Ans. 9 The total production overheads are Rs.26,00,000:

Product A: 10,000 × Rs. 30 = Rs. 3,00,000

Product B: 20,000 × Rs. 40 = Rs. 8,00,000

Product C: 30,000 × Rs. 50 = Rs. 15,00,000

On the basis of ABC analysis this amount will be apportioned as follows:

Statement of Activity Based Production Cost

Activity Cost Pool	*Cost Driver*	*Ratio*	*Total Amount (Rs.)*	*A* (Rs.)	*B* (Rs.)	*C*
Stores Receiving	Purchase requisition	6:9:10	2,96,000	71,040	1,06,560	1,18,400
Inspection	Production Runs	5:7:8	8,94,000	2,23,500	3,12,900	3,57,600
Dispatch	Orders Executed	6:9:10	2,10,000	50,400	75,600	84,000
Machine Setups	Set ups	12:13:15	12,00,000	3,60,000	3,90,000	4,50,000
Total Activity Cost				7,04,940	8,85,060	10,10,000
Quantity Sold				10,000	20,000	30,000
Unit Cost				70.49	44.25	33.67
Add: Conversion Cost				80	80	90
Total				150.49	124.25	123.67

Ans 10:

(i) Traditional Method

	Rs, Cost per Unit		
	P	**Q**	**R**
Direct Method	90	80	120
Direct Labour	80	240	160
Overhead @ Rs. 6/Hr on Machine Hour	60 (10 x6)	108 (18 x 6)	84 (14 x 6)
	230	**428**	**364**

Workings under ABC						
Product	**No. of Units**	**M Hrs/Unit**	**M Hrs**	**Batches**	**Inspection**	**Purchase Order**
P	3000	10	30000	20 (3000/150)	100 (20 x 5)	60 (20 x 3)
Q	5000	18	90000	10 (5000/500)	40 (10 x 4)	100 (10 x 10)
R	20000	14	280000	20 (20000/1000)	60 (20 x 3)	160 (20 x 8)
			400000	50	200	320
Overhead @ Rs. 6/Hr =4L x 6➔Rs. 24L						

[Rs. In ooo's]

(ii) Activities	**%**	**Cost Pool**	**C Driver**	**CDQ**	**CDQ Rate(Rs.)**
MC Setup	20	480	Batches	50 Batches	9600

M_c Operation	30	720	M Hrs	4L	1.80
Inspection	40	960	Inspection	200	4800
Mat	10	240	Purchase Order	320	750
	100	**2400**			

(iii) Link of overheads						
Product	**Set up cost**	**Machine Operation Cost**	**Inspection Cost**	**Purchase Order Cost**	**Total**	**Rate**
P	192000 (20 x 9600)	54000 [30000x1.8]	480000 [100x4800]	45000 [60x750]	771000	257
Q	96000 [10x9600]	162000 [90000x1.8]	192000 [40x4800]	75000 [100x750]	525000	105
R	192000 [20x9600]	504000 [280000x1.8]	288000 [60x4800]	120000 [160x750]	1104000	55.2

Cost sheet under ABC

	P	Q	R
Direct Material	90	80	120.00
Direct Labour	80	240	160.00
Overhead	257	105	55.20
	427	**425**	**335.20**

Ans. 11: **(i) Computation of the activity based overheads**

Step 1: Compute cost per unit of cost driver = Cost pool / cost driver volume

Activity	Cost Driver	Cost Pool (a)	Cost driver volume/yr (b)	Cost/Unit of cost driver (a)/(b)
Purchasing	Purchase orders	Rs.75,000	1,500	Rs.50/pruchse order
Setting	Batches produced	Rs.112,000	2,800	Rs.40/batch
Materials handling	Material movements	Rs. 96,000	8,000	Rs.12/movement
Inspection	Batches produced	Rs.70,000	2,800	Rs.25/batch
Machining	Machine hours	Rs.150,000	50,000	Rs.3/machine hour

Step 2: Compute the volume of cost drivers consumed by Product Nova Shaft

Purchase orders (given) = 25
Batches = 15,000/100 = 150

Materials movement = 150 batches × 6 = 900

Machine hours = 15,000 units × 0.1 = 1,500

Step 3: Compute the Activity Based Overheads Cost for Product Nova Shaft

Activity	Cost Driver	Costing Rate / Cost Driver Unit Rs.	

Purchasing	Purchase orders	50	25 order × Rs.50	Rs.1,250
Setting	Batches produced	40	150 batches × Rs.40	Rs.6,000
Material handling	Material movements	12	900 movement × Rs.12	Rs.10,800
Inspection	Batches produced	25	150 batches × Rs.25	Rs.3,750
Machining	Machine hours	3	1,500 hours × Rs.3	Rs.4,500
				Rs.26,300

(ii) Computation of budgeted overheads costs for Product Nova Shaft using absorption costing

Budgeted overheads = (Rs.75,000 + Rs.96,000 + Rs.112,000 + Rs.70,000 + Rs.150,000) = Rs.503,000

Budgeted absorption cost/machine hour = Rs.503,000 / 50,000 = Rs.10.06

Budgeted machining hours for Product Nova Shaft = 1,500

Budgeted absorbed overhead = 1,500 × Rs.10.06 = Rs.15,090

(iii) Ways in which the company can reduce the ABC for product Nova Shaft:

- Reduce the number of batches by increasing the batch size which will then reduce the setting up overhead, materials handling and inspection costs.
- Reduce the number of purchase orders
- Innovate ways of speeding up production so that the machining hours are reduced.

Ans. 12:

(a)

	Sales	*A*	*B*	*C*	*Total*
(i)	Units Rs.	25,000	56,000	27,000	1,08,000
	Selling price/unit	18	14	12	
(ii)	Sales Value (Rs.)	4,50,000	7,84,000	3,24,000	15,58,000
(iii)	Prime Cost Overhead	12	9	8	
(iv)	No. of units/run	2,520	2,810	3,010	
(v)	Prime Cost Rs.	3,02,400	5,05,800	2,16,720	
(vi)	Gross Margin (ii – v)	1,47,600	2,78,200	1,07,280	5,33,080

	Total	A	B	C
Inspection Cost				
$\left(\frac{7,3000}{146} \times 30/80/36 \text{ respectively}\right)$	73,000	15,000	40,000	18,000
Machine Maintenance				
$\left(\frac{1,42,000}{710} \times 200/240/270 \text{ respectively}\right)$	1,42,000	40,000	48,000	54,000
Dye Cost	10,250	2,000	6,000	2,250
Sub Total	2,25,250	57,000	94,000	74,250
Selling Overhead Advertisement				
$\left(\frac{83,000}{56,000+27,000} \times 56/27 \text{ respectively}\right)$	83,000	–	56,000	27,000
Other Overheads				
$\left(\frac{25,000}{108} \times 25/56/27 \text{ respectively}\right)$	25,000	5,787	12,963	6,250
Packing			54,000	
Sub Total Selling Overhead	1,62,000	5,787	1,22,963	33,250

Workings:

	A	B	C	Total
Gross Production/unit /run (1)	2,520	2,810	3,010	
Defectives/run (2)	20	10	10	
Good units / run (3)	2,500	2,800	3,000	
Sales (Goods units)(4)	25,000	56,000	27,000	
No. of runs (5)	10	20	9	
Gross Production (6) = (1) × (5)	25,200	56,200	27,090	
Prime Cost / unit (7)	12	9	8	
Prime Cost (8) Rs.	3,02,400	5,05,800	2,16,720	10,24,920
Inspection hours/run (9)	3	4	4	
Inspection hours (10) = (9) × (5)	30	80	36	146
M/c hours / run (11)	20	12	30	
M/c hours (12) = (1) × (5)	200	240	270	710
Dye Cost/run (13)	200	300	250	
Dye cost (14) (13) × (5)	2,000	6,000	2,250	10,250

Conventional Accounting System

	Total	A	B	C
Sales – units / Production (good units)	1,08,000	25,000	56,000	27,000
Gross Margin (Rs.)	5,33,080	1,47,600	2,78,200	1,07,280
Production overheads (Rs.)	2,25,250	52,141	1,16,797	56,313
Selling Overhead (Rs.)	1,62,000	37,500	84,000	40,500
Sub-Total Overhead (Rs.)	3,87,250	89,641	2,00,797	96,813
Net profit (Rs.)	1,45,830	57,959	77,403	10,467

Ranking	II	I	III
	Activity Based System		
	A	*B*	*C*
Sales – units / Production (good units)	25,000	56,000	27,000
Gross Margin (Rs.)	1,47,600	2,78,200	1,07,280
Production overheads (Rs.)	57,000	94,000	74,250
Selling Overhead (Rs.)	5,787	1,22,963	33,250
Sub-Total Overhead (Rs.)	62,787	2,16,963	1,07,500
Net profit (Rs.)	84,813	61,237	(220)
Ranking	I	II	III

Ans. 13: (i) Factory overhead applicable to machine oriented activity = Rs. 37424

Total Machine hours = Volume × Machine hour required for each period

= (500 × ¼) + (5000 × ¼) + (600×1) + (7000 ×3/2) = 12475 hours

Machine overhead charges = Rs. 37424/12475 hours = Rs. 3 per hour

Setup Costs = Rs. 4355/17 i.e., total number of setups = Rs. 256.18

Material ordering cost = Rs. 1920/10 operations = Rs. 192

Material handling cost = Rs. 7580/27 operations = Rs. 280.74

Spare parts = Rs. 8600/12 parts = Rs. 716.67

	Products			
Overheads Items	**A**	**B**	**C**	**D**
Machine Overhead	1/4×Rs. 3 = 0.75	1/4×Rs. 3 = 0.75	1× Rs. 3 = 3.00	3/2×Rs. 3 = 4.50
Setup cost	1×256.18/500 = .51	6×256.18/5000=.31	2×256.18/600=.85	8×256.18/7000=.29
Material ordering cost	1×192/500=.38	4×192/5000=.15	1×192/600=.32	4×192/7000=.29
Material handling cost	2×280.74/500=1.12	10×280.74/5000=.56	3×280.74/600=1.40	12×280.74/7000=.48
Spare parts cost	2×716.67/500=2.87	5×716.67/5000=.72	12×716.67/600=1/19	4×716.67/7000=.41

(ii) Competition of overhead per unit based on two system and their difference

Products	Machine overhead Rs.	Setup Rs.	Material ordering Rs.	Material handling Rs.	Spare parts Rs.	Total (ABC system)	Old system Rs.	Difference
A	0.75	0.51	0.38	1.12	2.87	5.63	1.20	+4.43
B	0.75	0.31	0.15	0.56	0.72	2.49	1.20	+1.29
C	3.00	0.85	0.32	1.40	1.19	6.76	4.80	+1.96
D	4.50	0.29	0.11	0.48	0.41	5.79	7.20	-1.41

The traditional system does not make correct assumptions that all overheads are related to volume and machine time. Under traditional system products A and C are under costed because it misallocates costs for small volume products. The activity based costing system recognizes the amount of input to each cost unit. Product B previously avoided its full share of overheads because of its low machine time and may still do so if part of Rs. 37425 of machine oriented overhead should be apportioned on some other basis. Product D is overcosted because the additional system loaded it with overhead attributable to activities concerned with products A, B & C as a result of using a volume-based and machine oriented rate which failed to pay proper attention to activity costing.

Ans. 14 (a) Statement showing total cost of different products, assuming absorption of overhead on a machine hour basis

	Product A	Product B	Product C	Product D
Direct material	40	50	30	60
Direct labour*	28	21	14	21

Overhead	80	60	40	60
Cost of production per unit	148	131	84	141
Output in units	120	100	80	120
Total Costs (Rs.)	17760	13100	6720	16920

* Rate per machine hour = Rs. 26000/1300 hours = Rs. 20
Machine Hours = 480 + 300 + 160 + 360 = 1300 hours
(b)

Cost	Rs.	Drivers	No.	Cost/unit of driver
Setups	5250	Production runs	21*	Rs. 250
Stores/receiving	3600	Requisitions	80@	45
Inspection/quality	2100	Production runs	21	100
Handling/dispatch	4620	Orders	42	110

* Production runs = (120/20) + (100/20) + (80/20) + (120/20)
@ Requisitions = 20 for each product or 80 in total.
It may be pointed out that machine department cost of Rs. 10430 will continue to be absorbed on a machine hour basis as before. The relevant absorption rate will be = Rs. 10430/1300 = Rs. 8.02 per machine hour.

	Total cost (Rs.)			
	A	B	C	S
Direct material	4800	5000	2400	7200
Direct labour	3360	2100	1120	2520
Set-ups	1500	1250	1000	1500
Stores/receiving	900	900	900	900
Inspection/quality	600	500	400	600
Handling/dispatch	1320	1100	880	1320
Machine dept. costs	3851	2407	1284	2888
	16331	13257	7984	16928
Cost per unit	136.09	132.57	99.80	141.07

(c)

	A	B	C	D
Cost per unit (a)	148	131	84	141
Cost per unit (b)	136.09	132.57	99.80	141.07
Difference	(11.91)	1.57	15.80	0.07

The total overheads which are spread over the four products have been apportioned on different bases, causing the product cost to differ substantially in respect of products A and C. A change from traditional machine hour rate to an activity based system may have effect on:

(a) pricing and profits tot the extent that pricing is based on a 'cost plus' approach.
(b) Reported profits to the extent that stock levels fluctuate between reporting periods.

Ans. 15:

(a) Total cost of different products (overhead absorption on Machine hour basis)

	A	B	C	D
	Rs.	Rs.	Rs.	Rs.
Direct material	42	45	40	48
Direct labour	10	09	07	08
Overhead	72	54	36	18
Cost of production per unit	124	108	83	74
Out put in unit	720	600	480	504
Total cost	89,280	64,800	39,840	37,296

Machine hours (720 × 4 + 600 × 3 + 480 × 2 + 504 × 1) = 6,144 hours.

Rate per hour = $\frac{\text{Rs}\,1,10,592}{6,144\,\text{hours}}$ = Rs18 per hour.

(b) Activity based costing system

	Set up	*Store receiving*	*Inspection*
Machine operation and maintenance cost of Rs 63,000 to be distributed in the ratio of 4: 3: 2.	28,000	21,000	14,000

Cost	*Rs*	*Drivers*	*No*	*Cost per unit of driver (Rs)*
Set up	48,000	Production runs	96	500
Store receiving	36,000	Requisitions raised	200	180
Inspection	24,000	Production runs	96	250
Material handling and disp	2,592	Orders	192	13.50

Production Run for A (720/24) = 30 ; B (600/24) = 25 ; C (480/24) = 20 ; D (504/24) = 21.

	A (Rs)	*B(Rs0*	*C(Rs)*	*D(Rs)*
Direct material	30,240	27,000	19,200	24,192
Direct labour	7,200	5,400	3,360	4,032
Setup	15,000	12,500	10,000	10,500
Store receiving	9,000	9,000	9,000	9,000
Inspection	7,500	6,250	5,000	5,250
Material handling and dispatch	810	675	540	567
Total cost	69,750	60,825	47,100	53,541
Per unit cost	96.875	101.375	98.125	106.23

(c)

	A	*B*	*C*	*D*
Cost per unit (a)	124	108	83	74
Cost per unit (b)	96.88	101.38	98.13	106.23
Difference	(27.12)	(6.62)	15.13	32.23

The total overheads which are spread over the four products have been apportioned on different bases, causing the product cost to differ substantially: in respect of product A and D a change from traditional machine hour rate to an activity system may have effect on price and profits to the extent that pricing is based on cost plus approach.

Ans. 16:

(a) **Budget Cost Statement**

Activity	Activity Cost (Rs.) (Budgeted)	Activity Driver	No. of Units of Activity Driver (Budget)	Activity Rate (Rs.)	Deposits	Loans	Credit Cards
1.ATM Services	8,00,000	ATM Transaction	2,00,000	4	6,00,000	-	2,00,000
2. Computer Processing	10,00,000	Computer Transaction	20,00,000	0.50	7,50,000	1,00,000	1,50,000
3. Issuing Statements	20,00,000	No. of Statements	5,00,000	4.00	14,00,000	2,00,000	4,00,000
4. Customer Inquiries	3,60,000	Telephone Minutes	7,20,000	0.50	1,80,000	90,000	90,000
Budgeted Cost	41,60,000				29,30,000	3,90,000	8,40,000
Units of product as estimated in the budget period					58,600	13,000	14,000
Budgeted Cost per unit of the product					50	30	60

Working Notes:

(i) ATM 4,00,000 + 2,00,000 + 2 × 1,00,000 = 8,00,000

(ii) Computer 5,00,000 (Fixed = 2,50,000) Variable= 10,00,000
2,50,000 increase to 3 times = 7,50,000

(iii) Issuing Statements 2,00,000 + 80% × 2,00,000 = 2 + 1.6 = 3,60,000

Ans. 17:

(a) Working:

Calculation of Direct Labour hours:

	Rs.
Total Indirect Costs (Rs.)*	23,85,000
Total Direct labour hours (30,000 + 9,750)	39,750
Overhead absorption rate	$\frac{\text{Rs. } 23,85,000}{39,750 \text{ hours}} = \text{Rs. } 60 \text{ per hour}$

(i) Statement showing total manufacturing costs and profits

	Product A (60,000 units)		Product B (15,000 units)		Total (Rs.)
	Per unit	Amount (Rs.)	Per unit	Amount (Rs.)	
Direct materials	18.75	11,25,000	45.00	6,75,000	18,00,000
Direct labour	10.00	6,00,000	13.00	1,95,000	7,95,000
Prime cost	28.75	17,25,000	58.00	8,70,000	25,95,000
Indirect costs (absorbed on the basis of direct labour hours)	30.00 (18,00,000/ 60,000 units)	18,00,000 (30,000 hours @ Rs. 60 per hour)	39.00 (5,85,000/ 15,000 units)	5,85,000 (9,750 hours @ Rs. 60 per hour)	23,85,000
Total cost	58.75	35,25,000	97.00	14,55,000	49,80,000
Sales	63.00	37,80,000	137.00	20,55,000	58,35,000
Profit (Sales – Total cost)	4.25	2,55,000	40.00	6,00,000	8,55,000

* Calculation of total Indirect Cost:

	Rs.
Cleaning and maintenance wages	2,70,000

Designing costs	4,50,000
Set-up costs	3,00,000
Manufacturing operations cost	6,37,500
Shipment costs	81,000
Distribution costs	3,91,500
Factory Administration Costs	2,55,000
	23,85,000

Indirect cost allocation to products A and B:

	Product A	Product B
Direct labour hours	30,000	9,750
Direct labour hour rate:	Rs. 60	60
Indirect costs	Rs. 18,00,000	5,85,000
Output (units)	60,000	15,000
Cost per unit of output	Rs. 30	39

Statement showing the total manufacturing costs and profits using direct labour hour basis of absorption and treating cleaning and maintenance cost as indirect cost:

	Product A		Product B		Total
	Rs./unit	Amount	Rs./unit	Amount	
Output (units)		60,000		15,000	
		Rs.		Rs.	Rs.
Sales	63.00	37,80,000	137.00	20,55,000	58,35,000
Direct Materials	18.75	11,25,000	45.00	6,75,000	18,00,000
Direct Labour	10.00	6,00,000	13.00	1,95,000	7,95,000
Prime Cost	28.75	17,25,000	58.00	8,70,000	25,95,000
Indirect costs	30.00	18,00,000	39.00	5,85,000	23,85,000
Total costs	58.75	35,25,000	97.00	14,55,000	49,80,000
Profit	4.25	2,55,000	40.00	6,00,000	8,55,000

(ii) **Calculation of Setup hours**

	Product A	**Product B**
Total Output (in units)	60,000	15,000
No. of quantity produced per batch	240	50
Setup time per batch	2 hours	5 hours

Setup hours (Total) (No. of batches × set up time per batch)	$\left(\frac{60,000}{240}\times 2\right)=500$	$\left(\frac{15,000}{50}\times 5\right)=1,500$

Calculation of Cost Driver, Rates and summary of indirect cost relating to Product A & B:

Activity and Cost Drivers	Amount (Rs.)	Cost Drivers for Product			Activity Cost Rates	Indirect Costs	
		A	B		(Amount / total of cost driver)	Product A	Product B
Cleaning & Maintenance (Direct Labour hours)	2,70,000	30,000	9,750	39,750	6.7925 per Direct labour hour	2,03,775	66,227
Designing costs (square feet)	4,50,000	30 sq. feet	70 sq. feet	100	4,500 per sq. feet	1,35,000	3,15,000
Setup costs (setup hours)	3,00,000	500 hours	1,500 hours	2,000	150 per setup hour	75,000	2,25,000
Manufacturing operations costs (molding machine hours)	6,37,500	9,000	3,750	12,750	50 per molding hours	4,50,000	1,87,500
Shipment costs (No. of shipments)	81,000	100	100	200	405 per shipment	40,500	40,500
Distribution costs (area in cubic feet)	3,91,500	45,000 cubic feet	22, 500 cubic feet	67,500	5.80 per cubic feet	2,61,000	1,30,500
Factory administration costs (direct labour hours)	2,55,000	30,000	9,750	39,750	6.4151 per labour hour	1,92,453	62,547
Production (units)						13,57,728	10,27,274
						60,000	15,000
						22.63	68.48

Cost Sheet based on activity based costing system:

Description	Product A		Product B	
	Total cost	Per unit	Total cost	Per unit
	Rs.	Rs.	Rs.	Rs.
Sales	37,80,000	63.00	20,55,000	137.00
Direct Cost				
Direct Materials	11,25,000	18.75	6,75,000	45.00
Direct Labour	6,00,000	10.00	1,95,000	13.00
Total	17,25,000	28.75	8,70,000	58.00
Indirect costs	13,57,728	22.63	10,27,274	68.48
Total costs	30,82,728	51.38	18,97,274	126.48
Profit	6,97,272	11.62	1,57,726	10.52

(iii) Comparison of results:

Description	Product A		Product B	
	Traditional Costing System	Activity Based System	Traditional Costing System	Activity Based System
	Rs.	*Rs.*	*Rs.*	*Rs.*

Selling Price	63.00	63.00	137.00	137.00
Direct costs	28.75	28.75	58.00	58.00
Indirect costs	30.00	22.63	39.00	68.48
Total cost per unit	58.75	51.38	97.00	126.48
Profit per unit	4.25	11.62	40.00	10.52

Opinion:

In the traditional costing system, Product B appears to be more profitable than Product A whereas under the activity based costing system, Product A appears to be more profitable than product B. The activities like designing, set up, manufacturing operation cost, shipment and distribution are support service activities and the consumption of resources relating to these activities are not dependent on direct labour hours. The quantum of consumption of resource of each support service activity is different in respect of the two products manufactured and hence activity based costing presents a true view of cost of production. Moreover, the suggestion to treat cleaning and maintenance activity as a direct cost pool is commendable because costs should be charged direct wherever possible. The results reveal that the company should concentrate upon product B.

Alternative Solution:

Cleaning and maintenance activity will not find a place in the statement of calculation of cost driver rates. However, other cost driver rates will be unchanged.

Statement showing total cost and profits on the basis of Activity Based Costing

	Product A		**Product B**		**Total (Rs.)**
	Per unit	Amount (Rs.)	Per unit	Amount (Rs.)	
Direct materials	18.75	11,25,000	45.00	6,75,000	18,00,000
Direct labour	10.00	6,00,000	13.00	1,95,000	7,95,000
Cleaning & maintenance expenses	2.00	1,20,000*	10.00	1,50,000*	2,70,000
Prime cost	30.75	18,45,000	68.00	10,20,000	28,65,000
Indirect costs:					
Designing	2.25	1,35,000	21.00	3,15,000	4,50,000
Setup	1.25	75,000	15.00	2,25,000	3,00,000
Manufacturing operation	7.50	4,50,000	12.50	1,87,500	6,37,500
Shipments	0.67	40,500	2.70	40,500	81,000
Distribution	4.35	2,61,000	8.7	1,30,500	3,91,500

			0		
Factory administration	3.21	1,92,453	4.17	62,547	2,55,000
Total indirect costs	19.23	11,53,953	64.07	9,61,047	21,15,000
Total costs	49.98	29,98,953	132.07	19,81,047	49,80,000
Sales	63.00	37,80,000	137.00	20,55,000	58,35,000
Profits (Sales – total costs)	13.23	7,81,047	4.93	74,953	8,55,000

* The Cost Accountant identified Rs. 1,20,000 for Product A and balance Rs. 1,50,000 of cleaning and maintenance wages for Product B.

(iii) Comparison of results:

	Product A		Product B	
Allocation basis	Direct Labour Hour	Activity Based Costing	Direct Labour Hour	Activity Based Costing
Selling Price	63	63	137.00	137.00
Prime cost	28.75	30.75	58.00	68.00
Total Indirect costs	30.00	19.23	39.00	64.07
Total costs (Prime cost + Total indirect costs)	58.75	49.98	97.00	132.07
Profit per unit	4.25	13.02	40.00	4.93

Comments:

It is evident from the comparison of results that under single cost pool system the product A is overcost and product B is undercost. This is due to allocation of indirect cost on the basis of blanket rate based on direct labour hour and considering one of the significant cost as an indirect one. Cost Accountant's decision for allocation of indirect costs on the basis of ABC methods and identifying be cleaning and maintenance cost as direct element of cost appears to be a good decision. Result show that the firm enjoys competitive advantage with regards to product A.

Ans. 18

(1) Single factory direct labour hour overhead rate = $\frac{\text{Rs } 3,10,000}{2,000}$ = Rs 155 per direct labour hour

Computation of unit cost (existing system)

	R (Rs)	S(Rs)	T(Rs)
Direct labour cost @ Rs 12 per hour	300	5,760	600

Direct material	1,200	2,900	1,800
Overheads(direct labour hours × Rs 155 per hour	3,875	74,400	7,750
	5,375	83,060	10,150
Quantity Produced (No)	560	12,800	2,400
Cost per unit	9.60	6.49	4.23

(2) ABC system involves the following stages,

1. Identifying the major activities that take place in an organisation.
2. Creating a cost pool /cost centre for each activity
3. Determining the cost driver for each activity
4. Assigning the cost of activities to cost objects (e.g. products, components, customers etc)

The most significant activities have been identified e.g. receiving components consignments from suppliers, setting up equipment for production runs, quality inspections, and despatching orders to customers. The following shows the assignment of the costs to these activities,

(Rs ,000)

	Receiving supplies	*Set ups*	*Quality inspection*	*Despatch*	*Total*
Equipment operation expenses	18.75	87.50		18.75	125.00
Maintenance	3.75	17.50		3.75	25.00
Technicians wages initially allocated to Maintenance(30% of Rs 85,000= Rs 25,500 and then reallocated on same basis on maintenance)	3.83	17.85		3.82	25.50
Balance of technicians wages allocated to set ups and quality inspections		34.00	25.50		59.50
Stores wages - Receiving	35.00				35.00
Despatch wages - Despatch				40.00	40.00
	61.33	156.85	25.50	66.32	310.00

Note : Equipment operation expenses and Maintenance allocated on the basis 15%,70% and 15% as specified in the question.

The next stage is to identify the cost drivers for each activity and establish cost driver rates by dividing the activity costs by a measure of cost driver usage for the period. The calculations are as follows :-

Receiving supplies ($\frac{\text{Rs } 61,330}{980}$) = Rs 62.58 per component.

Performing set ups ($\frac{1,56,850}{1,020}$) = Rs 153.77 per set up

Despatching goods ($\frac{66,320}{420}$) = Rs 157.93 per despatch

Quality inspection ($\frac{25,500}{640}$) = Rs 39.84 per quality inspection

Finally, costs are assigned to components based on their cost driver usage. The assignments are as follows,

	R (Rs)	S(Rs)	T(Rs)
Direct labour	300	5,760	600
Direct materials	1,200	2,900	1,800
Receiving supplies	2,628.36	1,501.92	1,752.24
Performing set ups	2,460.32	2,767.86	1,845.24
Quality inspections	398.40	318.72	717.12
Despatching goods	3,474.46	13,424.05	7,264.78
Total costs	10,461.54	26,672.55	13,979.38
No of units produced	560	12,800	2,400
Cost per unit	18.682	2.08	5.82

For components, the overhead costs have been assigned as follows,

(Component R)

Receiving supplies (42 receipts at Rs 62.58)

Performing set ups (16 production runs at Rs 153.77)

Quality inspections (10 at Rs 39.84)

Despatching goods (22 at Rs 157.93).

Ans 19:

Overhead rate per labour hour

$$= \frac{\text{Overhead incurred in first half year}}{\text{Direct labour hours worked}} = \frac{\text{Rs. 21,00,000}}{\text{40,000 hours}} = \text{Rs. 52.50 per labour hour}$$

Apportionment of technical staff salaries

Machine maintenance	= 6,37,500 X 31/100	= Rs. 1,91,250
Set up	= 6,37,500 X 40/100	= Rs. 2,55,000
Quality Inspection	= 6,37,500 X 30/100	= Rs. 1,91,250

Statement showing apportionment of 'Machine operation' and 'Machine maintenance' between stares and production activity (set up) in ratio 20:80

Particulars	Total Expenses	Stores / Receiving	Set up/ Production run
Machine operation	10,12,500	2,02,500	8,10,000
Machine maintenance (Rs. 1,87,500 + Rs. 1,91,250)	3,78,750	75,750	3,03,000

Particulars	Total Expenses	Stores / Receiving	Set up / Production run
Wages and salaries of stores staff	2,62,500	2,62,500	-
Component of set- up cost	2,55,000	-	2,55,000
Total	19,08,750	5,40,750	13,68,000

Rate per activity cost driver

Particulars	Stores / Receiving	Set up/ Production run	Quality inspection
Total overheads (Rs.)	5,40,750	13,68,000	1,91,250
Units of activities carries out	1,960	2,040	1,280
Rate per activity cost driver (Rs.)	275.89	670.59	149.41

Statement showing computation of cost of products P and Q (Based on the existing system of single overhead recovery rate)

Particulars	Product	
	P	Q
Direct Labour hours	960	100
Unit made	15,000	5,000
Direct materials cost	6,000	4,000
Direct labour cost (@ Rs. 6 per D.L.H.)	5,760	600
Overheads (@ Rs. 52.50 per D.L.H.)	50,400	5,250
Total cost of products	62,160	9,850
Cost per unit	4.144	1.97

Statement showing computation af cost of products P and Q (Using activity based costing system)

Particulars		Product	
		P	Q
Units		15,000	5,000
Direct materials cost		6,000	4,000
Receiving/ Stores cost		5,760	600
Receiving Stores cost	(48 X 275.89) (52 X 275.89)	13,243	14,346
Production runs / Set ups cost	(36 X 670.59) (24 X 670.59)	24,141	16,094
Inspection cost	(30 X 149.41) (10 X 149.41)	4,482	1,494
Total Cost products		53,626	36,534
Coat per unit		3.58	7.31

Computation of sales value per quarter of component K (Using activity based costing system)

Units of component K *To be delivered per quarter*	*3,000*
	Rs.
Component of initial design cost per quarter (Rs. 60,0000/8 quarters)	*7,500*
Direct material costs	*12,000*
Direct labour cost (600 hours X Rs. 6)	*1,800*
Receiving cost (50 X Rs. 275.89)	*5,518*
Production runs cost (6 X Rs. 670.59)	*4,024*
Inspection cost (24 X Rs. 149.41)	*3,586*
Total cost	*34,428*
Add: Mark up (25% of cost)	*8,607*

Sales value	*43,035*
Selling price per unit of K (Rs. 43,035/3,000 units)	*16.34*

Ans 20

(i) Job cost sheet for Host Restaurant and Pizza Hut (using a simplified costing system)

	Host Restaurant (Rs.)	*Pizza Hut (Rs.)*
Professional labour cost:		
25 hours @ Rs.60 per hour	1,500	
40 hours @ Rs.60 per hour		2,400
(Refer to working note 1)		
Professional Support staff		
25 hours @ Rs.120per hour	3,000	
40 hours @ Rs.120 per hour		4,800
(Refer to working note 2)		
Total	4,500	7,200

(ii) Job cost sheet using an Activity based costing

	Host Restaurant (Rs.)	*Pizza Hut (Rs.)*
Professional labour cost	500	
5 hours @ Rs.100 per hour		3,000
30 hours @ Rs.100 per hour		
(Refer to working note 3)		
Associate labour cost	800	
20 hours @ Rs.40		400
10 hours @ Rs.40		
(Refer to working note 4)		
Design support	1,690	
Rs.1.30 × Rs.1,300		4,420
Rs.1.30 × Rs.3,400		
(Refer to working note 5)		
Staff support	1,056	
25 hours @ Rs.42.22		1,689
40 hours @ Rs.42.22		
(Refer to working note 6)		
	4,046	9,509

(iii) Determining the amount by which each job was under or overcosted using a simplified costing system.

	Host Restaurant (Rs.)	*Pizza Hut (Rs.)*
Cost using simplified system	4,500	7,200
Cost using Activity Based system	4,046	9,509
Difference	454	(2,309)

The simplified costing system overcosted Host Restaurant job by Rs.454 and undercosted Pizza Hut job by Rs.2,309.

Working notes:

1. *Professional labour cost per hour*

$$\text{Professional labour cost per hour} = \frac{\textit{Professional salaries}}{\textit{Professional labour hours}}$$

$$= \frac{(2\times \text{Rs.}1,50,000)+(4\times \text{Rs.}60,000)}{6\times 1,500\text{ hours}}$$

$$= \frac{\text{Rs.}3,00,000+\text{Rs.}2,40,000}{9,000\text{ hours}}$$

$$= \text{Rs.}60 \text{ per hour}$$

2. *Professional support cost per hour*

$$\text{Professional support cost per hour} = \frac{\textit{Total support cost}}{\textit{Professional labour hours}}$$

$$= \frac{\text{Rs.}10,80,000}{9,000\text{ hours}}$$

$$= \text{Rs.}120 \text{ per hour}$$

3. *Partner wage rate per hour*

$$\text{Partner rate per hour} = \frac{\textit{Partner salaries}}{\textit{Partner billable hours}}$$

$$= \frac{\text{Rs.}3,00,000}{3,000\text{ hours}}$$

$$= \text{Rs.}100 \text{ per hour}$$

4. *Associate wage rate per hour* $= \dfrac{\textit{Associate salaries}}{\textit{Associate billable hours}}$

$$= \frac{4\times \text{Rs.}60,000}{4\times 1,500\text{ hours}}$$

$$= \text{Rs.}40 \text{ per hour}$$

5. *Design support per Re. of professional labour*

$$= \frac{\textit{Budgeted design support costs}}{\textit{Budgeted professional labour cost}}$$

$$= \frac{\text{Rs.}7,00,000}{\text{Rs.}5,40,000}$$

$$= \text{Rs.}1.30 \text{ per Re. of professional labour}$$

6. Staff support per professional labour hour

$$= \frac{\textit{Budgeted staff support costs}}{\textit{Budgeted professional labour hours}}$$

$$= \frac{\text{Rs.}3,80,000}{9,000\text{ hours}}$$

$$= \text{Rs.}42..22 \text{ per professional hour}$$

Ans. 21:

(i) Comparison of manufacturing cost per unit.

	Audio Player Model	
	'AB 100'	*'AB 200'*
	Rs.	*Rs.*
Direct material cost	1,000.00	800.00
Direct manufacturing labour cost	200.00	180.00
Machining costs	200.00	160.00
Testing costs	250.00	200.00
Rework costs	150.00	75.00
Ordering costs	2.00	1.25
Engineering costs	198.00	198.00
Total manufacturing cost per unit	2,000.00	1,614.25

Working notes for audio player model 'AB 200'

(i) Machining hours and cost: Machining hours = (1 hour–0.20 hours) or 0.80 hours)

Machining cost is 0.80 hours × Rs.200 or Rs.160

(ii) Testing hours and cost: Testing hours = 2 hours × (1 hour – 0.20) or 1.60 hours.

Testing cost is 1.60 hours × Rs.125 or Rs.200

(iii) Rework cost per unit:

Rework units = 5% × 10,000 units or 500 units. Rework cost = 500 units × Rs.1,500 or Rs.7,50,000. Rework cost per unit Rs.7,50,000 / 10,000 units or Rs.75 per unit.

(iv) Ordering cost:

No. of orders per month 50 components × 2 orders = 100

Ordering cost per month 100 orders × Rs.125 per order = Rs.12,500

Ordering cost per unit = Rs.12,500 / 10,000 units = Rs.1.25 per unit.

(v) It is assumed that total available engineering hours will be used for manufacturing 'AB 200' model of audio player.

(ii) Effect of design change and pricing decision on operating income of ABC.

		(Rs. Lakhs)
Revenue loss on 10,000 units		(40)
(Rs.10,000 units × Rs.400)		
Saving in cost:		
Direct material costs	20.00	
(Rs.200 × 10,000 units)		
Direct manufacturing labour costs	2.00	
(Rs.20 × 10,000 units)		
Rework costs	7.50	29.50

(5% × 10,000 units × Rs.1,500)

Net effect on operating income (10.50)

Conclusion:

Operating income per month will be reduced by Rs. 10.50 Lakhs.

Effects of reduction in components, machining time, and testing time will not have any immediate effect, because it is difficult to adjust the available facilities in ordering department, machining department and testing department.

Ans. 28:

Maximum capacity 80,000 units

Presented sales 20,000 units @ Rs. 100 p.u.

Selling price/unit	Demand
100	20,000
90	40,000
80	80,000 = Full capacity

∴Target cost/unit = 80 –25% of sales
= 80- 20 = 60 p.u.

(b) At present

Variable cost/unit = 40% of cost i.e. 75 = Rs. 30

∴Fixed cost/unit = 100 –25% = 75

COS	75
Less: Variable cost/unit	30
Fixed cost	45 p.u. Total fixed

cost 45×80,000 = 36 lakhs

∴Add full capacity target cost = Rs. 60/unit ×80,000 units
= Rs. 48 lakhs

Total estimate cost

Fixed cost	36 lakhs
Variable cost (80,000×40)	24 lakhs
	60 lakhs

∴Required. Cost reduction following value engineering is Rs. 12 lakhs.

(e) Rate of return 15% Profit p.u. 25% of 80 = 20/unit

Profit before tax = 20×80,000 = 16 lakhs

ROCE = (PBI/Investment)

∴Investment = (PBI/ROCE) = 16 lakhs/15% = Rs. 10666667.

Ans. 29:

Target profit	25,000
Add: Fixed cost	1,40,000
Add: Additional Advertisement	28,500

(a) Total contribution	1,93,500
(b) Required. Sales volume	12,000
contribution/unit (a¸b)	16.125
Target Selling price/unit	32
Less: Contribution/unit	16.125
Target variable cost p.u.	15.875
Less: material cost p.u.	8.000
Labour + Variable overhead	7.875
Labour: x hr. @ 4	
Variable overhead x hr. @ 0.5	

∴4.5x =	7.875
x (hr.)	1.75
Time/unit	1.75
Present	2.00
Time reduced	0.25 hr.

Ans. 30:

	Part A	Part B
Target Price (Rs.)	145	115
Less : Variable Cost p.u. (Rs.)		
Material(1.6 kg. @ Rs. 12.5 p.kg.) (Rs.)	20	20
Variable OH Machine A (0.6/0.25 hrs @ Rs. 80 p.h.) (Rs.)	48	20
Variable OH: Machine B (0.5/0.55 hrs @ Rs. 100 p.h.) (Rs.)	50	55
Total Variable Cost p.u. (Rs.)	118	95
Contribution p.u. (Rs.)	**27**	**20**
Number of parts can be manufactured on the basis of:		
Alloy Available (13000kg ÷ 1.6/1.6)	8,125	8,125
Machine A (4000 hrs ÷ 0.6/0.25)	6,666	16,000
Machine B (4500 hrs ÷ 0.5/0.55)	9,000	8,181
Maximum units that can be manufactured	**6,666**	**8,125**
Total Contribution (6,666 units × 27; 8,125 × 20)	**179,982**	**162,500**

Hence it is recommended to produce Part A.

(b) Parts A to be Manufactured	6,666 units	
	Hours utilized	Idle hours
Machine A usage (6,666 × 0.6)	3,999.6	0.4
Machine B usage	3,333	1167
Compensation for unutilized machine hour (1167.4 @ Rs 60/ hour)		Rs. 70,044
Revised contribution after reduction of 10% in S.P. [6,666 × (145 × 0.9 – 118)]		Rs. 83,325
Total Contribution		**Rs. 153,369**

Ans. 31

(i) Cost of product as per Target Costing

	Coco	Stawberry	Vanilla
Selling Price per unit	23.00	18.00	13.00
Less: Markup (25% of cost or 20% of selling Price)	4.60	3.60	2.60
Target Cost per unit (Rs.)	**18.40**	**14.40**	**10.40**

(ii) Cost of product as per Traditional Costing

	Coco	Stawberry	Vanilla

Maximum Volume (units)	60,500	24,200	72,600
	Rs.	Rs.	Rs.
Material	8.00	6.00	5.00
Labour	5.00	4.00	3.00
Prime Cost	13.00	10.00	8.00
Store Support (30% of Prime Cost)	3.90	3.00	2.40
Total Cost per unit	16.90	13.00	10.40
Total Cost	10,22,450	3,14,600	7,55,040

(iii) Cost of product as per Activity Based Costing

	Coco	Stawberry	Vanilla
Maximum Volume (units)	60,500	24,200	72,600
	Rs.	Rs.	Rs.
Material	8.00	6.00	5.00
Labour	5.00	4.00	3.00
Prime Cost	13.00	10.00	8.00
Overheads (Working Note-2)	3.29	5.23	2.17
Total Cost per unit	16.29	15.23	10.17
Total Cost	9,85,320	3,68,670	7,38,100

(iv) Comparision in Cost of each product under each method

	Coco	Stawberry	Vanilla
As per Target Costing	18.40	14.40	10.40
As per Traditional Costing	16.90	13.00	10.40
As per Activity based Costing	16.29	15.23	10.17

Comment: Since cost of Strawberry is high in ABC costing in comparison to target costing and traditional methods, it is indicating that actual profit under target costing is less than targeted.

Working Note-1 :

	Coco	Stawberry	Vanilla
Current Selling Price per unit (Rs.)	25.00	20.00	15.00
Current Sales (units)	50,000	20,000	60,000
Selling Price (Rs.)	24.00	19.00	14.00
Revised Sales (units)	55,000	22,000	66,000
Selling Price (Rs.)	23.00	18.00	13.00
Revised Sales (units) (upto production capacity)	60,500	24,200	72,600

Working Note-2 :

	Coco	Stawberry	Vanilla
Ordering Cost (35/30/15 @ 800)	28,000	24,000	12,000
Delivery Cost (112/66/48 @ 700)	78,400	46,200	33,600
Shelf Stocking (130/150/160 @ 199)	25,870	29,850	31,840
Customer Support (60,500/24,200/72,600 @ 1.1)	66,550	26,620	79,860
TOTAL COST	1,98,820	1,26,670	1,57,300
No. of units	60,500	24,200	72,600
Cost per unit	3.29	5.23	2.17

Note: On calculation of total overhead costs under traditional & ABC system, costs are same i.e. Rs. 4,82,790, hence we will ignore the line "In ABC these costs are coming under customer support and assistance." written in question.

Ans. 32:

(a) (i) The target cost of each product after reduction is computed as follows:

Product	*Present Price (Rs)*	*Proposed Price (Rs)*	*Target Cost (Rs) (with 25% Margin)*
A	180	175	140
B	175	170	136
C	130	125	100
D	180	175	140

(ii) Statement showing cost/unit of Driver as per ABC

Cost	*Amount*	*Driver*	*No.*	*Cost/unit of Driver*
Set-ups	26,250	Production runs	105*	Rs.250.00
Stores receiving	18,000	Requisition	400**	Rs.45.00
Inspection/Quality	10,500	Production runs	105	Rs.100.00
Handling/Dispatch	23,100	Orders	210	Rs.110.00
Machine Department	52,130	Machine Hrs.	6,500	Rs.8.02

* Production runs = (600/20) + (500/20) + (400/20) + (600/20) = 105

** Requisitions = 100 for each product or 400 total

Machine hours = 2,400 + 1,500 + 800 + 1,800 = 6,500 hours.

Statement showing Total Cost and Cost Per Unit as per ABC

Item	*A* Rs.	*B* Rs.	*C* Rs.	*D* Rs.
Direct Material	24,000	25,000	12,000	36,000
Direct Labour	16,800	10,500	5,600	12,600
Set-up	7,500	6,250	5,000	7,500
Stores receiving	4,500	4,500	4,500	4,500
Inspection/Quality	3,000	2,500	2,000	3,000
Handling/Dispatch	6,600	5,500	4,400	6,600
Machine Dept. Cost	19,248	12,030	6,416	14,436
Total Cost	81,648	66,280	39,916	84,636
Output (Units)	600	500	400	600
Cost per unit	136.08	132.56	99.79	141.06

(iii) Comparison of Actual Cost and Target Cost

Cost	*A* Rs.	*B* Rs.	*C* Rs.	*D* Rs.
Actual	136.08	132.56	99.79	141.06
Target	140.00	136.00	100.00	140.00
Difference	(-) 3.92	(-) 3.44	(-) 0.21	(+) 1.06

Comment:

The total actual cost of A, B and C product is less than the target cost so there is no problem in reducing the cost of these product by Rs.5 from the present price. It will increase the profitability of the company but the cost of D is slightly more than the target cost, it is therefore, suggested

that the company should either control it or redesign it.

Ans. 33: Working Notes:

	Particulars	P	Q
(a)	Production/Sales Quantity (units)	1,00,000	50,000
(b)	Batch Size (units)	1000	500
(c)	No. of batches	100	100
(d)	Set up time per batch (hours)	30	36
(e)	Total set up hours (c d) (hours)	3,000	3,600
(f)	Machine set up cost (Rs.)		4,62,000
(g)	Cost driver per machine set up hour		
	$\frac{4,62,000}{6,600}$ = Rs. 70		
(h)	Testing time per unit	5 hours	9 hours
(i)	Total testing time (a h) (hours)	5,00,000	4,50,000
(j)	Testing cost		
	Rs. 23,75,000		
(k)	Cost driver per testing hour		
	$\frac{23,75,000}{9,50,000}$ = Rs. 2.50		

(a) Computation of full cost per unit using Activity Based Costing:

Particulars	Basis	P	Q
Direct material	Direct	42,00,000	30,00,000
Direct labour	Direct	15,00,000	10,00,000
Direct machine cost	Direct	7,00,000	5,50,000
Machine set up cost	3,000 hours @ Rs. 70	2,10,000	
	3,600 hours @ Rs. 70		2,52,000
Testing cost	5,00,000 hours @ Rs. 2.50	12,50,000	
	4,50,000 hours @ Rs. 2.50		11,25,000
Engineering cost	Allocated	8,40,000	14,10,000
Total cost (Rs.)		87,00,000	73,37,000
Cost per unit (Rs.)		87.00	146.74

(b) Mark up on full cost basis for Product P:

Particulars	Per unit
Selling price	100.05
Less: Full cost	87.00
Mark up	13.05

Percentage of mark up on full cost = 13.05 /87 = 15 %

(c) Target cost of Product P after new design is implemented

Target price (given)	86.25
Mark-up $\frac{86.25 \times 15}{}$	11.25

115	
Target cost per unit (Rs.)	75.00

(d) Statement of cost for new design of P

Particulars	*Basis*	*Cost P.U.*	*Total Cost*
Direct Material	Decreased by Rs. 5 p.u.	37.00	37,00,000
Direct Labour	Decreased by Rs. 2 p.u.	13.00	13,00,000
Direct Machining cost	No change as machine is dedicated	7.00	7,00,000
Machine set up cost	100 set up 28 hours Rs. 70	1.96	1,96,000
Testing cost	1,00,000 units Rs. 2.5 4 hours	10.00	10,00,000
Engineering cost	No change	8.40	8,40,000
Total cost		77.36	77,36,000

The target cost is Rs. 75 p.u. and estimated cost of new design is Rs. 77.36 p.u.
The new design does not achieve the target cost set by Computo Ltd. Hence the target mark up shall not be achieved.

(e) Possible Management Action:

Value engineering and value analysis to reduce the direct material costs.

Time and motion study in order to redefine the direct labour time and related costs.

Exploring possibility of cost reduction in direct machining cost by using appropriate techniques.

Identification of non-value added activities and eliminating them in order to reduce overheads.

The expected selling price based on estimated cost of Rs. 77.36 per unit is (Rs.77.36 + 15%) Rs. 88.96. Introduce sensitivity analysis after implementation of new design to study the sales quantity changes in the price range of Rs.
86.25 to Rs. 88.96.

Ans. 34:

	P1 Rs/unit	P2 Rs./unit
Material	407.5	292.1
Overhead-Material handling	85×1.2 = 102	46×1.2 = 55.2
Assembly Management	40×3.2 = 128	40×1.9 = 76
Machine insertion	48×0.7 = 33.6	31×0.7 = 21.7
Manual insertion	36×2.1 = 75.6	25×2.1= 31.5
Quality testing	1.4×25 = 35	1.1×25 = 27.5
Present cost	781.70	504.00
Target cost	680.00	390.00

	Revised P1 Rs./unit	Revised P2 Rs./unit
Direct material	381.20	263.10
Overhead:		

Material handling	(71×1.2) = 85.2	(39×1.2) = 46.8
Assembly hour	(21×40) = 84.0	(1.6×40) = 64.0
Machine inspection	(59×0.7) = 41.3	(29×0.7) = 20.30
Manual inspection	(12×2.10) = 25.2	(10×2.10) = 21.00
Electronics	(1.2×25) = 30.00	(0.9×25) = 22.50
Estimated cost	646.90	437.70
Target cost	680.00	390.00
	Achieved	not achieved

Ans. 39: Machine X-Life 12 years

	Year	Cost Rs.	Discount Factor	Discounted Cost Rs.
Purchase price	0	19,000	1.00	19,000
Overhead cost	8	4,000	0.47	1,880
Trade-in –value	12	(3,000)	0.32	(960)
Annual repair cost	1-12	2,000	6.81	13,620
				33,540

Annualized equivalent =Rs.33,540 / 6.81=Rs.4,925

Machine W-Life 12 years

	Year	Cost Rs.	Discount Factor	Discounted Cost Rs.
Purchase price	0	13,000	1.00	13,000
Overhead cost	4	2,000	0.68	1,360
Trade-in –value	6	(3,000)	0.56	(1,680)
Annual repair cost	1-6	2,600	4.36	11,336
				24,016

Annualized equivalent
Recommendation : Purchase machine 'X'
Assumptions:

a. Same performance, capacity and speed.
b. No. inflation.
c. 12 year-estimates are as accurate as 6 – year estimates.
d. Cash flow at the year end.

Ans. 40: The cost driver rates are as follows:
Product design = Rs.250 per design hour (Rs.2m/8000 hours)
Purchasing = Rs.50 per purchase order (Rs.200000/4000 orders)
Production (excluding depreciation) = Rs.100 per machine
Hour ((Rs.1 500000-Rs.300000)/ 12000 hours)
Packing =Rs.20 per cubic meter (Rs.400000/ 20000)
Distribution =Rs.5 per kg (Rs.600000/ 120000)
The activity –based overhead cost per unit is as follows:

		(Rs.)
Product design	(400 design hours at Rs.250 per hour=Rs.100000 Divided by life –cycle output of 5000 units)	20.00
Purchasing	(5 purchase orders at 50 units per order costing A total of Rs.250 per output of 250 units)	1.00
Production	(0.75 machine hours at Rs.100 per machine hour)	75.00
Depreciation	(Asset cost over life cycle of 4 years= 16 quarters Depreciation at Rs.8000 per quarter divided by life cycle Output of 5000 units)	25.60
Packing	(0.4 cubic meters at Rs.20)	8.00
Distribution	(3 kg at Rs.5)	15.00

Total costs 14.60

Ans. 41: The total cost consists of the installation cost plus electrical charges for 5 years.

(i) So total cost for Electric immersion heater =Rs.160 + 200X5 =Rs.1160

(ii) Total cost for a gas boiler =Rs.760 + Rs.80X5 =Rs.1160

Hence, on the total cost basis, both the equipments have equal preference, and the housewife can choose any one. Let us now calculate the present value of money for each of the two possibilities.

Year	PV factor @ 9% p.a	Electric Immersion heater		Gas Boiler	
		Operating Cost Rs.	Discounted Cost Rs.	Operating Cost Rs.	Discounted Cost Rs.
0	1.0000	160	160.00	760	760.00
1	0.9174	200	183.48	80	73.39
2	0.8417	200	168.34	80	67.33
3	0.7722	200	154.44	80	61.78
4	0.7084	200	141.68	80	56.67
5	0.6499	200	129.98	80	51.99
		Total Cost=937.92 (Rs.938,say)		Total Cost =1071.16 (Rs.1071 say)	

On the basis of present value @ 9% p.a over a period of five years., the total cost of Electric immersion heater is Rs.938 and that of a Gas boiler is Rs.1071. Hence, the housewife is advised to purchase an electric immersion heater.

If the equipment are to be considered for a period of 8 years, then

Total cost for electrical immersion heater =Rs.160+200X8 =Rs.1760

Total cost for gas boiler =Rs.760+Rs.80X8 =Rs.1400

Hence, the housewife will be advised to purchase a gas boiler.

Year	PV factor @ 9% p.a	Electric Immersion heater		Gas Boiler	
		Operating Cost Rs.	Discounted Cost Rs.	Operating Cost Rs.	Discounted Cost Rs.
6	0.5963	200	119.26	80	47.70
7	0.5470	200	109.40	80	43.76
8	0.5019	200	100.38	80	40.15
			329.04 (329,say)		131.61 (Rs.132 say)

Present value in case of electric immersion heater

= P.V. over five years + P.V. over next three years =Rs.938+Rs.329 =Rs.1267

Present value in case of gas boiler =Rs.1071+Rs.132 =Rs.1203

Hence, over a 8 years period, the present value of a gas boiler is less

On the basis of total cost as well as present value of money, gas boiler is cheaper over 8 years period, hence the housewife is advised to purchase a gas boiler. **]**

Ans. 42: Relevant Operating Cash outflow p.a. if part X 248 is outsourced

Purchase Cost (Cash outflow)	(a)	50000
Relevant Cash inflow from outsourcing:		
Direct materials		22000
Direct Labour		11000
Variable Overhead		7000
Product and Process engineering		4000
Rent		1000
Total Cash Savings	(b)	45000
Net Cash Outflow	(a) - (b)	(5000)

Net Present Value of cash inflow if part is outsourced

Particulars	Year	Amount Rs.	P.V. factor @ 12%	P.V Rs.
Disposal value of machine	0	15000	1000	15000
Cash Outflow due to outsourcing	1	5000	0.893	(4465)
	2	5000	0.797	(3985)

3	5000	0.712	(3560)
4	5000	0.636	(3180)
5	5000	0.567	(2835)
NPV			(3025)

Analysis : Since the NPV is negative , it is desirable to manufacture the part internally.

Notes:

(1) Equipment depreciation is a non- cash cost item. Therefore, it is not relevant.
(2) Product and process engineering cost is relevant for the entire period of outsourcing i.e. for 5 years.
(3) Allocated rent is irrelevant but rent saved (i.e, Rs.1000) is relevant.
(4) Allocated general plant overhead is irrelevant.

Ans. 43: Evaluation of Alternative proposals

Alternative I :Repairs to existing machine:			(Rs.)
Cost of Repairs	19000 X 50 / 100	=Rs.9500	.
Equivalent annual cost for 5 years	(9500 / 3.791)		2506
Add: Running and Maintenance cost p.a net of tax	(20000 X 50 / 100)		10000
Present value of cash outflows p.a			12506

Alternative II : Replace the old machine		
Purchase cost of new machine		49000
Less: sale proceeds of old machine		5000
Net: Cash Outflow		44000
Equivalent annual cost for 10 years	(44000 / 6.145)	7160
Add: Running and maintenance cost p.a net of tax	(14000 X 50 / 100)	7000
		14160
Less : Tax Saving on depreciation	(49000 / 10) X 50 / 100	2450
Present value of cash outflow p.a		11710

Analysis : From the above analysis it is observed that alternative II i.e., replacement of old machine with a new machine is more profitable, since the cash outflow p.a. will decrease by Rs. 796 (i.e. Rs.12506 – Rs.11710) if old machine is replaced with new machine.**]**