

## Overheads

### Questions:

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**Q.1** You are given the flowing information of the three machines of a manufacturing department of X Ltd.

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

(The foreman and the attendant control all the three machines and spend equal time on them.)

The following additional information is also available:

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

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

You are required to:

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

1. An increase of 15% in the price of spare parts.
2. An increase of 25% in the consumption of spare parts for machine 'B' & 'C' only.
3. 20% general increase in wages rates.

**Q.2** Calculate Machine Hour Rate from the following particulars:

Cost of Machine	- Rs. 25, 00,000
Salvage Value	– Rs. 1, 25,000
Estimated life of the machine	– 25,000 Hours
Working Hours (per annum)	– 3,000 Hours
Hours required for maintenance	– 400 Hours
Setting – up time required	– 8% of actual working hours

**Additional Information:**

- (i) Power 25 units @ Rs.5 per unit per hour.
- (ii) Cost of repairs and maintenance Rs. 26,000 per annum.
- (iii) Chemicals required for operating the machine Rs. 2,600 per month.
- (iv) Overheads chargeable to the machine Rs. 18,000 per months.
- (v) Insurance Premium (per annum) 2% of the cost of machine.
- (vi) No. of operators-02 (looking after three other machines also).
- (vii) Salary per operator per month Rs. 18,500.

**Q.3** A machine costing Rs. 10 lacs was purchased on 1-4-2011. The expected life of the machine is 10 years. At the end of this period its scrap value is likely to be Rs. 10,000. The total cost of all the machines including new one was Rs. 90 lac.

The other information is given as follows:

- (i) Working hours of the machine for the year was 4,200 including 200 non-productive hours.
  - (ii) Repairs and maintenance for the new machine during the year was Rs. 5,000.
  - (iii) Insurance premium was paid for all the machine Rs. 9,000
  - (iv) New machine consumes 8 units of electricity per hour, the rate per unit being Rs. 3.75.
  - (v) The new machine occupies  $\frac{1}{10}$  area of the department. Rent of the department is Rs. 2,400 per month.
  - (vi) Depreciation is charged on straight line basis.
- Compute machine hour rate for the new machine.

**Q.4** The following particulars refers to process used in the treatment of material subsequently, incorporated in a component forming part of an electrical appliance:

- (i) The original cost of the machine used (Purchased in June 2008) was Rs. 10,000. Its estimated life is 10 years, the estimated scrap value at the end of its life is Rs. 1,000, and the estimated working time per year (50 weeks of 44 hours) is 2200 hours of which machine maintenance etc., is estimated to take up 200 hours.  
No others loss of working time expected , setting up time , estimated at 100 hours, is regarded as productive time .( Holiday to be ignored).
- (ii) Electricity used by the machine during production is 16 units per hour at cost of a 9 paisa per unit. No current is taken during maintenance or setting up.
- (iii) The machine required a chemical solution which is replaced at the end of week at a cost of Rs. 20 each time.
- (iv) The estimated cost of maintenance per year is Rs. 1,200
- (v) Two attendants control the operation of machine together with five other identical machines. Their combined weekly wages, insurance and the employer's contribution to holiday pay amount Rs. 120.
- (vi) Departmental and general works overhead allocated to his machine for the current year amount Rs. 2,000.

You are required to calculate the machine hour rate of operating the machine.

**Q.5** X Ltd. recovers overheads at a pre- determined rate of Rs. 50 per man- day. The total factory overheads incurred and the man-days actually worked were Rs. 79 lakhs and 1.5 lakhs days respectively. During the period 30,000 units were sold. At the end of the period 5,000 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 10,000 uncompleted units which may be treated as 50 % complete.

On analyzing the reasons, it was found that 60% of the unabsorbed overheads were due to defective planning and the balance were attributable to increase in overhead cost.

How would unabsorbed overheads be treated in cost accounts?

**Answer:**

**Q.1 Ans:**

		Basis of apportionment	Total Amount (Rs.)	Machine		
				A	B	C
				Amount (Rs.)	Amount (Rs.)	Amount (Rs.)
<b>(A)</b>	<b>Standing Charges :</b>					
	Insurance	Depreciation Basis	8,000	3,000	3,000	2,000
	Indirect Labour (W.N.3)	Direct Labour	24,000	6,000	9,000	9,000
	Building Maintenance expenses	Floor Space	20,000	8,000	8,000	4,000
	Rent and Rates	Floor Space	1,20,000	48,000	48,000	24,000
	Salary of Foreman	Equal	2,40,000	80,000	80,000	80,000
	Salary of attendant	Equal	<u>60,000</u>	<u>20,000</u>	<u>20,000</u>	<u>20,000</u>
	Total standing charges		<u>4,72,000</u>	<u>1,65,000</u>	<u>1,68,000</u>	<u>1,39,000</u>
	Hourly rate for standing charges			<u>84.75</u>	<u>86.29</u>	<u>71.40</u>
<b>(B)</b>	<b>Machine Expenses</b>					
	Depreciation	Direct	20,000	7,500	7,500	5,000
	Spare parts (W.N.2)	Final estimates	13,225	4,600	5,750	2,875
	Power	K.W. rating	40,000	15,000	10,000	15,000
	Consumable Stores	Direct	<u>8,000</u>	<u>3,000</u>	<u>2,500</u>	<u>2,500</u>
	Total Machine expenses		<u>81,225</u>	<u>30,100</u>	<u>25,750</u>	<u>25,375</u>
	Hourly Rate for Machine expenses			<u>15.46</u>	<u>13.23</u>	<u>13.03</u>
	Total ( A+B)		<u>553.225</u>	<u>1,95,100</u>	<u>1,93,750</u>	<u>1,64,375</u>
	Machine Hour rate			<u>100.21</u>	<u>99.52</u>	<u>84.43</u>

**Working Notes:****1. Calculation of effective working hours :**

No. of holidays 52 (Sundays) + 12 (other holidays) = 64

Saturday (52 -2) = 50

No. of days (Work full time) = 365 – 64 – 50 = 251

**Hours**

Full days work 251 × 8 =2,008

Half days work 50 × 4 = 200

2,208

**Hours**

1,987 (Rounded off)

Effective capacity 90% of 2,208

Less: Normal loss of time (Breakdown) 2%

40 (Rounded off)

Effective running hour

1,947

**2. Amount of spare parts :**

	<b>A</b>	<b>B</b>	<b>C</b>
	<b>Rs.</b>	<b>Rs.</b>	<b>Rs.</b>
Preliminary estimates	4,000	4,000	2,000
Add: Increase in price @ 15%	<u>600</u>	<u>600</u>	<u>300</u>
	4,600	4,600	2,300
Add: Increases in consumption @ 25%	<u>—</u>	<u>1,150</u>	<u>575</u>
Estimated cost	<u>4,600</u>	<u>5,750</u>	<u>2,875</u>

**3. Amount of indirect Labour is calculated as under :**

	<b>Rs.</b>
Preliminary estimates	20,000
Add: Increase in wages @ 20%	<u>4,000</u>
	<u>24,000</u>

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

**Q.2 Ans:**

Particulars	Selling-up time is 'Unproductive' ( Machine hour-2,407*)	Setting-up time is 'Productive' (Machine hour- 2,600)
	Rs.	Rs.
<b>Fixed Charges ( Standing Charges):</b>		
Overhead Chargeable Rs. 18,000 × 12 = Rs.2,16,000 $\left(\frac{\text{Rs.2,16,000}}{2,407 \text{ hours}}\right); \left(\frac{\text{Rs.2,16,000}}{2,600 \text{ hours}}\right)$	89.74	83.08
Operator's Salary : Rs. 18,500 × 12 × 2 Operators 4 machines = Rs. 1,11,000 $\left(\frac{\text{Rs.1,11,000}}{2,407 \text{ hours}}\right); \left(\frac{\text{Rs.1,11,000}}{2,600 \text{ hours}}\right)$	46.12	42.69
Insurance : 2% of Rs. 25,00,000 = Rs.50,000	20.77	19.23
	<b>156.63</b>	<b>145</b>
<b>Variable Expenses ( Machine expenses) per hour</b>		
Depreciation: $\frac{\text{Rs.25,00,000}-\text{Rs.1,25,000}}{25,000 \text{ hours}}$	95	95
Power : ( 25 units × Rs. 5 )	125	125
Repairs and maintenance: $\left(\frac{\text{Rs.26,000}}{2,407 \text{ hours}}\right); \left(\frac{\text{Rs.26,000}}{2,600 \text{ hours}}\right)$	10.8	10
Chemical : $\left(\frac{\text{Rs.2,600} \times 12}{2,407 \text{ hours}}\right); \left(\frac{\text{Rs.2,600} \times 12}{2,600 \text{ hours}}\right)$	12.96	12
<b>Machine Hour Rate</b>	<b>400.39</b>	<b>387</b>

$$\frac{400}{2,600}$$

$$\text{Less: Setting-up hours} \quad \underline{193}$$

$$\text{Actual working hours} \left( \frac{\text{Rs.2,600 hours}}{108} \times 100 \right) \quad \underline{2,407}$$

**Assumptions:**

1. Working hours (i.e. 3,000 hours) are inclusive of maintenance and setting up time.
2. It is assumed that no power is consumed by the machine during unproductive setting-up hours.

3. Depreciation is calculated on the basis of estimated life of the machine hours. Hence per unit machine hour rate of depreciation will be same.

**Q.3 Ans:**

**Computation of machine hour rate of new Machine**

Particulars	Total (Rs.)	Per hour (Rs.)
<b>A. Standing Charges</b>		
• Insurance Premium $9,000 \times \frac{1}{9}$	1,000	
• Rent $\frac{1}{10} \times 2,400 \times 12$	<u>2,880</u>	
	<u>3,880</u>	0.97 (W.N.)
<b>B. Machine expenses</b>		
• Repairs and Maintenance [ $5,000/4,000$ ]		1.25
• Depreciation $\left[ \frac{10,00,000 - 10,000}{10 \times 4,000} \right]$		24.75
• Electricity 8 units $\times$ Rs. 3.75		30.00
Machine hour rate		<u>56.97</u>

**Working Note:**

**Computation of productive Machine hour rate**

Total hours	4,200
<b>Less:</b> Non-Productive hours	<u>200</u>
	<u>4,000</u>
$3,880/4,000 = 0.97$	

**Q.4 Ans:**

**Statement showing the computation of Machine Hour Rate:**

Particulars	Per hour (Rs.)
<b>A. Standing charges :</b>	
- Operator wages	1,000
- Departmental and General Overheads	<u>2,000</u>
- Total	3,000
Standing Charges per hour $3,000 \div 2,000$	1.5

**B. Machine Expenses:**

- Depreciation	0.45
( 10,000 – 1,000) ÷ 10 = 900	
$\frac{900}{2,000} = 0.45$	
- Electricity	1.37
(16 unit × 0.09 × 1900 hrs.) ÷ 2,000	
- Special Chemical Solution	0.50
( Rs. 20 × 50 ) ÷ 2,000	
- Maintenance	<u>0.60</u>
( 1,200 ÷ 2,000)	
C. Machine hour rate	<u>4.42</u>

**Working Note:****(i) Calculation of machine hours:**

Budgeted hours	2,200
Less: maintenance	<u>200</u>
	<u>2,000</u>

**Q.5 Ans:**

**Absorbed overheads** = Actual Man days × Rate /days  
= 1, 50,000 × 50  
= Rs. 75, 00,000

**Under absorption of overheads** = Actual overheads – Absorbed heads  
= 79, 00,000 – 75, 00,000 = 4, 00,000

**Reasons for under-absorption:**

1. Defective Planning 4, 00,000 × 60% = Rs. 2, 40,000
2. Increase in overheads cost 4, 00,000 × 40% = Rs. 1, 60,000

**Treatment in Cost Accounts:**

- (i) The unabsorbed overheads of Rs. 2, 40,000 on account of defective planning to be treated as abnormal and thus be charged to Costing Profit & Loss account.
- (ii) The balance of unabsorbed overheads i.e Rs. 1,60,000 be charged as below on the basis of supplementary overhead absorption rate  
Supplementary Rate = Rs. 1, 60,000/ (30,000 + 5,000+ 50% of 10,000)

= Rs. 4 per unit

(a) To Cost of Sales Account =  $30,000 \times 4$  = Rs. 1, 20,000

(b) To Finished Stock Account =  $5,000 \times 4$  = Rs. 20,000

(c) WIP Account =  $50\% \text{ of } 10,000 \times 4$  = Rs. 20,000

Rs. 1, 60,000