the total appropriated to each size as Cost per unit sold. The expenses and basis of apportionment are as follows,

Expenses	Amount Rs	Basis of Apportionment
Sales salaries	10,000	Direct charge
Sales commission	6,000	Sales turnover
Sales office expenses	2,096	Number of orders
Advertising - specific	22,000	Direct charge
Advertising - general	5,000	Sales turnover
Packing	3,000	Size of product
Delivery expenses	4,000	Size of product
Credit collection expenses	1,296	Number of orders
Warehouse expenses	1,000	Size of product

Data relating to the three sizes:

Particulars	Total	Size A	Size B	Size C
Number of salesmen, all paid same salary	10	4	5	1
Number of orders	1,600	700	800	100
% of specific advertising	100	30	40	30
Number of units sold	8,240	3, 440	3, 200	1, 600
Sales turnover	Rs 2,00,000	Rs 58,000	Rs 80,000	Rs 62,000
Capacity in cubic m. per unit		5	8	17

Sums for Extra Practice

34] A factory has 3 production departments (P1, P2, P3) and 2 service departments (S1 & S2). The following overheads & other information are extracted from the books for the month of January 2021.

Expense	Amount Rs
Rent	6,000
Repair	3,600
Depreciation	2,700
Lighting	600
Supervision	9,000
Fire Insurance for stock	3,000
ESI contribution	900
Power	5,400

Particulars	P1	P2	P3	S1	S2
Area sq ft	400	300	270	150	80
No. of workers	54	48	36	24	18
Wages	18,000	15,000	12,000	9,000	6,000
Value of plant	72,000	54,000	48,000	6,000	
Stock Value	45,000	27,000	18,000		
Horse power of plant	600	400	300	150	50

Allocate or apportion the overheads among the various departments on suitable basis.

35] The New Enterprises Ltd. has three producing departments A,B and C two service Departments D and E. The following figures are extracted from the records of the Co.

	Rs
Rent and Rates	5,000
General Lighting	600
Indirect Wages	1,500
Power	1,500
Depreciation on Machinery	10,000
Sundries	10,000

The following further details are available:

	A	B	C	D	E
Floor Space (Sq.Mts.)	2,000	2,500	3,000	2,000	500
Light Points	10	15	20	10	5
Direct Wages	3,000	2,000	3,000	1,500	500
H.P. of machines	60	30	50	10	--
Working hours	6,226	4,028	4,066	--	--
Value of Material	60,000	80,000	1,00,000	--	--
Value of Assets	1,20,000	1,60,000	2,00,000	10,000	10,000

The expenses of D and E are allocated as follows:

	A	B	C	D	E
D	20%	30%	40%	--	10%
E	40%	20%	30%	10%	--

What is the factory cost of an article if its raw material cost is Rs50, labour cost Rs30 and it passes through Departments A, B and C. For 4, 5 & 3 hours respectively.

36] The summary as per primary distribution is as follows: Production departments A- Rs2400; B- Rs2100 & C- Rs1500 Service departments X – Rs700; Y- Rs900
Expenses of service departments are distributed in the ratios of:
X dept. : A- 20%, B- 40%, C- 30% and Y- 10% Y dept. : A- 40%, B- 20%, C- 20% and X- 20%
Show the distribution of service costs among A, B and C under repeated distribution method.

37] In a machine department of a factory there are five identical machines. From the particulars given below prepare the machine hour rate for one of the machines.
Space of the department 10,000 sq.mts.
Space occupied by the machine 2,500 sq.mts.
Cost of the machine (Rs) 20,000
Scrap value of the machine (Rs) 300
Estimated life of the machine 13 years
Depreciation charged at 7 ½ % p.a
Normal running of the machine 2,000 hours
Power consumed by the machine as shown by the meter Rs 3,000 p.a
Estimated repairs and maintenance throughout the working life of the machine (Rs) 5,200
Sundry supplies including oil, waste etc. charged direct to the machine amount to Rs 600 p.a.
Other expenses of the department are : Rs
Rent and Rates 9,000
Lighting (to be apportioned according to workers employed) 400
Supervision 1,250
Other charges 5,000
It is ascertained that the degree of supervision required by the machine is 2/5th and 3/5th being devoted to other machines. There are 16 workers in the department of whom 4 attended to the machine and the remaining to the other machines.

38] From the following particulars given below compute Machine hour rate for a machine.
a. Cost Rs 24,000
b. Scrap value Rs 4,000
c. Estimated Working life 40,000 hours
d. Estimated cost of repairs and maintenance during the whole life Rs 2,000
e. Standard charges of the shop for 4 weekly period Rs 3,000
f. Working hours in 4 weekly period 100 hours
g. No.of machines in the shop each of which is liable for equal charge are 30 machines.
h. Power used per hour 4 units @ 10p. per unit.

39] The following particulars relate to a processing machine treating a typical material. You are required to calculate the machine hour rate.
The cost of the machine Rs 10,000
Estimated life 10 years
Scrap value Rs1,000
Working time (50 weeks of 44 hrs. each) 2,200 hrs.
Machine maintenance per annum 200 hrs
Setting up time estimated @ 5% of total time
Electricity is 16 units per hour @ 10 paise per unit.
Chemicals required weekly Rs 20
Maintenance cost per year Rs 1,200
Two attendants control the operations of the machine together with 6 other machines, their combined weekly wages are Rs 140-. Departmental overhead allocated to this machine per annum Rs 2,000

40] At Ltd engineering Co. having 25 different types of automatic machines, furnishes you the following data for 2021-22 in respect of machine B:
1. Cost of the machine Rs50,000; Life - 10 years Scrap value is nil
2. Overhead expenses are:
   Factory Rent Rs 50,000 p.a.
   Heating and Lighting Rs40,000 p.a.
   Supervision Rs 1,50,000 p.a
   Reserve equipment of machine B Rs 5,000 p.a.
   Area of the factory 80,000 sq.ft.

Area occupied by machine B3,000 sq.ft.

3. Wages of operator is Rs 24 per day of 8 hours including all fringe benefits. He attends to one machine when it is under set up and two machines while under operation.
4. Estimated production hours 3,600 p.a.
   Estimated set up time 400 hrs.p.a.
   Power Rs 0.5 per hour

Fix dual machine hour rate and find the cost of the following jobs:

	JOB 1102	JOB 1308
Set up time (Hrs.)	80	40
Operation time (Hrs.)	130	160

41] You are required to calculate the machine hour rate from the following particulars.

a. Cost of the machine Rs10,000/- its estimated working life is 10 years and the estimated scrap value at the end of its life is Rs1,000. The estimated working time per year (50 weeks of 40 hours each) is 2,000 hours.
b. Electricity used by the machine is 16 units per hour at the cost of Rs0.10 per unit.
c. The machine requires a chemical solution which is replaced at the end of each week at cost of Rs200/- each time.
d. The estimated cost of maintenance per year is Rs3,600.
e. Two attendants control the operation of the machine together with five other identical machines their combined week wages amount to Rs120.
f. Departmental and General works overheads allocated to the machine for the year were Rs2,000.

42] The overhead expenses of a factory are allowed on the machine hour method. You are required to calculate the hourly rate for a certain machine from the following information:

Cost	Rs58,000
Estimated scrap value	Rs3,000
Estimated working life	20,000 hours
Estimated cost of maintenance during working life of machine	Rs12,000
Power used for machine	Rs1 per hour
Rent, rates etc. per month (10% to be charged for this machine)	Rs1,500
Normal machine running hours during a month	180 hours
Standing charges other than rent, rates etc. per month	Rs200

43] An engineering company, engaged in the manufacture of various heavy engineering products, has installed one Horizontal Borer for specialized manufacturing operations. Calculate the machine hour rate on the basis of the following particulars:

1. F.O.B cost of machine – Rs 24 lakhs.
2. Customs duty, insurance, freight etc. – Rs 11 lakhs.
3. Installation expenses – Rs 3 lakhs.
4. Cost of tools adequate for 2 years only – Rs 4 lakhs.
5. Cost of machine room – Rs 3 lakhs.
6. Cost of air-conditioning for the machine Room – Rs 2 lakhs.
7. Rate of interest on term-loan to finance the above capital expenditure – 12% per annum.
8. Salaries etc. for operators and supervisory staff – Rs 2 lakhs per year.
9. Cost of electricity – Rs 11 per hour.
10. Consumption of the stores – Rs 5,000 per month.
11. Other expenses – Rs 5 lakhs per annum.
12. Assume rate of depreciation 10% per annum on Fixed Assets.
13. Total working hours in the Machine Room is 20,000 hours a month.
14. Loading & unloading time is 10% of the total time.

You can make suitable assumptions, if necessary, for the purpose of your

44] Your company uses a historical cost system and applies overheads on the basis of "Predetermined" rates. The following are the figures from the Trial Balance as at 30-9-2021:-

	Dr. (Rs)	Cr. (Rs)
Manufacturing overheads	7,36,566	---
Manufacturing overheads-applied	---	5,43,526
Work-in-progress	2,31,780	---
Finished Goods Stock	3,80,532	---
Cost of Goods Sold	9,90,788	---

Give two methods for the disposal of the under absorbed overheads and show the profit implications of the method.