PAPER – 5: ADVANCED MANAGEMENT ACCOUNTING

*Question No.**1** is compulsory.*

*Answer any **five** questions from the remaining **six** questions.*

Working notes should form part of the answer.

No statistical or other table will be provided with this question paper.

Question 1

(a) *SRB Ltd. manufactures products X, Y and Z. The following details relate to a certain production period :*

	X	Y	Z
Direct Material ₹/u	75	60	60
Direct labour ₹/u (at ₹ 15/hour)	45	60	75
Production overheads ₹/u (Traditional method)	44	58	73
Total Production Cost ₹/u	164	178	208
No. of units produced	12,000	18,000	24,000
Purchase requisitions (nos.)	300	300	400
No. of production runs	800	1,000	1,200

Since most of the overheads relate to production runs, the management wants to use the ABC System, for which the following information is given:

Activity	**Cost Driver**	**Overhead Amount**
Stores Receiving	Purchase Requisitions	4,50,000
All other production overheads	Production Runs	Balance Amount ·

You are required to find out the production overhead cost per unit of only Z under the ABC System. ***(5 Marks)***

(b) *M has a plan to invest ₹ 2,40,000 in three different types of funds-*

Debt (A), Debt + equity (B) and Equity (C). A offers a return of 4% p.a. and has a low risk·. Fund B offers a return of 6% p.a. and has a moderate risk. Fund C offers a return of 10% p.a. but has a high risk due to volatility in the stock market. To be on the safe side, M decided to invest not more than 15 percent of the investment amount in C and atleast twice as much in A as in B. The rates of return will continue up to the end of the year.

Formulate the above as a linear program to maximise annual return. (no need to solve).

Will an average annual return of 6% be feasible? ***(5 Marks)*** *(c) The following information is provided for October 2019:*

Product	Budgeted		Cost ₹/u		Actual	
	Sales Units	Selling Price ₹/u	Standard	Actual	Units Sold	Sales Value (₹)
P	11,000	20	16	17	15,000	3,30,000
Q	9,000	25	14	11	12,000	2,40,000

Compute:

(i) Product wise sales margin mix variance.

(ii) Product wise sales margin price variance. **(5 Marks)**

(d) ABC Ltd. has to decide whether to accept a special order or not for a certain product P using spare 'capacity in respect of which the following information is given:

Materials	Requirements	In Stock	Book Value	Replacement Cost per kg.	Realisable value per kg.
Material A (in use for production)	500 kg	250 kg	₹ 1,250	₹ 7	₹ 3
Material B (not currently in use)	1,500 kg	700 kg	₹ 1,400	₹ 3	₹ 1.50

Fixed overhead is absorbed of ₹ 10 per unit.

In the given decision context; identify the following :

Sl. No.	Item	Value (₹)
I	II	III
(i)	Relevant cost of 500 kg of A	
(ii)	Relevant cost of 1,500 kg of B	
(iii)	Relevant fixed overheads	
(iv)	Opportunity cost of 800 kg of B not in stock	
(v)	Relevant cost of 20 kg of A damaged in stock	

(Present only columns I & III in your answers). **(5 Marks)**

Answer

(a) Computation of Total Production Overheads

	X	Y	Z	TOTAL
Production Overheads p.u. (₹)	44	58	73	
No. of units produced	12,000	18,000	24,000	
Total production Overhead (₹)	5,28,000	10,44,000	17,52,000	**33,24,000** .
Less: Stores Receiving				4,50,000
All other Production Overheads				28,74,000

Calculation of Rate per Cost Driver

Purchase requisition = 4,50,000 / (300+300+400)

= 4,50,000 / 1000 = **₹ 450/-**

Production Run = 28,74,000/(800+1000+1200)

= 28,74,000 / 3000 = **₹ 958/-**

Total Production Overhead for Z under ABC = (450 x 400) + (958 x 1200)

= 1,80,000 + 11,49,600 **= ₹ 13,29,600/-**

No. of units produced (Z) = 24,000

Total Production Overhead p.u. of Z = 13,29,600/24,000 = **₹ 55.40/-**

(b) Formulation of Linear Program

Let a, b and c be the amounts invested in A, B and C types respectively.

Objective Function Z = 4% a + 6% b + 10% c

(or)

$Z = 0.04\,a + 0.06\,b + 0.10\,c$

$a + b + c = 2{,}40{,}000$

$c \leq$ 15% of 2,40,000

i.e., $c \leq 36{,}000$

$a, b, c \geq 0$

$a \geq 2b$ (or) $b \leq \frac{1}{2}\,a$

Maximum investment in a and b = 2,40,000 - 36,000 = 2,04,000

Therefore, Investment in b = 2,04,000 x 1/3 = 68,000

Investment in a = 2,04,000 x 2/3 = 1,36,000

Computation of Annual Average Rate of Return

Fund Type	A	B	C
Investment (₹)	1,36,000	68,000	36,000
Rate of Return (%)	4	6	10
Return (₹)	5,440	4,080	3,600

Average Rate of Return = (5440+4080+3600) /2,40,000 X 100

= 13,120/2,40,000 X 100 = 5.47 %

Since the expected average annual return is 5.47%, the Average Annual Return of 6% is not feasible.

(c) (i) Sales Margin Mix Variance = Bud. Margin (Actual Qty - Revised Bud. Qty) *

P = 4 (15,000 - 14,850) = 600 F

Q = 11(12,000 - 12,150) = 1,650 A

(ii) Sales Margin Price Variance = Actual Qty. (Actual Margin - Bud. Margin) *

P = 15,000 (6 - 4) = 30,000 F

Q = 12,000 (6 - 11) = 60,000 A

** Formula may be in different form*

W.N.: 1 Computation of Actual Selling Price

P = 3,30,000/15,000 = ₹22/-

Q = 2,40,000/12,000 = ₹20/-

W.N.: 2 Computation of Revised Bud. Qty., Bud. Margin and Actual Margin

Product	Bud. Qty. (units)	Rev. Bud. Qty. (units)	Actual Qty. (units)	Actual Price ₹	Bud. Price ₹	Bud. Cost ₹	Bud. Margin ₹	Actual Margin ₹
P	11,000	14,850	15,000	22	20	16	4	6
Q	9,000	12,150	12,000	20	25	14	11	6
	20,000	27,000	27,000					

(d) Computation of Costs

Sl. No.	Value (₹)	Reason
(i)	500 x 7 = 3,500	Relevant cost is the Replacement cost as the material is in use for production.

(ii)	700 x 1.50 = 1,050 800 x 3 = 2,400 3,450	Relevant cost is the Realisable value since the material is not currently in use. The additional units required for production has to be purchased at Replacement cost.
(iii)	NIL	Entire fixed cost is recovered from original production. No fixed cost for spare capacity production.
(iv)	NIL	
(v)	NIL or 20 x 4 = ₹ 80	

Question 2

(a) A school wants to purchase four identical hand-crafted gifts from Sunbeam Co. to be given to die Chief Guest and other dignitaries during a function. Each gift can be crafted by a single labourer.

Sunbeam will start the work on the next day of the order. The following information is estimated for the first unit of the gift:

Particulars	*₹/unit*
Direct variable costs (excluding labour)	*3,500*
Direct labour (30 hours @ ₹ 60 per hour)	*1800*

Other Information :

- *80% learning curve ratio is applicable only to direct labour.*
- *Each day consists of eight working hours per labourer; No overtime is allowed.*
- *Desired mark-up is 20% of all variable costs.*

Compute the minimum amount that Sunbeam can quote for 4 units of the gifts, if the school will take delivery of the gifts on

(i) the 5th day of the order. (i.e. 4 days from the commencement of work).

(ii) the 7th day of the order.

(iii) the 11th day of the order. ***(8 Marks)***

(b) Costs (in ₹ Lakhs) of repairing roads R_1, R_2, R_3 and R_4 by contractors are tabulated below:

Contractor / Road	*R_1*	*R_2*	*R_3*	*R_4*
C_1	*5*	*10*	*14*	*11*
C_2	*6*	*15*	*15*	*14,*
C_3	*7*	*15*	*16*	*15*

C_4	*8*	*9*	*13*	*14*
C_5	*9*	*12*	*16*	*10*

For strategic reasons, C_1 has to be given R_1. The management feels that C_5 will take unacceptably longer time for Roads R_1, R_2 and R_4. Therefore either C_5 can be given R_3 or must be eliminated. Can the management be convinced that C_5 can be given R_3 and yet be within the optimal assignment? Substantiate and find the optimal assignment(s) using the assignment algorithm. ***(8 Marks)***

Answer

(a) Computation of Time and Days at 80% Learning Curve Ratio

Units	Avg. Time p.u.(hrs)	Total Time (Hrs)	No. of Days @ 8 Hrs/day
1	30	30x1=30	4
2	24	24x2=48	6
4	19.2	19.2x4=76.8	10

Computation of Total Labour hour for different delivery time

Day of delivery from order date	No. of Labours required	Hrs. for 4 units
5th	4(one unit each)	30 x 4 = **120** (No Learning Curve effect)
7th	2(Two units each)	48 x 2 = **96**
11th	1(Four units)	76.8 x 1 = **76.8**

Computation of Minimum Price to be quoted for Four Units

	Time for delivery in days	Lab. Cost (₹)	Other V. Cost (₹)	Total Cost (₹)	Mark-up (₹)	Price (₹)
(i)	5	120 x 60 = 7,200	3,500 x 4 = 14,000	21,200	4,240	25,440
(ii)	7	96 x 60 = 5,760	3,500 x 4 = 14,000	19,760	3,952	23,712
(iii)	11	76.8 x 60 = 4,608	3,500 x 4 = 14,000	18,608	3,721.6	22,329.6*

(b) Due to strategic reasons **C_1** has to be given to R_1. Therefore, C_1R_1 need not be taken for assignment process.

Now, there are three roads (R_2, R_3 and R_4) and four contractors (C_2, C_3, C_4 and C_5). Since it is an unbalanced problem, one dummy column should be introduced. The resultant matrix is as follows :

	R_2	R_3	R_4	Dummy
C_2	15	15	14	0
C_3	15	16	15	0
C_4	9	13	14	0
C_5	12	16	10	0

	R_2	R_3	R_4	R_5
C_2	6	2	4	$\boxed{0}$
C_3	6	3	5	0
C_4	$\boxed{0}$	0	4	0
C_5	3	3	$\boxed{0}$	0

	R_2	R_3	R_4	R_5
C_2	4	$\boxed{0}$	4	0
C_3	4	1	5	$\boxed{0}$
C_4	$\boxed{0}$	0	6	2
C_5	1	1	$\boxed{0}$	0

C_5 cannot be given with R_3 optimally. Hence, C_5 has to be eliminated and the resultant matrix is as given below:

	R_2	R_3	R_4
C_2	15	15	14
C_3	15	16	15
C_4	9	13	14

	R_2	R_3	R_4
C_2	1	1	0
C_3	0	1	0
C_4	0	4	5

	R_2	R_3	R_4
C_2	1	0	0
C_3	0	0	0
C_4	$\boxed{0}$	3	5

By interchanging R_3 and R_4 between C_2 and C_3 there are two alternative optimal assignments are possible. They are as follows with respective costs:

Optimal Assignments and Costs

Assignments	Costs (₹ in lakhs)	Assignments	Costs (₹ in lakhs)
C_1 -- R_1	**5**	C_1 -- R_1	**5**
C_2 -- R_3	**15**	C_2 -- R_4	**14**
C_3 -- R_4	**15**	C_3 -- R_3	**16**
C_4 -- R_2	**9**	C_4 -- R_2	**9**
C_5 -- NIL	**---**	C_5 -- NIL	**---**
	44		**44**

Question 3

(a) TF is engaged in the production of four types of products, A, B, C, and D. The following information is available for November 2019:

Products	*A*	*B*	*C*	*D*
Contribution (per unit)	*9,000*	*9,600*	*7,000*	*4,800*
Machine Hours required per unit of production:				
Machine P	*9*	*10*	*8*	*4*
Machine Q	*10*	*11*	*12*	*6*
Machine R	*12*	*12*	*10*	*8*
Estimated Demand (Units)	*600*	*600*	*600*	*600*

Machine capacity is limited to 21,600 hours for each machine. Fixed costs are ₹ 75 lakhs for the month.

(i) Identify the bottleneck activity and allocate the machine time on the basis of bottleneck activity and compute the optimum profits.

(ii) If the bottleneck resource identified above is available on hire at ₹ 500/hour for any duration required, would it create an improved optimum profit? Present relevant calculations supporting your answer. ***(8 Marks)***

(b) ABC Co. is selling its products to customers A, B and C. The following information is given for the year 2018-19.

	Customer A	*Customer B*	*Customer C*
Sales in Lakhs (₹)	*15.90*	*20.0*	*15.0*
Number of deliveries (including rush deliveries)	*100*	*40*	*50*
Number of orders	*120*	*50*	*60*
Average number of hours per delivery (for verification of goods before loading for delivery)	*1*	*1.2*	*1.30*
Number of rush deliveries	*2*	*1*	*2*
Sales commission (% to sales)	*4*	*5*	*5*

Normal delivery cost is ₹ 1,250 per delivery. Order processing cost is ₹ 1,84,000. Verification cost of goods before loading is ₹ 5,32,500. Rush delivery cost is 180% of normal delivery cost. Variable cost is 75 percent of sales.

(i) Present a customer wise profitability statement.

(ii) An online selling company (OSC) offers to are the order processing and verification costs, arrange its own pickup and deliveries based on orders received. But OSC wants 8% commission on sales. Should ABC discontinue the least profitable customer in favour of OSC? Support your decision with relevant figures. How do you think ABC should evaluate the proposal? ***(8 Marks)***

Answer

(a) (i) Identification of bottleneck activity and allocation of machine time

Mach.	**Time Required for Products (Hours)**				**Total Time**	**Time Avail.**	**Machine Utilization**
	A	**B**	**C**	**D**			
P	5,400 (600 units x 9 hrs)	6,000 (600 units x 10 hours)	4,800 (600 units x 8 hours)	2,400 (600 units x 4 hours)	18,600	21,600	86.11%
Q	6,000 (600 units x 10 hours)	6,600 (600 units x 11 hours)	7,200 (600 units x 12 hours)	3,600 (600 units x 6 hours)	23,400	21,600	108.33%

R	7,200 (600 units x 12 hours)	7,200 (600 units x 12 hours)	6,000 (600 units x 10 hours)	4,800 (600 units x 8 hours)	25,200	21,600	116.67%

Since **Machine R** has the *highest machine utilization* it represents the bottle neck activity. Hence Product Ranking & Resource Allocation should be based on Contribution/Machine Hour of Machine R.

Allocation of Resources

Particulars	A	B	C	D
Contribution *per unit* (₹)	9,000	9,600	7,000	4,800
Time Required in Machine 'R' (hrs.)	12	12	10	8
Contribution per Machine Hour (₹)	750	800	700	600
Rank	II	I	III	IV
Allocation of Machine 'R' time (hrs.)	7,200 (600 units × 12 hours)	7,200 (600 units × 12 hours)	6,000 (600 units × 10 hours)	1,200 (Balance)
Production (units)	600	600	600	150 (1,200/8)
Allocation of Machine 'Q' time (hrs.)	6,000 (600 units x 10 hours)	6,600 (600 units × 11 hours)	7,200 (600 units × 12 hours)	900 (150 units × 6 hours)
Allocation of Machine 'P' time (hrs.)	5,400 (600 units x 9 hours)	6,000 (600 units x 10 hours)	4,800 (600 units x 8 hours)	600 (150 units x 4 hours)

Calculation of Optimum Profit:

Particulars	Amount (₹)
A (600 units × ₹9,000)	54,00,000
B (600 units × ₹9,600)	57,60,000
C (600 units × ₹7,000)	42,00,000
D (150 units × ₹4,800)	7,20,000
Total Contribution	1,60,80,000

Less: Fixed Cost	75,00,000
Optimum Profits	85,80,000

(ii) Hiring decision analysis:

Contribution per hour of R used for production of D = ₹ 600

Less: Hire Charges = ₹ 500

Increase in contribution per hour hired = ₹ 100

Machine Q also has insufficient hours to the extent of 1,800 (23,400 - 21,600), which is equivalent to produce 300 units (1,800/6) of D. Therefore, machine Q also becomes a bottleneck resource, but hiring both Q and R will amount to ₹ 1,000 per hour (500+500) which will deplete the profits. Therefore, 300 units of D cannot be produced.

The optimal decision is hiring R to the extent required to produce 150 units of D additionally by using the existing hours of machine Q also. By this decision the total number of D to be produced will be 300 units (from existing capacity 150units and from hiring capacity150 units). This will create an increase in optimal profit.

Statement Showing Change in Profitability

Particulars	Amount (₹)
Contribution from Additional Production of D (150 units × ₹4,800)	7,20,000
Less: Additional Cost (₹ 500×150 units × 8 hrs.)	6,00,000
Change in Profit	1,20,000

(b) (i) Customer wise Profitability Statement **in ₹**

Particulars	A	B	C
Sales Revenue ...(A)	15,90,000	20,00,000	15,00,000
Less: Variable Cost (Sales×75%) ...(B)	11,92,500	15,00,000	11,25,000
Contribution [25%ofSales] ...(A)- (B)	3,97,500	5,00,000	3,75,000
Less: Additional Overheads			
Normal Delivery Cost (No. of Normal Delivery × ₹ 1,250)	1,22,500	48,750	60,000
Rush Delivery Cost (No. of Rush Delivery × ₹ 2,250)	4,500	2,250	4,500
Order Processing Cost	96,000	40,000	48,000

(No. of Orders ×₹ 800)			
Verification Cost (No. of Hrs. × ₹ 2,500)	2,50,000	1,20,000	1,62,500
Sales Commission	63,600	1,00,000	75,000
Profit/Loss per customer	(1,39,100)	1,89,000	25,000
Profit Margin per customer (%)	(8.75)%	+9.45%	+1.67%
Rank	III	I	II

(ii) The online sale proposal will give ABC a 17% return (75% variable costs + 8% commission) on sales. However, the fundamental contribution from A is much higher at 21%. If delivery and order processing costs are managed, A may become profitable. If OSC is allowed to pick up at its own demand, ABC may spend on inventory holding costs and risk of obsolescence. The collection from OSC should also match at least A's debt collection terms. Having an identified customer A is better.

ABC may consider routing A's sales through OSC so that ABC can get an assured 17% return on sales by avoiding distribution costs.

Question 4

(a) HJ is a hotel in the neighbourhood of an office complex. It offers two types of rooms-single and double, with facilities of room service, complement breakfast, TV, etc. However, since its location lacks visibility, its business had not picked up after construction. It has 40 single and 10 double rooms, allotted for single and double occupancy respectively.

HJ has entered into an arrangement with an online booking agency (OBA) whereby hotel rooms are booked in advance through OBA. HJ has to pay 30% of the room rent billing as commission to OBA. There are frequent cancellations of bookings and therefore OBA has agreed to pay 10% of the billing to HJ. HJ agrees not to have any direct booking at the hotel. The complimentary breakfast costs HJ ₹ 120 per occupant.

HJ charges customers per night at ₹ 1,800 per single room and ₹ 2,200 per double room.

During the year, 150 days will have 40% occupancy and the remaining 215 days will have 90% occupancy levels. Assume occupancy as per proportion or room types. Fixed expenses amount to ₹ 1,22,40,000 during the year.

(i) Calculate the break-even number of room nights giving the break-up of single and double rooms.

(ii) What will be the profits earned during the year? ***(10 Marks)***

(b) A shop sells curds in 1 kg packets. The cost and selling price per packet are ₹ 40 and ₹ 50 respectively. The shelf life of the curd is 2 days. If it is not sold by the end of the second day, it has to be discarded. Daily demand based on past experience is as under:

Daily Demand	*0*	*40*	*45*	*55*	*70*	*80*
Probability	*0.02*	*0.15*	*0.25*	*?*	*0.23*	*0.05*

Consider the following sequence of Random Numbers:

53, 71, 11, 13, 84

(i) 50 packets of curd are purchased every morning and there is an opening stock of 9 packets (purchased the previous morning as on day 1). If the daily excess demand is not met, such short quantity is to be treated as loss of profit. Assume LIFO basis (Last in First Out basis - where the fresh curd is sold first).

Find, on the basis of simulation, the position of closing stock as at the end of the 4th day and the profit or loss of only Day 4. ***(6 Marks)***

Answer

(a) (i) Computation of Break even number of room nights:

Working Notes:

1. Single Room Occupancy Days in a Year = (40 Rooms ×150 Days ×40%) + (40 Rooms × 215 Days × 90%)

= 10,140 (4 times)

Double Room Occupancy Days in a Year = (10 Rooms ×150 Days ×40%) + (10 Rooms × 215 Days × 90%)

= 2,535

2. Revenue from Single and Double Room *per day* (in ₹)

	Room Rent	**Commission to OBA**	**Billing by HJ**	**Payment by OBA**	**Total Receipts**	**Comp. Breakfast**	**Contribution**
	(1)	(2) = 30% of (1)	(3) = (1) – (2)	(4) =10% of (1)	(5) = (3) +(4)	(6)	(7) = (5) - (6)
Single Room	1,800	540	1,260	180	1,440	120	1,320
Double Room	2,200	660	1,540	220	1,760	240	1,520

Break-even Room Nights

	₹
Wt. Average Contribution [{(1,520×1) + (1,320×4)}/5] per room night	1,360

Fixed Expenses	1,22,40,000
Break-even Room Nights $\left(\frac{₹\,1,22,40,000}{₹\,1,360}\right)$	9,000
Single Rooms (4/5)	7,200
Double Rooms (1/5)	1,800

(ii) Annual Profit Calculation

	₹
Contribution p.a from single room (₹ 1,320 × 10,140)	1,33,84,800
Contribution p.a from double room (₹ 1,520 × 2,535)	38,53,200
Less: Fixed Cost p.a	1,22,40,000
Profit	49,98,000

(b) Random No. Allocation and Simulation

Dd.	Prob.	Cum Prob.	R No. Allocation	RN	Dd.	Op. Stock	Supply	Discard	Cl. Stock
0	0.02	0.02	00 – 01	53	55	9	50	4	--
40	0.15	0.17	02 – 16	71	55	--	50	--	--
45	0.25	0.42	17 – 41	11	40	--	50	--	10
55	**0.30***	0.72	42 – 71	13	40	10	50	10	10
70	0.23	0.95	72 – 94	84	70	10	50		
80	0.05	1.00	95 – 99						

Position of Closing Stock as on 4th Day = 10 Packets

Profit and Loss only on Day 4:

Profit from sale of 40 packets @ (₹50 - ₹40) = ₹ 400

Less: Loss from discarded packets (10 x ₹40) = ₹ 400

Profit/Loss = NIL

Question 5

(a) A manufacturing company has the following budget for two different levels of activity:

Direct labour hours

Level of activity

No. of hours	*40,000*	*80,000*
Direct Material cost (₹)	*2,40,000*	*4,80,000*
Direct Labour cost (₹)	*1,60,000*	*3,20,000*

Machine hours

Level of activity

No. of hours	*1,50,000*	*1,80,000*
Maintaining equipment cost (f)	*2,85,000*	*3,33,000*
Machining cost (f)	*1,15,000*	*1,36,000*

Material Moves

Level of activity

No. of Moves	*16,000*	*32,000*
Material handling cost (₹)	*1,30,000*	*2,30,000*

Number of Batches Inspected

Level of activity

No. of batches	*80*	*160*
Inspection cost (₹)	*80,000*	*1,40,000*

During the period, the company worked a total of 60,000 direct labour hours, used 1,60,000 machine hours, made 22,000 moves, and performed 100 batches of inspection. The following actual costs were incurred:

	₹
Direct Material	*3,40,000*
Direct labour	*2,62,000*
Maintenance	*2,96,000*
Machining	*1,25,000*
Material handling	*1,70,000*
Inspections	*85,000*

The company applies overhead rates based on the given activities. The second level of activity is the practical level.

Consider the overheads as semi-variable in relation to the activity driver and hence arrive at the rates to compute the flexible budget figures. Compare these with the actual figures. Do you feel that overheads are being incurred efficiently? Suggest a measure for increasing profitability based on your findings. ***(10 Marks)***

(b) (i) Is it possible to have a high efficiency ratio while having a low activity ratio? Why? Explain.

(ii) In response to a falling demand condition of a perishable product, a factory reported a lower calendar ratio. Is this an appropriate decision by the Management? Explain.

(6 Marks)

Answer

(a) Statement Showing Budgeted, Actuals and Variance

	Budgeted (₹)	Actual (₹)	Variance (₹)
Direct Material (60,000 hrs. × ₹6)	3,60,000	3,40,000	20,000 (F)
Direct Labour (60,000 hrs. × ₹4)	2,40,000	2,62,000	22,000 (A)
Direct Costs Sub Total	6,00,000	6,02,000	2,000 (A)
Maintenance (1,60,000 × ₹1.60 + ₹45,000)	3,01,000	2,96,000	5,000 (F)
Machining (1,60,000 × ₹0.70 + ₹10,000)	1,22,000	1,25,000	3,000 (A)
Material Handling (22,000 × ₹6.25 + ₹30,000)	1,67,500	1,70,000	2,500 (A)
Inspections (100 × ₹750 + ₹20,000)	95,000	85,000	10,000 (F)
Overheads Sub Total	6,85,500	6,76,000	9,500 (F)

Workings:

Segregation of Fixed & Variable Cost elements from Semi-Variable Overheads

Maintenance

Variable Overhead $= \dfrac{₹3,33,000 - ₹2,85,000}{30,000}$

$=$ ₹1.60 per hour

Fixed Overhead $=$ ₹ 3,33,000 – (₹1.6 × 1,80,000)

$=$ ₹ 45,000

Machining

Variable Overhead $= \dfrac{₹1,36,000 - ₹1,15,000}{30,000}$

	=	₹0.70 per hour
Fixed Overhead	=	₹ 1,36,000 – (₹0.70 × 1,80,000)
	=	₹ 10,000

Material Handling

Variable Overhead	=	$\frac{₹2,30,000 - ₹1,30,000}{16,000}$
	=	₹6.25 per move
Fixed Overhead	=	₹ 2,30,000 – (₹6.25 × 32,000)
	=	₹ 30,000

Inspections

Variable Overhead	=	$\frac{₹1,40,000 - ₹80,000}{80}$
	=	₹750 per Batch
Fixed Overhead	=	₹ 1,40,000 – (₹750 × 160)
	=	₹ 20,000

Comment

Out of four overheads, two namely maintenance and inspection are managed well by achieving favorable variances to a tune of ₹15,000/-.

The remaining two overheads i.e., machining and material handling exceeded slightly from the budgeted with a variance of ₹5,500/-.

As a whole it seems that overheads are incurred and managed efficiently.

Measures to increase Profitability:

The profitability of the company can be improved by controlling the labour cost in the direct costs category and machining and material handling costs in the overheads category. Since all these three at present performed with negative variances.

(b) (i) Yes, it is possible to have a high Efficiency Ratio when Activity Ratio is low.

Efficiency Ratio (ER) = (Standard Hours / Actual Hours) x 100

Activity Ratio (A) = (Standard Hours / Budgeted Hours) x 100

If the actual production is lesser than the budgeted one, the standard hours for actual production will be lower than the budgeted hours. This will result in a low activity ratio.

At this occasion if the actual hours taken to produce are lesser than the standard time for actual production, the Efficiency Ratio will be high. Further, both ER and AR do not have direct relationship.

(ii) Yes, it is an appropriate decision.

When the demand falls, the management may decide to lower the production by declaring more holidays/temporary closures to avoid accumulation of unsold stock.

This decline in actual working days from the budgeted working days will bring down the Calendar Ratio. Hence, a lower Calendar Ratio is reported. Further, as the product is perishable too this is the most appropriate decision.

Calendar Ratio = Available working days / Budgeted working days

Question 6

(a) A company has two manufacturing divisions, A and B, that operate as independent profit centres. Division A produces two components 'XX' and 'YY' using the same labour force and has a capacity of 42,000 labour hours per annum.

The product cost data per unit is as under :

	Component XX (₹)	*Component YY (₹)*
Direct material per unit	*15*	*6*
Direct labour and variable overheads @ ₹ 25/labour hour	*75*	*25*

Division A has only one permanent customer 'P' for purchase of 10,000 units of component XX per annum at a selling price of ₹ 240 per unit. The balance capacity is used for the production of component YY, having unlimited demand at a price of 55 per unit.

Division B assembles ZZ by using an imported component. Any quantity can be imported. The product cost data per unit is as under :

Imported component	*₹240*
Direct Material (in addition to the imported component)	*40*
Direct labour and variable overheads @ ₹ 10/labour hour	*50*
Selling price	*450*

Instead of each imported component, one unit of xx can be used with slight modification, but this requires two extra hours per unit of ZZ in Division B. The demand for ZZ is 5,000 units per annum. B has 33,600 labour hours available.

If B is made to buy all its requirements from A, and assuming that 'P' will accept partial supplies,

(i) What would be the maximum transfer price per unit that B will agree to?

(ii) What would be A's production strategy? What will be the minimum transfer price per unit that A will agree to?

Independent of the above, restriction on B what is the best strategy for the company and the optimum contribution? ***(12 Marks)***

(b) *State with a brief reason, the appropriate pricing policy that should be adopted in the following situations. (Do not copy the situation into your answer books)*

(i) *A health centre doing routine health check-up with normal facilities.*

(ii) *A newly formed company is trying to build a unique product that it may patent. Some of the product's components, designed to specifications are outsourced to A. The pricing that should be followed by A.* ***(4 Marks)***

Answer

(a) Workings:

Statement Showing "Contribution *per unit*"

(₹)

Particulars	**Division A**		**Division B**	
	XX	**YY**	**ZZ $_{\text{Imp.}}$ Comp**	**ZZ-xx**
Selling Price	**240.00**	**55.00**	**450.00**	**450.00**
Direct Material	15.00	6.00	40.00	40.00
Direct Labour and Variable Overheads	75.00 (₹25×3h)	25.00 (₹25×1h)	50.00 (₹10×5h)	50.00 (₹10×5h)
Imported Material	---	---	240.00	---
XX	---	---	---	110 (₹90+₹20)
Variable Cost	90.00	31.00	330.00	200.00
Contribution	**150.00**	**24.00**	**120.00**	**250.00**
Hours per unit	3	1	5	5
Contribution *per hour*	50	24	24	50

Current Production Plan

Particulars	**Division A**		**Division B**
	XX	**YY**	**ZZ**
Current Production	10,000	12,000	5,000
Hours Utilised	30,000 (10,000×3h)	12,000 (12,000×1h)	25,000 (5,000×5h)
Hours Available	42,000 hrs.		33,600 hrs.
Balance Hours	NIL		8,600 hrs.

(i) Maximum Transfer Price from B's Perspective

Particulars	₹
Imported Material	240
Less: Cost of Modification (2h × ₹10)	20
Less: Opportunity Cost from production reduced (200 units × 120 / 4,800 units)	5
Transfer Price	**215**

(ii) Revised Production Strategy (If B buy all requirements from A)

Particulars	Division A		Division B
	XX	YY	ZZ
Proposed Production	**9,200 (P) +4,800** (internal)	**---**	**4,800** [33,600/(5h+2h)]
Hours Utilised	42,000 (14,000×3h)	---	33,600
Hours Available	42,000 hrs.		33,600 hrs.

Minimum Transfer Price for XX from A's perspective

Particulars	₹
Variable Cost	90.00
Opportunity Cost XX [800 units × ₹ 150 / 4,800 units]	25.00
Opportunity Cost YY [12,000 units × ₹ 24 / 4,800 units]	60.00
Minimum Transfer Price	**175.00**

(iii) Best Strategy (using Imported Component and Internal Transfer)

Particulars	Division A		Division B
	XX	YY	ZZ
Proposed Production	**10,000** (P-Max.) +**4,000** (internal-balance)	---	**4,000** (internal transfer) + **1,000** (imported)
Hours Utilised	42,000 (14,000×3h)	---	33,000 (4,000×7h+1,000×5h)
Hours Available	42,000 hrs.		33,600 hrs.

Statement Showing Profitability (₹)

Particulars	**XX**	**YY**	**ZZ**	**Total**
Contribution - Existing Plan	15,00,000 (10,000 units × ₹150)	2,88,000 (12,000 units × ₹24)	6,00,000 (5,000 units × ₹120)	23,88,000
Contribution - Revised Plan	13,80,000 (9,200 units × ₹150)	---	12,00,000 (4,800 units × ₹ 250)	25,80,000
Contribution - Best Strategy	15,00,000 (10,000 units × ₹150)	---	11,20,000 (4,000 units × ₹ 250) + (1,000 units × ₹120)	26,20,000

Hence, optimum production would be XX - (10,000 + 4,000) = 14,000 units

ZZ - (4,000 + 1,000) = 5,000 units.

(b)

S. No.	**Pricing Policy**	**Reason**
(i)	**Going Rate Pricing / Competitive pricing**	Going rate pricing/Competitive pricing primarily characterizes pricing practice in homogeneous product markets. The health centre is doing routine health check-up with normal facilities. Thus, it has ***very little choice about the setting of its own price***.
(ii)	**Cost Plus Pricing**	As the product is unique, A may take its cost of production into account and arrive at a price at which the components are to be sold. In arriving at cost of production, it is necessary to consider the size, ***designed specifications*** etc. Specifications of the new product are likely to undergo changes.

Question 7

*Answer **any four** out of the following **five** questions:*

(a) Mr. Roy, newly appointed as 'Head-Service quality' of TS Ltd., has been asked to address the following complaints from customers. He would start solving issues using Pareto Analysis (80/20 Rule) in the first quarter.

Complaint Categories	*No. of Complaints*
Customer Service	*218*
Overcharging/Wrong Billing	*372*

Non-posting of payments to account	*97*
Transfer of connections	*21*
Faults in Line	*436*
Connection Installations	*65*
Late attending of complaints	*246*
Activation of wrong plans	*135*

Substantiate with relevant figures whether the complaint 'Activation of wrong plans' will be addressed in the first quarter or not. ***(4 Marks)***

(b) *If A is an activity with successor 'S', identify the type of float in the following cases :*

I	*II*	*III*
Sl. No.	*Description*	*Float Type*
(i)	*Latest finish time of A minus earliest start time of S*	
(ii)	*Latest start time minus earliest start time of A*	
(iii)	*Value by which A can be delayed beyond its earliest starting point without affecting the earliest start time of S*	
(iv)	*Amount of time by which the actual completion of A can exceed its earliest expected completion time without causing any delay in the project duration.*	

(Present only columns I and III in your answers). ***(4 Marks)***

(c) *XYZ Co. uses standard absorption costing system. For a certain period, budgeted Fixed Overheads were ₹ 4,20,000; Budgeted production was 30,000 units; Fixed Overhead cost was over absorbed by ₹ 16,000 and Fixed Overhead Expenditure variance was ₹ 30,000 (Favourable).*

What was the actual production? ***(4 Marks)***

(d) *State whether and how the following situations are possible or not on introducing a JIT system of production in an automobile factory.*

(i) Increased cost of inspection at the production shop floor where suppliers' components have been delivered.

(ii) Increase in raw materials (purchase) cost.

(iii) Reduction in the variety of output produced.

(iv) Increase in computerization cost.

Without copying the situation, present your answers in the following format:

Sl. No.	*Possibility Yes/No*	*Reason*

(4 Marks)

(e) When we are attempting an initial solution to a balanced m x n transportation problem for minimising cost by Vogel's method, in the first allocation, suppose that total demand and total supply quantities are the same will the initial solution be degenerate? Why?

(4 Marks)

Answer

(a) Statement Showing "Pareto Analysis of Complaints from Customers"

Complaint Categories	**No. of Complaints**	**% of Total Items**	**Cumulative Percentage**
Faults in Line	436	27.42	27.42
Over Charging/ Wrong Billing	372	23.40	50.82
Late attending of complaints	246	15.47	66.29
Customer Service	218	13.71	80.00
Activation of wrong plans	**135**	**8.49**	**88.49**
Non-posting of payments to account	97	6.10	94.59
Connection Installations	65	4.09	98.68
Transfer of connections	21	1.32	100.00
Total	1,590		

'Activation of Wrong Plans' will not be addressed in the first quarter since it does not fall into the 80% category.

(b)

(i)	Interfering Float
(ii)	Total Float
(iii)	Free Float
(iv)	Total Float

(c) Fixed Overhead Expenditure Variance = Budgeted Fixed Overheads – Actual Fixed Overheads

30,000 (F) = 4,20,000 – Actual Fixed Production Overheads

Actual Fixed Overheads	=	3,90,000
Absorbed Fixed Overheads	=	Actual Fixed Overheads + Over Absorbed Fixed Overheads
	=	3,90,000 + ₹16,000
	=	4,06,000.
Standard Absorption Rate *per unit*	=	4,20,000 / 30,000 units
	=	14.00
So, Actual Production	=	4,06,000 / ₹14.00
	=	29,000 units

(d)

Sl. No.	Possibility Yes/ No	Reason
(i)	No	Inspection is eliminated at the receiving point. It is completed at the supplier's centre.
(ii)	Yes	Increase in raw materials (purchase) cost as suppliers deliver only small quantities of parts as and when they are needed. Therefore, more no. of orders, deliveries and receipts.
(iii)	Yes	Low variety of goods is an essential pre-requisite of a JIT system.
(iv)	Yes	The concern must install a system, which may be as simplistic as a fax machine or as advanced as an electronic data interchange system or linked computer systems, that tells suppliers exactly how much of which parts are to be sent to the company. Backflush requires automation. This is the key of JIT.

(e) Yes, the initial solution be degenerate.

Reason: In a balanced transportation problem with m origins and n destinations if a basic feasible solution has less than m + n - 1 allocations (occupied cells), the problem is said to be a *degenerate transportation* problem. Normally, while finding the initial solution (by any of the methods), any allocation made either satisfies supply or demand, but not both. *If, however, both supply and demand are satisfied simultaneously, row as well as column are cancelled simultaneously and the number of allocations become one less than m + n - 1. If this phenomenon occurs twice, the number of allocations becomes two less than m + n - 1 and so on.* Such a situation is handled by introducing an infinitesimally, a small allocation 'e' in the least cost and independent cell.