5 CHAPTER

Overheads

Meaning of Overheads	• It is the cost which cannot be conveniently traced to or identified with any particular cost unit. • Generally, it is the aggregate of indirect material cost, indirect labour cost and indirect expenses. • It is also known as indirect or supplementary costs.
Classification of Overheads	• It means determination of categories, classes or groups in which overheads costs may be sub–divided. • It can be done on various basis which are as follows: ➢ On the basis of function ➢ On the basis of nature ➢ On the basis of element ➢ On the basis of control
Overheads on the basis of Function	• Under this basis, overheads are classified as factory overheads, office and administrative overheads and selling and distribution overheads. • **Factory Overheads** – It represent all those indirect costs that are incurred in the manufacturing process e.g. stock keeping expenses, consumable stores, factory rent, depreciation of plant, etc. • **Office and Administrative Overheads** – It represents costs which are associated with the general management and administration of the organization e.g. office rent, directors fees, depreciation of office building, accounts and audit expenses etc. • **Selling and Distribution Overheads** – It represents all the expenses incurred for selling and distribution of products e.g. salaries of sales staff, commission, sales promotion expenses, delivery van expenses, transit insurance etc.
Overheads on the basis of Nature	• **Variable Overheads** – These costs vary with the volume of activity. Generally, these tend to vary in same proportion as of output. E.g. indirect material, lubricants etc. • **Fixed Overheads** – These costs are incurred period wise and doesn't vary upto a certain output limit. E.g. depreciation of plant, salary paid to permanent employees, insurance etc. • **Semi-Variable Overheads** – These costs contain both fixed and variable components and are thus partly affected by fluctuations in the level of activity. E.g. telephone and internet expenses, electricity cost etc.

Overheads on the basis of Element	• **Indirect Material –** These don't form part of finished product (cost object) e.g. lubricants, cleaning cloth etc. • **Indirect Labour –** These can't be allocated but can be apportioned e.g. foreman salary, supervisor salary etc. • **Indirect Expenses –** These are expenses other than direct expenses e.g. insurance, depreciation, advertisement etc.
Overheads on the basis of Controllability	• **Controllable Costs –** These can be controlled by the managerial influence and proper policies e.g. wages and salary, material cost etc. • **Uncontrollable Costs –** These can't be controlled by managerial influence e.g. depreciation, rent etc.
Advantages of classifying overheads into fixed and variable	• Helps in the ascertainment of marginal cost. • It helps in controlling costs. • It helps in the preparation of flexible budget. • It helps in determining separate absorption rates for fixed and variable overheads. • It helps in decision making.
Steps for Accounting and Control of Overheads	• Estimation and collection of data related to overheads • Distribution of overheads by allocation, apportionment and re-apportionment. • Absorption of overheads to the cost object or cost unit or cost centre • Calculating and treating over and under absorption of overheads
Allocation of Overheads	• It is the process of charging the full amount of cost directly to a cost centre for which it was incurred. • E.g. salary paid to indirect worker can be allocated to the respective departments. • These are also called as traceable overheads because they can be traced to the specific department.
Apportionment of Overheads	• It is the process of charging the common costs to various cost centers on some basis. • Overheads which are not wholly incurred for a particular department are apportioned only. • E.g. factory rent is paid as a whole, so it should be apportioned to all departments.
Re-apportionment of Overheads	• It is the process of charging the service department expenses to the production department. • Methods for Re-apportionment are as follows: ➢ Direct re-distribution method ➢ Step method or non-reciprocal method ➢ Reciprocal method ➢ Simultaneous equation method ➢ Trial and error method ➢ Repeated distribution method

Absorption of Overheads	• It is the process of charging or recovering or absorbing of overheads from the output produced in respective departments. • In other words, it is the allotment of overheads to cost units by means of rates separately calculated for each cost centre. • Variable manufacturing overheads are absorbed on the basis of actual production. • Fixed manufacturing overheads are absorbed on the basis of normal capacity.
Methods of Absorption of overheads	• A method of overhead absorption is considered appropriate if the total amount of overhead absorbed in a period does not fluctuate materially from the actual expenses incurred in the period. • **Direct Material Cost Percentage Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total Direct Labour Cost}}$ ➢ This method is suitable: ◆ where the prices of material don't fluctuate much. ◆ where the output is uniform ◆ where the proportion of overheads tot total cost is insignificant • **Direct Labour Cost Percentage Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total Direct Labour Cost}}$ ➢ This method is suitable: ◆ where labour is the major factor of production ◆ where labour rates do not fluctuate widely ◆ where both labour employed and work done are of uniform type. • **Prime Cost Percentage Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total Prime Cost}}$ ➢ This method is suitable: ◆ where output is uniform ◆ where both the quantity of direct materials and direct labour hours are constant • **Labour Hour Rate Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total Labour Hours}}$ ➢ This method is suitable where manual labour is a dominant factor of production. • **Machine Hour Rate Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total Machine Hours}}$ ➢ This method is suitable where major portion of production is performed by machinery.

	• **Rate Per Unit of Output Method** ➢ $\text{Absorption Rate} = \frac{\text{Total overheads of the cost centre}}{\text{Total units}}$ ➢ This method is suitable where similar type of goods are produced in large quantities.
Types of Overhead Rates	• Normal Rate = $\frac{\text{Actual amount of overheads}}{\text{Actual base}}$ • Pre-determined Rate = $\frac{\text{Budgeted amount of overheads}}{\text{Budgeted base}}$ • Blanket Rate = $\frac{\text{Total overheads of the factory}}{\text{Total base}}$ • Departmental Rate = $\frac{\text{Overheads of the particular department}}{\text{Actual base of the department}}$
Blanket Overhead Rate	• It is one single overhead absorption rate for the whole factory. • Blanket Overhead Rate = $\frac{\text{Budgeted production overhead costs for the whole factory}}{\text{Total units of the selected base}}$ • It involves disadvantages of too much averaging. • It is useful in companies producing a main product in continuous processes, e.g. chemical plant, glass factory etc. • It should be applied in case ➢ when company deals in only one major product ➢ In case of multiple products, the product must pass through all departments with same length of time in each department.
Over and Under recovery of overheads	• Overheads are absorbed on the basis of pre-determined rates, which are based on budgeted output and budgeted overheads. • But actual output or overheads may be different from budgeted. • As a result absorbed overheads may be more (Over absorption) or less (Under absorption).
Treatment of Under or Over absorbed overheads	• Use of Supplementary Rate ➢ It is used when: a. There is a serious estimation errors b. When there is a substantial change in the level of activities c. When there is a major change in the production method d. In case of contract on cost plus basis. ➢ There are two types of supplementary rates viz. positive and negative ➢ Under absorption is corrected by using positive supplementary rate, i.e., the unrecovered amount of overhead cost is added to the cost of sales, work-in-progress and unsold stock. ➢ Over absorption is corrected by using negative supplementary rate, i:e., the excess recovery of overhead cost is deducted from the cost of sales, work-in-progress and unsold stock

	• Carry Over of Overheads ➢ It is to be used when it is hoped that an over absorption in the current period will be more or less neutralized by under absorption in the next period and vice versa. ➢ E.g. in case of seasonal industries or cyclical businesses or in case of new projects ➢ The criticism against this method is that overheads of a particular period are not charged to that period entirely. ➢ Carryover of overheads adversely affects inter-temporal comparisons which may hinder managerial planning and control. • Transfer to Costing Profit and Loss Account ➢ It is to be used if under or over absorption is of relatively very small value or due to abnormal factors like fire, strike etc. ➢ The amount of under or over absorption due to above factors should be charged to the costing profit and loss account.
Causes of Under or Over recovery of overheads	• Estimates of overheads may prove erroneous • Actual output buffers from budgeted output • Actual hours worked buffering from budgeted hours • Increase in price of direct materials • Change in wage rate • Change in the ratio of skilled and unskilled workers • Degree of mechanization • Inappropriate method of absorption • Capacity utilization • Seasonal fluctuations • Cyclical fluctuations • Change in work situations
Treatment of administration overheads	• These are costs of formulating the policy, directing the organization and controlling the operation of an undertaking. • E.g. office rent, director's fees, managers' salaries etc. • Treatment ➢ Charge to Costing P&L Account – In this method, administrative over-heads should be treated as fixed cost as they are concerned with the formulation of policy and charged to Costing P&L Account. ➢ Apportionment between production and selling & distribution – In this method, it is assumed that administrative overheads are incurred both for production and for selling & distribution and thus to be divided on some equitable basis amount them. ➢ Treat as separate element of total cost – In this method, administration overheads ore considered as a cost of a distinct and identifiable operation of the organization necessary to carry on its activity and thus are recovered on some equitable basis.

Treatment of Selling & Distribution Overheads	• Selling expenses are incurred for the purpose of promoting, marketing etc. of different products. • Distribution expenses are relating to delivery and dispatch of goods to customers. • Treatment ➢ Allocation or apportionment – In this method, expenses are either allocated or apportioned to the various cost centres or goods on some equitable basis. ➢ Absorption or recovery – In this method, expense are recovered by using any of the methods like percentage on selling price, rate per unit sold etc.
Types of Capacity	• Installed or Rated Capacity • Practical Capacity • Normal Capacity • Actual Capacity • Idle Capacity
Installed or Rated Capacity	• It is the maximum capacity of producing goods or services. • It is determined on the basis of technical specification or technical evaluation. • It is also known as theoretical capacity.
Practical Capacity	• It is actually utilized capacity of plant. • It is also known as operating capacity or net capacity or available capacity. • It is computed after considering repairs, maintenance, idle time etc. • It is also used as a basis for determining overhead rates
Normal Capacity	• It is the capacity expected to be utilized or achieved over a period of time under normal circumstances. • It is computed after adjusting for planned maintenance. • It is also known as average capacity or capacity based on sales expectancy.
Actual Capacity	• It is the capacity actually achieved during the period. • It is presented as a percentage of installed capacity.
Idle Capacity	• It is the capacity which cannot be effectively utilized in production. • It can be either due to normal reasons or abnormal reasons. • Normal idle capacity is the difference between installed capacity and normal capacity i.e. Installed capacity – Normal capacity • Abnormal idle capacity is the difference between normal capacity and actual capacity if actual is lower than normal i.e. Normal capacity – Actual capacity
Treatment of Idle Capacity	• If it is due to unavoidable reasons such as repairs, maintenance etc. than a supplementary rate may be used to recover it from the production. • If it is due to avoidable reasons such as power failure, faulty planning etc. then it should be charged to costing profit and loss account. • If it is due to seasonal factors then, the cost should be charged to cost of production by inflating overhead rates.

Overhead Cost	Bases of Apportionment
1. i. Rent and other building expenses ii. Lighting and heating (conditioning) iii. Fire precaution service iv. Air-conditioning	Floor area, or volume of department
2. i. Perquisites ii. Labour welfare expenses iii. Time keeping iv. Personnel office v. Supervision	Number of workers
3. i. Compensation to workers ii. Holiday pay iii. ESI and PF contribution iv. Perquisites	Direct wages
4. General overhead	Direct labour hour, or direct wages or machine hours
5. i. Depreciation of plant and machinery ii. Repairs and maintenance of plant & machinery iii. Insurance of stock	Capital values
6. i. Power/steam consumption ii. Internal transport iii. Managerial salaries	Technical estimates
7. Lighting expenses (light)	No. of light points or area or metered units
8. Electric power (machine operation)	Horse power or machines, or number of machine hour or value of machines or units consumed
9. i. Material handling ii. Stores overhead	Weight of materials, or volume of materials, or value of materials or unit of materials

Cost of the Service Department	Basis of Re-apportionment
1. Maintenance and repair shop 2. Planning and progress 3. Tool room	Direct labour hours, machine hours, direct labour wages
4. Canteen and welfare 5. Hospital and dispensary 6. Personnel department	No. of direct workers, no. of employees etc.
7. Time-keeping	No. of card punched, no. of employees
8. Computer section	Computer hours, specific allocation to departments
9. Power house (electric lighting cost)	Floor area, cubic content, no. of electric point

Cost of the Service Department	Basis of Re-apportionment
1. Maintenance and repair shop 2. Planning and progress 3. Tool room	Direct labour hours, machine hours, direct labour wages
10. Power house (electric power cost)	Horse power, kwh, horse power hours, kwh hours
11. Stores department	No. of requisition, weight or value of material
12. Transport department	Crane hours, truck hours, truck tonnage etc.
13. Fire protection	Capital values
14. Inspection	Inspection hours

PRACTICAL QUESTIONS

1. SK Ltd. has three production departments and four service departments. The expenses for these departments as per Primary Distribution Summary are as follows: **[SM]**

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.

Ans. ₹34,20,000; ₹29,00,000; ₹26,40,000.

2. SK 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 March 2022: **[SM]**

	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						

	Total (₹)		A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
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 department expenses to production departments using Trial and error method.

Ans. (i) ₹2,70,000; ₹3,70,000; ₹6,00,000; ₹4,75,000; ₹5,35,000; (ii) ₹8,48,200; ₹6,50,500; ₹7,51,300.

3. An engine manufacturing company has two production departments: (i) Mobile and (ii) Boat and two service departments: (i) Maintenance and (ii) Factory. Budgeted cost data and relevant cost drivers are as follows:

Departmental Costs:	₹
Mobile	6,00,000
Boat	17,00,000
Factory	3,00,000
Maintenance	2,40,000
Cost Drivers:	
Factory department:	**No. of employees**
Mobile department	1,080 employees
Boat department	270 employees
Maintenance department	150 employees
	1,500 employees
Maintenance department:	**No. of work orders**
Mobile department	570 orders
Boat department	190 orders
Maintenance department	40 orders
	800 orders

Required:

(a) Compute the cost driver allocation percentage and then use these percentages to allocate the service department costs by using direct method.

(b) Compute the cost driver allocation percentage and then use these percentages to allocate the service department costs by using non-reciprocal method/step method.

Ans. (a) ₹10,20,000; ₹18,20,000; (b) 10,18,500; ₹18,21,500.

4. SK Ltd., have three departments which are regarded as production departments. Service departments' costs are distributed to these production departments using the "Step Ladder Method" of distribution. Estimates of factory overhead costs to be incurred by each department in the forthcoming year are as follows. Data required for distribution is also shown against each department: **[SM]**

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:

(a) Prepare a schedule showing the distribution of overhead costs of the four service departments to the three production departments; and

(b) Calculate the overhead recovery rate per direct labour hour for each of the three production departments.

Ans. (a) ₹3,00,000; ₹1,35,000; ₹1,60,000; (b) ₹75; ₹45; ₹40.

5. M/s SK Limited has its own power plant and generates its own power. Information regarding power requirements and power used are as follows: **[Nov 2018]**

	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 month of May	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 Dept. X renders service to A, B and Y in the ratio of 6:4:2 whereas department Y renders service to A and B in the ratio 4:1. The direct labour hours of Department A and B are 67,500 hours and 48,750 hours respectively. Required:

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

Ans. (1) ₹6,75,000; ₹5,85,000; (2) ₹10; ₹12.

6. From the following data, work out the predetermined machine hour rates for Departments A and B of a factory:

	Preliminary estimates of expenses		
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	– –	
Indirect labour	40,000	– –	
Building maintenance	7,000	– –	

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

(*a*) An increase of 10 per cent in 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 percent on the original value machinery to 12 per cent.

(*d*) 15 per cent general increase in wage rates.

The following information is available:

Dept. A	**Dept. B**	
Estimated direct labour hours	80,000	1,20,000
Ratio of K.W. rating	3	2
Estimated machine hours	25,000	30,000
Floor Space (Sq. ft)	15,000	20,000

Ans. ₹1.95; ₹2.44.

7. 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. **[SM]**

	Product A	**Product B**	**Product C**	**Product D**
Sales (₹)	3,00,000	5,00,000	2,50,000	4,50,000
Cost of sales (₹)	2,00,000	4,50,000	2,10,000	2,25,000
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 and insurance	30,000	Sq. Ft.
Depreciation	10,000	Parcel
Salesmen's salaries and expenses	60,000	Sales volume
Administrative wages and salaries	50,000	No. of invoices
Variable Costs:		
Packing wages & materials	₹0.20 sper parcel	
Commission	4% of sales	
Stationery	₹0.10 per invoice	

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

Ans. 9.50%; –12.10%; –8.80%; 26.40%.

8. The following information relates to the activities of a production department for a certain period in a factory:

Material used	₹72,000
Direct wages	₹60,000
Hours of machine operation	20,000
Labour hours worked	24,000
Overhead chargeable to the department	₹48,000
On one order carried out in the department during the period, the relevant data were:	
Material used	₹4,000
Labour Hours	1,650
Direct Wages	₹3,300
Machine hours	1,200

Prepare a comparative statement of cost of this order by using the following three methods of recovery of overheads:

(i) Direct Labour Hour Rate Method

(ii) Direct Labour Cost Rate Method

(iii) Machine Hour Rate Method

Ans. (i) ₹10,600; (ii) ₹9,940; (iii) ₹10,180.

9. A machine costs ₹90,000 and is deemed to have a scrap value of 5% at the end of its effective life (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 further 750 hours will be lost due to staggering. The other details in respect of the machine shop are:

(i) Wages, bonus and provident fund contribution of each of two operators (each operator is in charge of two machines)	₹6,000 per year
(ii) Rent and rates of the shop	₹3,000 per year
(iii) General Lighting of the shop	₹250 per month
(iv) Insurance premium for the machine	₹200 per quarter

(v)	Cost of repairs and maintenance per machine	₹250 per month
(vi)	Shop supervisor salary	₹500 per month
(vii)	Power consumption of the machine per hour 20 units, rate of power per 100 units	₹10
(viii)	Other factory overheads attributable to the shop	₹4,000 per annum

There are four identical machines in the shop. The supervisor is expected to devote one-fifth of his time for supervising the machine. Compute a comprehensive machine hour rate from the above details.

Ans. ₹12

10. The following particulars refer to process used in the treatment of a material subsequently incorporated in a component forming part of an electrical appliance:

(a) The original cost of the machine used (purchased in January 2015) was ₹10,000. Its estimated life is 10 years, the estimated scrap value at the end of its life is ₹1,000 and the estimated working time per year (50weeks of 44 hours) is 2,200 hours of which machine maintenance etc. is estimated to take up 200 hours. No other loss of working time is expected. Setting up time estimated at 100 hours. (Bank holidays are to be ignored).

(b) Electricity used in the machine during production is 16 units per hour at a cost of 9 p. per unit.

(c) The machine requires a chemical solution which is replaced at the end of each week at a cost of ₹20 each time.

(d) The estimated cost of maintenance per year is ₹1,200

(e) Two attendants control the operation of the machine together with five other identical machines. Their combined weekly wages, insurance and the employer's contributions to holiday pay amount to ₹120.

(f) Department and general works overheads allocated to this machine for the year amounts to ₹2,000.

You are required to calculate the machine- hour rate in each of the following cases:

(i) If setting up time is taken as productive time and the current is taken during setting up

(ii) If setting up time is taken as productive time and the current is not taken during setting up

(iii) If setting up time is taken as unproductive time but current is taken during setting up

(iv) If setting up time is taken as unproductive time and no current is taken during setting up

Ans. (i) ₹4.49; (ii) ₹4.42; (iii) ₹4.73; (iv) ₹4.65.

11. (a) Calculate the machine hour rate of a machine with information given below:

Operating data:

Total number of weeks per quarter = 13

Total number of hours per week = 48

Stoppage due to maintenance = 8 hrs. p.m.

Time taken for set-up = 2 hrs./week

Cost details:

Cost of machine = ₹2,00,000

Repair and maintenance = ₹24,000 p.a.

Consumable stores	=	₹30,000 p.a.
Rent, rates and taxes	=	₹8,000 per quarter
Operator's wages	=	₹3,000 p.m.
Supervisor's salary	=	₹5,000 p.m.
Cost of power	=	15 units per hour at ₹3 per unit

Notes:

(i) Life of the machine is 10 years. Depreciation is provided on straight line basis and is treated as variable cost.

(ii) Repairs and maintenance and consumables stores are variable costs.

(iii) Power is consumed for production runs only and for set-up. But cost of power is to be borne by the total time excluding maintenance stoppages.

(iv) The supervisor is supervising work on five identical machines including the one now considered.

(b) The company hires out excess capacity in the machine shop for outside jobs. Assuming that hire charges are fixed at variable cost plus 20% what rate should be quoted by the company?

Ans. (a) 109.16; (b) ₹91.

12. Work out the Machine Hour Rate for the following machine whose scrap value is Nil;

Details		Amount (₹)
Cost of machine		1,90,000
Freight and installation charges		10,000
Working life		Five years
Repairs and maintenance		40% of Depreciation
Annual power expenses @ 25 paise per unit		₹6,000
Eight hourly day charges:		
(i)	Power	24
(ii)	Lubricant oil	20
(iii)	Consumable Stores	28
(iv)	Wages	80

Ans. ₹47

13. From the following data of textile factory machine room, compute an hourly machine rate, assuming that the machine room will work on 90% capacity throughout the year and that a breakdown allowance of 10%, in addition, is reasonable.

There are 3 days holiday at Deepawali, 2 days at Holi and 2 days Christmas, exclusive of Sundays. The factory works 8 hours a day and 4 hours on Saturday. The year in question is not a leap year.

Number of machines (each of the same type)	40
Expenses:	₹Per annum
Power	3,12,000
Light	64,000
Salaries to foremen	1,20,000

Lubricating oil	6,600
Repairs to machines	1,44,600
Depreciation	78,560
Total	7,25,760

Ans. ₹10

14. A machine shop has 8 identical Drilling Machines run by 6 operators. The machines cannot be worked without an operator wholly engaged on it. The original cost of all these 8 machines works out to ₹8 lakhs. The particulars are furnished for a 6 months period: **[SM, Similar Jan 2021]**

Normal available hours per months	208
Absenteeism (without pay) hours p.m.	18
Leave (with pay) hours p.m.	20
Normal idle time unavoidable hours p.m.	10
Average rate of wages per day of 8 hours	₹20
Production bonus estimated	15% on wages
Value of power consumed	₹8,050
Supervision and Indirect Labour	₹3,300
Lighting and Electricity	₹1,200

Theses particulars are for a year:

Repairs and maintenance including consumable is 3% on value of machines

Insurance ₹40,000

Depreciation 10% on original cost

Other sundry works expenses ₹12,000

General Management expenses – allocated ₹54,530

You are required to work out a comprehensive machine hour rate for the Machine Shop.

Ans. ₹23.86

15. 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: **[MTP – Nov 2018]**

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 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.

Ans. (a) ₹52.50; (b) ₹152.50.

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

[SM, Similar Nov 2022]

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:			
Without the use of computer	600	900	–
With use of computer	400	600	1,000

You are required to compute the machine hour rate:

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

For the individuals job A, B and C

Ans. (a) ₹10; ₹27.50; (b) ₹17; ₹17; ₹27.50.

17. Meerut manufacturing company makes several product lines which are processed through three production departments – X, Y and Z. The information concerning the relevant data for a year is as follows:

	Factory overhead (including share of Service dept.)	Direct Labour Hours	Direct Labour Cost
Department X	₹1,24,000	80,000	₹1,60,000
Department Y	2,30,000	1,15000	2,41,500
Department Z	5,46,000	1,05,000	1,99,500

Production records at the end to the year indicated the following for the product line 'Krish'. 20,000 units

Produced	Dept. X	Dept. Y	Dept. Z
Prime Cost	₹45,000	₹10,500	₹59,500
Direct Labour Hours	10,000	5,000	30,000

You are required to:

(a) Calculate the departmental and plant-wise, over-head rates based on direct labour hours;

(b) Compute the cost of 'Krish' line for the year by using (i) Plant-wise rate and (ii) department rates;

Comment on the results.

Ans. (a) ₹1.55; ₹2; ₹5.20; ₹3; (b) (i) ₹2,96,500; (ii) ₹2,50,000.

18. SE Limited manufactures two products – A and B. The company had budgeted factory overheads amounting to ₹36,72,000 and budgeted direct labour hour of 1,80,000 hours. The company uses pre-determined overhead recovery rate for product costing purposes.

The department-wise break-up of the overheads and direct labour hours were as follows:

Particulars	Budgeted Overheads	Budgeted Direct Labour Hours	Rate per Direct Labour Hour
Department Pie	₹25,92,000	90,000 hours	₹28.80
Department Qui	₹10,80,000	90,000 hours	₹12.00
Total	₹36,72,000	1,80,000 hours	

Additional information:

Each unit of product A requires 4 hours in department Pie and 1 hour in department Qui. Also, each unit of product B requires 1 hours in department Pie and 4 hours in department Qui.

This was the first year of the company's operation. There was no WIP at the end of the year. However, 1,800 and 5,400 units of Products A and B were on hand at the end of the year.

The budgeted activity has been attained by the company. You are required to:

(i) Determine the production and sales quantities of both products 'A' and 'B' for the above year.

(ii) Ascertain the effect of using a pre-determined overhead rate instead of department-wise rates on the company's income due to its effect on stock value.

(iii) Calculate the difference in the selling price due to the use of pre-determined overhead rate instead of using department-wise overhead rates. Assume that the direct costs (material and labour costs) per unit of products A and B were ₹25 and ₹40 respectively and the selling price is fixed by adding 40% over and above these costs to cover profit and selling and administration overhead.

Ans. (i) Production – 18,000; 18,000; Sales 16,200; 12,600; (ii) Profit increase by ₹90,720; (iii) Product A underpriced by ₹35.28 and Product B over priced by ₹35.28.

19. Job No. 198 was commenced on October 10 and completed on November 1. Materials used were ₹6,000 and labour charged directly to the job was ₹4,000. Other information is as follows: **[SM]**

Machine No. 215 used for 40 hours, the machine hour rate being ₹35.

Machine No. 160 used for 30 hours, the machine hour rate being ₹40.

6 welders worked on the job for 5 days of 8 hours each: the direct labour hour per welder is ₹20.

Expenses not included for calculating the machine hour or direct labour hour rate totaled ₹20,000, total direct wages for the period being ₹2,00,000. Ascertain the works costs of job no. 198.

Ans. ₹17,800

20. In a manufacturing unit, overhead was recovered at a predetermined rate of ₹25 per man-day. The total factory overhead expenses incurred and the man-days actually worked were ₹41.50 lakhs and 1.50 lakhs days respectively. **[SM]**

Out of the 40,000 units produced during a period, 30,000 were sold. On analyzing 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. How would unabsorbed overheads be treated in cost accounts?

Ans. Under recovery ₹4,00,000.

21. The total overhead expenses of a factory are ₹4,50,608. Taking into account the normal working of the factory, overhead was recovered from production at ₹1.25 per hour. The actual hours worked were 2,93,104. How would your 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 material and indirect labour and the other 50% was due to factory's inefficiency. Also give the profit implication of the method suggested. **[SM]**

Ans. Under recovery ₹84,228.

22. SK Ltd. manufactures a single product and absorbs the production overheads at a pre-determined rate of ₹10 per machine hour. At the end of current financial year, it has been found that actual production overheads incurred were ₹6,00,000. It includes ₹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 current year is as under: **[SM]**

Production:

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

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.

Calculate the amount of under-absorption of production overheads during the current year

Show the accounting treatment of under-absorption of production overheads.

Ans. Under recover ₹45,000.

23. SK Ltd. has calculated a predetermined overhead rate of ₹22 per machine hour for its Quality Check (QC) department. This rate has been calculated for the budgeted level of activity and is considered as appropriate for absorbing overheads. The following overhead expenditures at various activity levels had been estimated. **[MTP – July 2020]**

Testing Overheads	Number of machine hours
₹3,38,875	14,500
₹3,47,625	15,500
₹3,56,375	16,500

You are required to:

(a) Calculate the variable overhead absorption rate per machine hour

(b) Calculate the estimated total fixed overheads

(c) Calculate the budgeted level of activity in machine hours

(d) Calculate the amount of under/over-recovery of overheads if the actual machine hours were 14,970 and actual overheads were ₹3,22,000.

(e) Analyze the arguments for and against using departmental absorption rates as opposed to a single or blanket factory wide rate.

Ans. (a) ₹8.75; (b) ₹2,12,000; (c) 16,000; (d) Over recovery ₹7,340.

24. SK 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. **[SM, MTP Nov 2020]**

Budgeted overhead rates are used in the production departments to absorb factory overheads to the products. The rate of Department P1 is based on 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:

Cost of department S1 to P1 and P2 equal and

Cost of department S2 to P1 and P2 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:

Department	P1	₹25,50,000	S1	₹6,00,000
	P2	₹21,75,000	S2	₹4,50,000

Budgeted output in units:

Product A – 50,000; B – 30,000

Budgeted raw material cost per unit;

Product A – 120; B – 150.

Budgeted time required for production per unit;

Department P1:	Product – A: 1.5 machine hours
	Product – B : 1.0 machine hours
Department P2:	Product – A: 2 direct labours
	Product – B: 2.5 direct labours

Average wage rates budgeted in Department P2 are: Product A – ₹72 per hour and Product B – ₹75 per hour.

All material are used in Department P1 only.

Actual Data: (for the month of July)

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 P2:

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	P1	₹2,31,000	S1	₹60,000	
	P2		₹2,04,000	S2	₹48,000

You are required to:

(a) Compute the predetermined overhead rate for each production department

(b) Prepare a performance report for July, that will reflect the budgeted costs and actual costs.

Ans. (a) ₹30 per machine hours; ₹15 per labour hour; (b) ₹25,71,000; ₹26,31,000.

PRACTICE QUESTIONS

25. Service department expenses are: **[SM]**

Boiler house	₹3,00,000
Pump Room	₹60,000
Total	₹3,60,000

The allocation basis is:

	Production Department		Service Department	
	A	**B**	**Boiler House**	**Pump Room**
Boiler House	60%	35%	-	5%
Pump Room	10%	40%	50%	-

Ans. ₹2,10,769; ₹1,49,231.

26. Suppose the expenses of two production departments A and B and two service departments X and Y are as under: **[SM]**

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

Prepare a statement apportioning the costs of service departments over the production departments using step method.

Ans. ₹4,60,000; ₹5,10,000.

27. SK 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: **[SM, Similar Nov 2020, Similar RTP May 2020]**

	₹
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 machine 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:

(a) Compute overhead rate per production hour of each production department

(b) 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.

Ans. (a) ₹9.75; ₹15.78; ₹20.52; (b) ₹1,178.17.

28. SK Company has the following account balances and distribution of direct charges on 31st March, 2021. **[RTP – May 2019]**

	Total	Production Dept.		Service Dept.	
		Machine shop	Packing	Gen. Plant	Stores
Allocated Overheads:	(₹)	(₹)	(₹)	(₹)	(₹)
Indirect labour	29,000	8,000	6,000	4,000	11,000
Maintenance material	9,900	3,400	1,600	2,100	2,800
Misc. supplies	5,900	1,500	2,900	900	600
Superintendent's salary	16,000	-	-	16,000	-
Cost & payroll salary	80,000	-	-	80,000	-

Overheads to be apportioned:

Power	78,000
Rent	72,000
Fuel and Heat	60,000
Insurance	12,000
Taxes	8,400
Depreciation	1,20,000

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

	Floor Space (sq. ft.)	Radiator Sections	No. of Employees	Investment	H.P. hours
Machine shop	2,000	45	20	8,00,000	3,500
Packing	800	90	12	2,40,000	500
General Plant	400	30	4	80,000	-
Stores & Maintenance	1,600	60	8	1,60,000	1,000

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.

(b) Determine the service department distribution by simultaneous equation method.

Ans. (a) ₹1,97,250; ₹80,625; ₹1,25,775; ₹87,550; (b) ₹3,38,071; ₹1,53,129.

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

Departments	Expenses (₹)	Area (in Sq. Mtr.)	Number of employees
Main Department:			
Purchase Department	5,00,000	12	800
Packing Department	8,00,000	15	1700
Distribution Department	3,50,000	7	700
Service Department:			
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 Meters' 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.

Ans. (i) ₹7,96,000; ₹12,61,000; ₹5,53,000; (ii) ₹181.74; ₹143.95; ₹189.38.

30. SK Ltd. manufactures luggage trolleys for airports. The factory, in which the company undertakes all of its production, has two production departments- 'Fabrication' and 'Assembly', and two service departments- 'Stores' and 'Maintenance'. The following information have been extracted from the company's budget for the financial year ended 31st March: **[MTP – Nov 2019]**

Allocated Overhead Costs	₹
Fabrication Department	15,52,000
Assembly Department	7,44,000
Stores Department	2,36,000
Maintenance Department	1,96,000
Other Overheads	₹
Factory rent	15,28,000
Factory building insurance	1,72,000
Plant & machinery insurance	1,96,000
Plant & Machinery Depreciation	2,65,000
Subsidy for staffs' canteen	4,48,000

Direct Costs	₹	₹
Fabrication Department:		
Material	63,26,000	
Labour	8,62,000	71,88,000
Assembly Department:		
Material	1,42,000	
Labour	13,06,000	14,48,000

The following additional information is also provided:

	Fabrication Department	Assembly Department	Stores Department	Maintenance Department
Floor area (square meters)	24,000	10,000	2,500	3,500
Value of plant & machinery (₹)	16,50,000	7,50,000	75,000	1,75,000
No. of stores requisitions	3,600	1,400	---	---
Maintenance hours required	2,800	2,300	400	---
No. of employees	120	80	38	12
Machine hours	30,00,000	60,000		
Labour hours	70,000	26,00,000		

Required:

(a) Prepare a table showing the distribution of overhead costs of the two service departments to the two production departments using step method; and

(b) Calculate the most appropriate overhead recovery rate for each department.

(c) Using the rates calculated in part (b) above, calculate the full production costs of the following job order:

Job number IGI2019

Direct Materials	₹2,30,400
Direct Labour:	
Fabrication Department	240 hours @ ₹50 per hour
Assembly Department	180 hours @ ₹50 per hour
Machine hours required:	
Fabrication Department	210 hours
Assembly Department	180 hours

Ans. (a) ₹36,01,649; ₹17,35,351; (b) ₹1.20 per machine hour; ₹0.67 per labour hour; (c) ₹2,51,773.

31. SK Ltd. is an online book retailer. They have 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:

Departments	Revenues	No. 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 Systems	–	21	1,400

Cost incurred in each of four departments for October, 2018 are as follows:

Departments	₹
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 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.

Ans. (i) ₹15,20,668; ₹8,13,131; (ii) ₹15,19,478; ₹8,14,321; (iii) ₹15,20,641; ₹8,13,158.

32. From the details furnished below you are required to compute a comprehensive machine-hour rate: **[MTP – May 2019]**

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

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

Ans. ₹406.85.

33. A machine shop cost centre contains three machines of equal capacities. **[SM, MTP May 2018]**

Three operators are employed on each machine, payable ₹20 per hour each. The factory works for forty-eight hours in a week which includes 4 hours setup time. The work is jointly done by operators. The operators are paid fully for the forty-eight hours. In addition, 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 allocate 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 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 and foreman's salary per annum ₹12,960 and other miscellaneous expenditure per annum ₹18,000.

Required:

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

(b) Calculate the machine hour rate.

Ans. (a) ₹17,513.54; (b) ₹99.51.

34. M/s SK Private Limited has purchased a machine costing ₹29,14,800 and its 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: **[May 2019]**

Repair & Maintenance during the whole life of the machine are expected to be ₹5,40,000.
Insurance premium (per annum) 2% of the cost of the machine
Oil and Lubricants required for operating the machine (per annum) ₹87,384
Power consumptions: 10 units per hour @ ₹7 per unit. No power consumption during repair and maintenance.
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.

Ans. ₹180

35. A manufacturing company has added a new machine to its fleet of eleven existing machines. New machine is purchased for ₹12,70,000 with installation cost of ₹40,000. The machine has an estimated life of 10 years and is expected to realize ₹90,000 as scrap at the end of its useful life. Other relevant data are as follows: **[May 2019]**
Budgeted annual working hours are 2,400 based on 8 hours per day for 300 days. This includes 180 hours for plant maintenance and 120 hours of productive set-up time.
Electricity used by the new machine is 12 units per hour at a cost of ₹6.50 per unit. No current is drawn during maintenance and setup.
Three operators control the operations of all the twelve machines and average rate of wages per operator per day is ₹600 and production bonus is 10% of wages.
Annual insurance premium for the new machine is ₹12,600
Annual maintenance cost of new machine including consumable stores is ₹32,500
Rent of the factory is ₹24,000 per month. Area occupied by new machine 200 sq. ft. and area occupied by other machines is 2,800 sq. ft.
Required: Compute the comprehensive machine hour rate.

Ans. ₹180

36. 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 for 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. **[SM]**

Ans. ₹382.85

37. 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 realize ₹90,000 as scrap value at the end of its working life. **[RTP – May 2021]**

Other relevant data are as follows:
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.

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

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

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.

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.

Department al 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 to compute the machine hour rate.

Ans. 822.34

38. The following information are available for the three machines of a manufacturing department of KBC Ltd.: **[MTP May 2024]**

	Preliminary estimates of expenses (per annum)			
	Total	**Machines**		
	(₹)	P (₹)	Q (₹)	**R (₹)**
Depreciation	20,000	7,500	7,500	5,000
Spare parts	10,000	4,000	4,000	2,000
Power	40,000			
Consumable stores	10,000	4,000	3,000	3,000
Insurance of machinery	8,000			
Indirect labour	20,000			
Building maintenance expenses	20,000			
Annual interest on capital outlay	60,000	25,000	25,000	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		
	P	**Q**	**R**
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 14 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 85% capacity throughout the year and 2% is reasonable for breakdown.

You are required to:

Calculate predetermined machine hour rate 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 'Q' and 'R' only.
- 20% general increase in wage rates
- An 10% decrease in the consumption of consumable stores.

Ans. ₹107.17, ₹106.22, ₹90.13

39. Sree Ajeet Ltd. having fifteen different type of automatic machines furnishes information as under for 2018-2019. **[RTP – Nov 2018]**

Overhead expenses: Factory rent ₹1,80,000 (floor area 1,00,000 sq. ft.), Heat and gas ₹60,000 and supervision ₹1,50,000

Wages of the operator are ₹200 per day of 8 hours. Operator attends to one machine when it is under set up and two machines while they are under operation.

In respect of machine B (one of the above machines) the following particulars are furnished:

Cost of machine ₹1,80,000, Life of machine – 10 years and scrap value at the end of its life ₹10,000

Annual expenses on special equipment attached to the machine are estimated as ₹12,000

Estimated operation time of the machine is 3,600 hours while set up time is 400 hours per annum.

The machine occupies 5,000 sq. ft. of floor area

Power cost ₹5 per hour while machine is in operation.

Estimate the comprehensive machine hour rate of machine B. Also find out machine costs to be absorbed in respect of used o machine B on the following two work orders

	Work order-1	Work order - 2
Machine set up time (Hours)	15	30
Machine operation time (Hours)	100	190

Ans. ₹3,620; ₹6,935

40. SK Ltd. manufactures a single product. It recovers factory overheads at a pre-determined rate of ₹20 per man-day. **[Dec 2021, Similar Nov 2019]**

During the year 2020-21, the total factory overheads incurred and the man-days actually worked were ₹35.50 lakhs and 1.50 lakh days respectively. Out of the amount of ₹35.50 lakhs, ₹2.00 lakhs were in respect of wages for strike period and ₹1.00 lakh was in respect of expenses of previous year booked in the current year. During the period, 50,000 units were sold. At the end of the period, 12,000 completed units were held in stock but there was no opening stock of finished goods. Similarly, there was no stock of uncompleted units at the beginning of the period but at the end of the period there were 20,000 uncompleted units which may be treated as 65% complete in all respects.

On investigation, it was found that 40% of the unabsorbed overheads were due to factory inefficiency and the rest were attributable to increase in the cost of indirect materials and indirect labour. You are required to:

(i) Calculate the amount of unabsorbed overheads during the year 2020-21.

(ii) Show the accounting treatment of unabsorbed overheads in cost accounts and pass journal entry.

Ans. (i) Under recovery ₹2,50,000.

41. SK engineering factory fabricates machine parts to customers. The factory commenced fabrication of 12 Nos. machine parts to customer's specifications and the expenditure incurred on the job for the week ending 21st August, is given below: **[SM]**

	(₹)	(₹)
Direct materials (all items)		78.00
Direct labour (manual) 20 hours @ ₹1.50 per hour		30.00
Machine facilities:		
Machine No. I : 4 hours @ ₹4.50	18.00	
Machine No. II: 6 hours @ ₹6.50	39.00	57.00
Total		165.00
Overheads @ ₹0.80 per hour on 20 manual hours		16.00
Total cost		181.00

The overhead rate of ₹0.80 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, the total labour hours worked was 2,400 and machine Nos. I and II had worked for 30 hours and 32½ hours respectively.

Prepare a cost sheet for the job for the fabrication of 12 Nos. machine parts duly levying the supplementary rates.

Ans. Total cost ₹200.

42. 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: **[SM]**

Department	Direct Material	Direct Wages	Direct Overheads	Direct Labour Hours	Machine Hours
Budgeted:					
Machine	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

Department	Direct Material	Direct Wages	Direct Overheads	Direct Labour Hours	Machine Hours
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:

Department	Direct Material	Direct Wages	Direct Labour Hours	Machine Hours
Machine	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:

(i) Calculate the overhead absorption rate as per the current policy of the company and determine the selling price of Job

(ii) 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.

(iii) Determine the selling price of job based on the overhead application rates calculated in (ii) above.

(iv) 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.

Ans. (i) SP = ₹4,660.50; (iii) ₹4,989.40; (iv) Under recover ₹39,000 and over recovery ₹99,000.

43. Based on the data below, what is the amount of the overhead under-/over absorbed?

[MTP May 24]

Budgeted overhead – ₹5,25,000
Budgeted machine hours- 17,500
Actual machine hours- 17,040
Actual overheads- ₹5,20,000
A. 5,000 under-absorbed
B. 8,800 under-absorbed
C. 8,800 over-absorbed
D. 5,000 over-absorbed

Ans. (c) 8800 over-absorbed

44. During half year ending inter departmental review meeting of P Ltd., cost variance report was discussed and the performance of the departments were assessed. The following figures were presented.

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

Actual production overheads ₹34,08,000

The above amount is inclusive of the following payments made:

Paid as per court's order ₹4,50,000

Expenses of previous year booked in current year	₹1,00,000
Paid to workers for strike period under an award	₹4,20,000
Obsolete stores written off	₹36,000

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

Production

Finished goods	1,10,000 units
Works-in-progress	
(50% complete in every respect)	80,000 units
Sale:	
Finished goods	90,000 units

Machine worked during the period was 3,000 hours.

At the of preparation of revenue budget, it was estimated that a total of ₹50,40,000 would be required for budgeted machine hours of 6,000 as production overheads for the entire year.

During the meeting, a data analytic report revealed that 40% of the over/under-absorption was due to defective production policies and the balance was attributable to increase in costs.

You were also present at the meeting; the chairperson of the meeting has asked you to be ready with the followings for the performance appraisal of the departmental heads:

(i) How much was the budgeted machine hour rate used to recover overhead?

(a) ₹760 (b) ₹820 (c) ₹780 (d) ₹840

(ii) How much amount of production overhead has been recovered (absorbed) upto the end of half year end?

(a) ₹25,20,000 (b) ₹34,08,000 (c) ₹24,00,000 (d) ₹24,60,000

(iii) What is the amount of overhead under/ over absorbed?

(a) 1,18,000 over-absorbed (b) 1,18,000 under- absorbed

(c) 18,000 over-absorbed (d) 18,000 under-absorbed

(iv) What is the supplementary rate for apportionment of over/under absorbed overheads over WIP, Finished goods and Cost of sales?

(a) ₹0.315 per unit (b) ₹0.472 per unit

(c) ₹0.787 per unit (d) ₹1 per unit

(v) What is the amount of over/under absorbed overhead apportioned to Work in Progress?

(a) ₹9,440 (b) ₹42,480 (c) ₹18,880 (d) ₹70,800

Ans. (i) - (d), (ii) - (a), (iii) - (a), (iv) - (b), (v) - (c)

SOLUTION OF PRACTICE QUESTIONS

25. Statement of Overhead Distribution

Particulars	Basis	Production Department		Service Department	
		Dept A	Dept B	Boiler	Pump
Expenses		-	-	3,00,000	60,000
Boiler House expenses	60:35:5	2,03,077	1,18,462	(3,38,462)	16,923
Pump room expenses	10:40:50	7,692	30,769	38,462	(76,923)
Total		**2,10,769**	**1,49,231**	**-**	**-**

Working note – 1

Let D = Total expenses of Boiler house to be apportioned

Let E = Total expenses of pump room to be apportioned

Thus, D = 3,00,000 + (0.5)E

E = 60,000 + (0.05)D

Solving above equations, we get, D = 3,38,462 and E = 76,923

26. Statement of Overhead Distribution

Particulars	Basis	Production Department		Service Department	
		Dept A	Dept B	Dept X	Dept Y
Amount as given		3,00,000	3,20,000	2,00,000	1,50,000
Expenses of Dept X	40:35:25	80,000	70,000	(2,00,000)	50,000
Expenses of Dept Y	40:60	80,000	1,20,000	-	(2,00,000)
Total		**4,60,000**	**5,10,000**	**-**	**-**

27. Overheads Distribution Summary

Item of Cost	Basis of Apportionment	P1 (₹)	P2 (₹)	P3 (₹)	S1 (₹)	S2 (₹)
Direct Wages	Allocation	—	—	—	18,750	6,250
Rent and Rates	loor Area (4:5:6:4:1)	12,500	15,625	18,750	12,500	3,125
General Lighting	Light Point (2:3:4:2:1)	1,250	1,875	2,500	1,250	625
Indirect Wages	Direct Wages (6:4:6:3:1)	5,625	3,750	5,625	2812.5	937.5
Power	H.P. of Machines (6:3:5:1)	10,000	5,000	8,333	1,667	—
Dep. of Machine	Value-Machine (12:16:20:1:1)	12,000	16,000	20,000	1,000	1,000

Insurance of Machine	Value-Machine (12:16:20:1:1)	4,800	6,400	8,000	400	400
		46,175	48,650	63,208	38,380	12,338
Cost of Dept. S1	Apportioned	8,003	12,004	16,006	(40,014)	4,001
Cost of Dept. S2	Apportioned	6,536	3,268	4,901	1,634	(16,339)
		60,714	63,922	84,115	—	—
Prod. Hrs Worked		6,225	4,050	4,100	—	—
Rate per Hour (₹)		9.75	15.78	20.52	—	—

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

S2 = 38,380 + 0.10 (12,338 + 0.10 S1)

S1 = 38,380 + 1233.8 + 0.01 S1

0.99 S1 = 39,613.8

∴ S1 = ₹40,014

∴ S2= 12,338 + 0.10 × 40,014 = ₹16339.4

Cost of Product X	(₹)
Direct Material	625.00
Direct Labour	375.00
Prime Cost	1,000.00
Production on Overheads	
P1 5 hours × ₹9.75 = 48.75	
P2 3 hours × ₹15.78 = 47.34	
P3 4 hours × ₹20.52 = 82.08	178.17
Factory Cost	1,178.17

28. (a) Statement of Apportionment of Overheads

Expenses	Basis	Production Department		Service Department	
		Machine Shop (₹)	Packing (₹)	General Plant (₹)	Stores & Maint. (₹)
Indirect labour	Allocation	8,000	6,000	4,000	11,000
Maintenance material	Allocation	3,400	1,600	2,100	2,800
Superintendent's salary	Allocation	-	-	16,000	-
Misc. supplies	Allocation	1,500	2,900	900	600
Cost & payroll salaries	Allocation	-	-	80,000	-
Total	**-**	**12,900**	**10,500**	**1,03,000**	**14,400**
Power	H.P. hours	54,600	7,800	-	15,600

Rent	Floor space	30,000	12,000	6,000	24,000
Fuel & Heat	Radiator secs.	12,000	24,000	8,000	16,000
Insurance	Investment	7,500	2,250	750	1,500
Taxes	Investment	5,250	1,575	525	1,050
Depreciation	Investment	75,000	22,500	7,500	15,000
Total		**1,97,250**	**80,625**	**1,25,775**	**87,550**

(b) Distribution of Service department expenses

Expenses	Production Department		Service Department	
	Machine Shop (₹)	Packing (₹)	General Plant (₹)	Stores (₹)
Total expenses [as per (a)]	1,97,250	80,625	1,25,775	87,550
Exp. Of general plant (1,61,745 in 20:12:8)	80,872	48,524	(1,61,745)	32,349
Exp. of stores & maintenance (1,19,899 in 50:20:30)	59,949	23,980	35,970	(1,19,899)
Total	**3,38,071**	**1,53,129**	**-**	**-**

Let the total overheads of General Plant = 'a' and the total overheads of Stores = 'b'

a = 1,25,775 + 0.3b ...(i)

b = 87,550 + 0.2a ...(ii)

Putting the value of 'b' in equation no. (i)

a = 1,25,775 + 0.3(87,550 + 0.2a)

a = 1,25,775 + 26,265 + 0.06a

0.94a = 1,52,040

a = 1,61,745

Putting the value of a in equation (ii)

b = 87,550 + (0.2×1,61,745) = 1,19,899

29. (i) & (ii) Overheads Distribution Sheet

Particulars	Basis	Main Department			Service Department	
		Purchase	Packing	Distribution	Maintenance	Personnel
Expenses	Allocation	5,00,000	8,00,000	3,50,000	6,40,000	3,20,000
Maintenance Department Expenses	Area (12:15:7:6)	1,92,000	2,40,000	1,12,000	(6,40,000)	96,000
Personnel Department Expenses	No. of Ees (8:17:7)	1,04,000	2,21,000	91,000	-	(4,16,000)
Total		7,96,000	12,61,000	5,53,000	-	-

Total Hours		12 × 365 = 4,380	24 × 365 = 8,760	8 × 365 = 2,920	-	-
Rate per hour		181.74	143.95	189.38	-	-

Working Note - 1

	Main Department			Service Department	
	Purchase	**Packing**	**Distribution**	**Maintenance**	**Personnel**
Area (in sq. mtr.)	12	15	7	-	6
% of service rendered by Maintenance Department	30%	37.50%	17.50%	-	15%
Number of Employees	800	1700	700	200	-
% of service rendered by Personnel department	23.53%	50%	20.59%	5.88%	

The usual method used for ranking the support departments for Step Down Allocation Method is % of Service rendered by one Service Department to another. Based on this, Maintenance Department provides 15% (highest %) of service to Personnel Department. Thus, first maintenance department expenses should be distributed first.

30. (a) Table of Primary Distribution of Overheads

Particulars	Basis of Apportionment	Total Amount	Production Dept.		Service Depart.	
			Fabrication	Assembly	Stores	Maintenance
OHs Allocated	Allocation	27,28,000	15,52,000	7,44,000	2,36,000	1,96,000
Direct Costs	Actual	-	-	-	---	---
Other OHs:						
Factory rent	Floor Area (48:20:5:7)	15,28,000	9,16,800	3,82,000	95,500	1,33,700
Factory bldg.. insurance	Floor Area (48:20:5:7)	1,72,000	1,03,200	43,000	10,750	15,050
P&M insurance	Value of P&M (66:30:3:7)	1,96,000	1,22,038	55,472	5,547	12,943
P&M Dep.	Value of P&M (66:30:3:7)	2,65,000	1,65,000	75,000	7,500	17,500
Canteen Subsidy	No. of employees (60:40:19:6)	4,48,000	2,15,040	1,43,360	68,096	21,504
		53,37,000	30,74,078	14,42,832	4,23,393	3,96,697

Re-distribution of Service Departments' Expenses:

Particulars	Basis of Apportionment	Production Department		Service Departments	
		Fabrication	Assembly	Stores	Maintenance
OH as per Primary distribution	Primary distribution	30,74,078	14,42,832	4,23,393	3,96,697
Maint. Depart. Cost	Maintenance Hours (28:23:4)	2,01,955	1,65,891	28,851	(3,96,697)
		32,76,033	**16,08,723**	**4,52,244**	**---**
Stores Department	No. of Stores Requisition (18:7)	3,25,616	1,26,628	(4,52,244)	
		36,01,649	**17,35,351**	---	---

(b) Overhead Recovery Rate

Department	Apportioned Overhead (₹)	Basis of Overhead Recovery Rate	Overhead Recovery Rate (₹)
	(I)	(II)	[(I)÷(III)]
Fabrication	36,01,649	30,00,000 Machine Hours	1.20 per Machine Hour
Assembly	17,35,351	26,00,000 Labour Hours	0.67 per Labour Hour

(c) Calculation of full production costs of Job no. IGI2014.

Particulars	Amount (₹)
Direct Materials	2,30,400
Direct Labour:	
- Fabrication Deptt. (240 hours × ₹50)	12,000
-Assembly Deptt. (180 hours × ₹50)	9,000
Production Overheads:	
- Fabrication Deptt. (210 hours × ₹1.20)	252
- Assembly Deptt. (180 hours × ₹0.67)	121
Total Production Cost	**2,51,773**

31. (*a*) Overheads Distribution Sheet (Direct Method)

Particulars	Basis	Sales Department		Support Department	
		Corporate	Consumer	Admin.	Inform.
Primary Distribution					
Factory OHs	Allocated	12,97,751	6,36,818	94,510	3,04,720
Secondary Distribution					
Administrative Department	42:28:00	56,706	37,804	(94,510)	-
Information Department	24:20:00	1,66,211	1,38,509	-	(3,04,720)
Total		**15,20,668**	**8,13,131**	**-**	-

(b) Determination of Ranking of support departments based on percentage of their services rendered for step down allocation method.

Particulars	Sales Department		Support Department	
	Corporate	Consumer	Admin.	Inform.
No. of Employees	42/91	28/91	-	21/91
% of service rendered by Administrative Department (Rank – I)	46.15%	30.77%	-	23.08%
Processing time used	2400	2000	400	-
% of service rendered (Rank – II)	50%	41.67%	8.33%	-

Overheads Distribution Sheet (Step-Down Distribution Method)

Particulars	Basis	Sales Department		Support Department	
		Corporate	Consumer	Admin.	Inform.
Primary Distribution Total		12,97,751	6,36,818	94,510	3,04,720
% service rendered by costs					
(I) Admin. Department	42:28:21	43,620	29,080	(94,510)	21,810
(II) Info. System Dept.	24:20	1,78,107	1,48,423	-	(3.26,530)
Total		**15,19,478**	**8,14,321**	**-**	-

(c) The usual method used for ranking the support departments for Step Down Allocation Method is % of Service rendered by one Service Department to another. However, another method of ranking can also be used which is the amount of cost of service rendered.

Particulars	Admin.	Info. System
Cost of service rendered		
Admin. Deptt. (94,510 × 23.08%)	-	21,813 (Rank II)
Info. System (3,04,720 × 8.33%)	25,383 (Rank I)	-

(d) Let the total cost of administrative department be 'a'
Let the total cost of Information System be 'b'
a = 94,510 + 0.0833b
b = 3,04,720 + 0.2308a
Solving the above equations:
a = 1,22,215 & b = 3,32,923

Particulars	Basis	Sales Department		Support Department	
		Corporate	Consumer	Admin.	Inform.
Primary Distribution Total		12,97,751	6,36,818	94,510	3,04,720
Administrative Department	46.15%:30.77%:23.08%	56,407	3,87,605	(1,22,215)	28,203
Info. System Dept.	50:41.67:8.33	1,66,483	1,38,735	27,705	(3,32,932)
Total		15,20,641	8,13,158	-	-

32. Effective machine hours = 200 × 75% = 150
Statement of Machine Hour Rate

Particulars	Amount (₹)
Fixed Expenses	
Depreciation [3,24,000 × 10% × (1/12)]	2,700
Total wages of machine man (working note – 1)	6,737
Total wages of helper (working note – 1)	4,945
Supervision charges	3,000
Electricity and lighting charges	7,500
Repair & Maintenance charges	17,500
Insurance of plant & building (16,250 ÷ 12)	1,354
Other general expenses (27,500 ÷ 12)	2,292
Fixed expenses	46,028
Effective machine hours	150
Fixed expenses per machine hour	306.85
Variable Expenses per machine hour	
Power $\left(\frac{15,000}{150}\right)$	100
Machine hour rate	406.85

Working Note – 1

Particulars	Total wages Machine man	Total wages Helper
Wages	(125/8) × 200 = 3,125	(75/8) × 200 = 1,875
Dearness allowance	1,575	1,575
(A)	4,700	3,450
(+) Production bonus (A ÷ 3)	1,567	1,150

(+) Leave Wages (A × 10%)	470	345
Total Wages	**6,737**	**4,945**

33. Effective machine hours = (48 × 4) – (4 × 4) = 176 hours
Computation of cost of running one machine for a four week period

Fixed charges of the machine shop	**Per Annum**
Rent	5,400
Heat and light	9,720
Forman's salary	12,960
Other miscellaneous expenditure	18,000
	46,080
Fixed expenses of the machine shop for one machine for four-week $\left(\frac{46,080}{3}\times\frac{4}{52}\right)$	₹1,1821.54
Depreciation $\left(52,000 \times 10\% \times \frac{4}{52}\right)$	400
Total Fixed Expenses (A)	1,581.54
Variable Expenses:	
Wages (48 × 4 × 20 × 3)	11,520
Bonus [((48 × 4) – 16) × 20 × 10% × 3]	1,056
Repairs and maintenance (60 × 4)	240
Consumable stores (75 × 4)	300
Power (192 – 16) = 176 × 20 units × 0.80	2,816
Total Variable Expenses (B)	15,932
Total Expenses (A + B)	17,513.54

Machine hour rate = $\frac{17,513.54}{176}$ = ₹99.51

34. Effective machine hours = 4,500 – 300 = 4,200
Statement of Machine hour Rate

Particulars	Amount (₹)
Fixed Expenses:	
Repair & Maintenance (5,40,000 ÷ 15)	36,000
Depreciation $\left(\frac{29,14,800-1,50,000}{15}\right)$	1,84,320
Insurance (29,14,800 × 2%)	58,296
Oil and Lubricant	87,384
Salary to operator (24,000 × 12 × 1/3)	96,000
Total Fixed Expenses	4,62,000
Effective Machine hours	4,200
Fixed cost per machine hour	110
Machine Expenses:	
Power (10 × 7)	70
Machine Hour Rate	**180**

35.

Effective machine hours = 2,400 – 180 = 2,220 hours

Electricity consumption hours = 2,400 – 180 – 120 = 2,100 hours

Statement of Machine Hour Rate

Particulars	Amount (₹)
Fixed Expenses	
Depreciation $\left(\frac{12,70,000+40,000-90,000}{10}\right)$	1,22,000
Operator wages $\left(\frac{3\times600\times300}{12}\right)$	45,000
Production Bonus (45,000 × 10%)	4,500
Insurance premium	12,600
Maintenance cost	32,500
Rent of factory $\left(\frac{24,000\times12}{2,800+200}\times200\right)$	19,200
Fixed expenses	2,35,800
Effective machine hours	2,220
Fixed expenses per machine hour	106.22
Variable Expenses per machine hour	
Electricity $\left(\frac{12\times6.50\times2,100}{2,220}\right)$	73.78
Machine hour rate	180.00

Solution – 36

36. Effective machine hours = 4,380 hours

Statement of Machine Hour Rate

Particulars	Amount (₹)
Fixed Expenses	
Depreciation $\left(\frac{1,00,00,000-9,00,000}{10}\right)$	9,10,000
Rent (30,000 × 12 × ¼)	90,000
Lighting charges (8,000 × 12 × 2/10)	19,200
Foreman salary (19,200 × 12 × 1/6)	38,400
Insurance (1,00,00,000 × 1%)	1,00,000

Sundry expenses (900 × 12)	10,800
Fixed expenses(A)	11,68,400
Variable Expenses	
Electricity (15 × 5 × 4,380)	3,28,500
Repairs $\left(\frac{18,00,000}{10}\right)$	1,80,000
Variable expenses (B)	5,08,500
Total expenses (A+B)	16,76,900
Effective machine hours	4,380
Machine hour rate	382.85

37. Effective machine hours = 2,496 – 312 = 2,184 hours

Statement of Machine Hour Rate

Particulars	Amount (₹)
Fixed Expenses	
Depreciation $\left(\frac{24,90,000-90,000}{12}\right)$	2,00,000
Operator's Salary $\left(\frac{30,000\times12\times3}{6}\right)$	1,80,000
Fringe benefits (1,80,000 × 20%)	36,000
Departmental and general overheads (5,00,000 × 110% × 1/6)	91,667
Fixed expenses(A)	5,07,667
Variable Expenses	
Electricity [(2,496 × 60 × 6) + (416 × 10 × 6)]	9,23,520
Component replacement cost (2,400 × 52)	1,24,800
Machine maintenance cost	2,40,000
Variable expenses (B)	12,88,320
Total expenses (A+B)	17,95,987
Effective machine hours	2,184
Machine hour rate	822.34

38. **Statement of Machine Hour Rate**

Particulars	Basis	P (₹)	Q (₹)	R (₹)
Standing Charges				
Insurance	Depreciation basis	3,000	3,000	2,000
Indirect labour (20,000 + 20% = 24,000)	Direct labour	6,000	9,000	9,000
Building Maintenance	Floor Space	8,000	8,000	4,000
Rent & Rates	Floor Space	48,000	48,000	24,000
Salary of Foreman	Equal	80,000	80,000	80,000

Salary of attendant	Equal	20,000	20,000	20,000
Total Standing charges (A)		**1,65,000**	**1,68,000**	**1,39,000**
Machine Expenses				
Depreciation	Direct	7,500	7,500	5,000
Spare parts	Final estiamtes	4,600	5,750	2,875
Power	KW Rating	15,000	10,000	15,000
Consumable stores (10,000 – 10% = 9,000)	Direct	3,600	2,700	2,700
Total Machine Expenses (B)		**30,700**	**25,950**	**25,575**
Total Expenses (A + B = C)		1,95,700	1,93,950	1,64,575
Effective Machine hours (D)		1,826	1,826	1,826
Machine Hr. Rate (C÷D)		**107.17**	**106.22**	**90.13**

Working note – 1

Number of days in a year	=	365
Less: Sunday	=	52
Less: Holidays	=	14
Less: Saturday (52 – 2)	=	50
Full working days	=	249
Hours on full working days (249 × 8)	=	1,992
Hours on half days (50 × 4)	=	200
Total hours	=	2,192
Effective hours at 85% level	=	1,863
Less: Normal loss @2%	=	37
Effective running hours	=	1,826

Working note – 2

Particulars	P	Q	R
Preliminary estimates of Spare parts	4,000	4,000	2,000
(+) Increase in price @15%	600	600	300
	4,600	4,600	2,300
(+) Increase in consumption@25%	-	1,150	575
Estimated Cost	4,600	5,750	2,875

Working note – 3

Interest on capital outlay is a financial matter and, therefore it has been excluded from the cost accounts.

39. Statement showing machine hours rate of Machine B

Particulars	₹
Standing Charges:	
Factory rent [(1,80,000 ÷ 1,00,000) × 5,000]	9,000

Particulars	₹
Heat and Gas (60,000 ÷ 15)	4,000
Supervision (1,50,000 ÷ 15)	10,000
Depreciation [(1,80,000 – 10,000) ÷ 10]	17,000
Annual expenses on special equipment	12,000
Total fixed expenses (A)	52,000
Total Machine hours (B)	4,000
Fixed cost per hour (A ÷ B)	13

Particulars	Set up rate per hour (₹)	Operation rate per hour (₹)
Fixed cost	13.00	13.00
Power	-	5.00
Wages	(200 ÷ 8) 25.00	$\left(\frac{200}{8}\times\frac{1}{2}\right)$ 12.50
Machine hour rate	**38.00**	**30.50**

Statement of cost of Work Order

Particulars	Work- Order – 1	Work Order - 2
Set up time cost	38×15 = 570	30×38 = 1,140
Operation time cost	100×30.5 = 3,050	190×30.5 = 5,795
Total cost	**3,620**	**6,935**

40. (i)

	Amount (₹)
Total production overheads actually incurred during the period	35,50,000
Less: Wages for strike period	2,00,000
Less: Expenses of previous year booked in current year	1,00,000
Net production overheads actually incurred	32,50,000
Less: Production overheads absorbed (1,50,000 × ₹20)	30,00,000
Under recovered overheads	2,50,000

(ii) As 40% of the under absorbed overheads i.e. ₹1,00,000 (₹2,50,000 × 40%) were due to factor inefficiency, this being abnormal, hence should be debited to profit and loss account.

Amount of balance under absorbed overheads = ₹2,50,000 – 1,00,000 = ₹1,50,000

Equivalent units = 50,000 + 12,000 + (20,000 × 65%) = 75,000

$$\text{Supplementary rate} = \frac{1,50,000}{75,000 \text{ units}} = ₹2 \text{ per equivalent unit}$$

	Equivalent Units	Amount (₹)
Work-in-progress (20,000 units × 65% × 2)	13,000	26,000
Finished stock (12,000 units × 2)	12,000	24,000
Cost of sales (50,000 units × 2)	50,000	1,00,000
Total	**75,000**	**1,50,000**

Journal Entry

Cost of Sales A/c	Dr.	1,00,000	
Finished goods ledger control A/c	Dr.	24,000	
Work-in-progress ledger control A/c	Dr.	26,000	
To Overheads control A/c			1,50,000
Costing P&L A/c	Dr.	1,00,000	
To Overheads Control A/c			1,00,000

41. Statement of Cost

Particulars	₹	₹
Material		78
Labour 20 hours @ ₹1.50		30
Machine facilities:		
Machine No. I: 4 hours @ ₹4.50	18	
Machine No. II: 6 hours @ ₹6.50	39	57
Overheads 20 hours @ ₹0.80 per hour		16
		181
Supplementary Rates		
Overheads 20 hours @ ₹0.20 per hour	4	
Machine facilities:		
Machine No. I: 4 hours @ ₹1.50	6	
Machine No. II: 6 hours @ ₹1.50	9	19
Total Cost		**200**

Working notes:

Overheads budgeted: 3,000 hours @ ₹0.80 = ₹2,400

Actual hours: 2,400 hours

Actual rate per hour ₹2,400/2,400 hours = ₹1

Supplementary charge ₹0.20 (₹1 – 0.80) per hour

Machine facilities:

	Machine No. I	**Machine No. II**
Budgeted	(40 × ₹4.50) = ₹180	(40 × ₹6.50) = ₹260
Actual number of hours	30	32½
Actual rate per hour	₹6	₹8
Supplementary rate per hour	₹6 – ₹4.50 = ₹1.50	₹8 – ₹6.50 = ₹1.50

42. (*i*) Calculation of Overhead Recovery Rates as per the Policy i.e., (Single Blanket rate)

Departments	**Budgeted Factory OHs (₹)**	**Budgeted Direct Wages (₹)**
Machining	3,60,000	80,000
Assembly	1,40,000	3,50,000
Packing	1,25,000	70,000
Total	**6,25,000**	**5,00,000**

Blanket OH Recovery Rate = $\frac{\text{Total Overheads (Budgeted)}}{\text{Total Direct Wages (Budgeted)}} \times 100 = \frac{6,25,000}{5,00,000} \times 100$ = 125 % of Direct wages

Selling Price of Job No. CW 7083:	₹
Direct Materials (1200 + 600 + 300)	2,100.00
Direct Wages (240 + 360 + 60)	660.00
Prime Cost	2,760.00
Add: Overheads @ 125% of Direct Wages i.e. 660 × 125%	825.00
Factory/Works Cost	3,585.00
Add: Administrative/Selling Overheads and Profits (3,585 × 30%)	1,075.50
Selling Price	4,660.50

(ii) Recommended Methods of absorption of factory overheads:

Single Blanket Overhead Recovery Rates could be used in places where work performed in each department is fairly uniform or standardized. But here in the given problem we can observe that among the three Departments, Machining Department is basically a machine intensive department whereas the Assembly & Packing Department are Labour Intensive Departments. Hence application of Single Blanket rate common to all the departments may not be suitable. Instead of applying Blanket Recovery Rates we may recommend different rates for different departments as under:

Machining Department:

Since, machine is the pre-dominant factor of production in this department, hence machine hour rate should be used to recover overheads:

Machine Hour Rate = $\frac{\text{Budgeted Factory Overhead}}{\text{Budgeted Machine Hour}} = \frac{3,60,000}{80,000}$ = 4.5 per machine hour

Assembly Department:

Direct Labour being the predominant factor of production in this department, hence Direct Labour Hour rate should be used to recover overheads in this department.

Direct Labour Hour Rate = $\frac{\text{Budgeted Factory Overhead}}{\text{Budgeted Direct Labour Hour}} = \frac{1,40,000}{1,00,000\text{ Hours}}$ = ₹1.4 per Direct Labour Hour

Packing Department:

Again, here also labour being the most important factor of production Direct Labour Rate should be used to recover overheads in this department.

Direct Labour Hour Rate = $\frac{\text{Budgeted Factory Overhead}}{\text{Budgeted Direct Labour Hour}} = \frac{1,25,000}{50,000\text{ Hours}}$ = ₹2.5 per Direct Labour Hour

(iii) Selling Price of Job No. CW 7083 on the basis of overhead recovery rates recommended in (ii) above.

		₹
Direct Material (1200 + 600 + 300)		2,100
Direct Wages (240 + 360 + 60)		660
Prime Cost		2,760
Add: Factory Overheads:		
Machining Dept (180 Machine Hour × 4.5 Per Machine Hour)	810	
Assembly Dept.(120 Direct Labour Hour × 1.40 per DL Hr)	168	
Packing Dept:(40 Direct Labour Hour × 2.5 per DL Hr)	100	1,078
Works Cost		3,838
Add: Administrative Selling Overheads & Profit (3838 × 30%)		1,151.40
Selling Price		4,989.40

(iv) Under/Over Recovery of Overheads:

(a) Under Current Policy (i.e., Blanket Recovery Rates)

S. No.	Particulars	Departments (₹)			Total (₹)
		Machining	Assembly	Pocking	
A.	Direct Wages (Actual) (₹)	96,000	2,70,000	90,000	
B.	Overheads Recovered as per Single Blanket Rate of 125% of Direct Wages [A × 125%]	1,20,000	3,37,500	1,12,500	5,70,000
C.		3,90,000	84,000	1,35,000	6,09,000
D.	Actual Overheads Incurred (₹)	(2,70,000)	2,53,500	(22,500)	(39,000)
	(Under)/Over Recovery of Overheads [B – C]				

(b) Under the Suggested Method:

S. No.	Particulars	Departments			Total
		Machining	Assembly	Pocking	
A.	OH Recovery Method	Machine Hour Rate	Direct Labour Hour Rate	Direct Labour Hour Rate	
B.	OH Recovery Rates (₹)	₹4.5 per Machine Hour	₹1.4 per Direct Labour Hour	₹2.5 per Labour Hour	
C.	Machine Hours Worked in Machining Dept. (Hours)	96,000	—	—	
D.	Labour Hrs Worked in Assembly & Packing Dept	—	90,000	60,000	
E.	OHs Recovered: (₹) Machining [C × B]	4,32,000	—	—	
	Assembly: [D × B]	—	1,26,000	—	7,08,000
	Packing: [D × B]	—	—	1,50,000	6,09,000
F.	Actual Overheads Incurred (₹)	3,90,000	84,000	1,35,000	99,000
G.	(Under)/Over Recovery of OHs (₹) [E – F]	42,000	42,000	15,000	

43. Under recover = Actual OHs – Recovered OHs = 5,20,000 – (17040 × 30) = ₹8,800

44. (i) (d) Budgeted Machine hour rate (Blanket rate)

$$= \frac{₹50,40,000}{6,000 \text{ hours}} = ₹840 \text{ per hour}$$

(ii) (a) ₹25,20,000

(iii) (a)

	Amount (₹)	Amount (₹)
Total production overheads actually incurred during the period		34,08,000
Less: Amount paid to worker as per court order	4,50,000	
Expenses of previous year booked in the current year	1,00,000	
Wages paid for the strike period under an award	10,06,000	
Obsolete stores written off	36,000	10,06,000
		(3000)

Less: Production overheads absorbed as per machine hour rate (3,000 hours × ₹840)		25,20,000
Amount of over absorbed production overheads		1,18,000

Budgeted Machine hour rate (Blanket rate) calculated in part (i)

(iv) **(b) Accounting treatment of over absorbed production overheads:** As, 40% of the over absorbed overheads were due to defective production policies, this being abnormal, hence should be credited to Costing Profit and Loss Account.

Amount to be credited to Profit and Loss Account

= ₹1, 18,000 × 40% = ₹47,200.

Balance of over absorbed production overheads should be distributed over Works in progress, Finished goods and Cost of sales by applying supplementary rate*.

Amount to be distributed = ₹1,18,000 × 60% = ₹70,800

Supplementary rate = $\frac{₹70,800}{1,50,000 \text{ units}}$ = **₹0.472 per unit**

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

	Equivalent completed units	**Amount (₹)**
Work-in-Progress (80,000 units × 50% × 0.472)	40,000	18,880
Finished goods (20,000 units × 0.472)	20,000	9,440
Cost of sales (90,000 units × 0.472)	90,000	42,480
Total	1,50,000	70,800

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