



J.K. SHAH[®]
TEST SERIES
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SUGGESTED SOLUTION

FINAL MAY 2019 EXAM

SUBJECT- AMA

Test Code – FNJ 7122

BRANCH - () (Date :)

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Answer 1:**(A)**

	Situation	Appropriate Pricing Policy
(i)	'W' is a new product for the company and the market and meant for large scale production and long term survival in the market. Demand is expected to be elastic.	Penetration Pricing
(ii)	'X' is a new product for the company, but not for the market. X's success is crucial for the company's survival in the long term.	Market Price or Price Just Below Market Price
(iii)	'Y' is a new product to the company and the market. It has an inelastic market. There needs to be an assured profit to cover high initial costs and the unusual sources of capital have uncertainties blocking them.	Skimming Pricing
(iv)	'Z' is a perishable item, with more than 80% of its shelf life over.	Any Cash Realizable Value*

(*) this amount decreases every passing day.

(4 marks)**(B)****Computation of Variances**

$$\begin{aligned}
 \text{Efficiency Variance} &= \text{Cost Impact of undertaking activities more / less than standard} \\
 &= (21 \text{ deliveries}^* - 19 \text{ deliveries}) \times \text{Rs. } 200 \\
 &= 400 \text{ (F)}
 \end{aligned}$$

$$(*) \left(\frac{20 \text{ Deliveries}}{2,000 \text{ units}} \right) \times 2,100 \text{ units}$$

(2 marks)

$$\begin{aligned}
 \text{Expenditure Variance} &= \text{Cost impact of paying more / less than standard for actual activities undertaken} \\
 &= 19 \text{ deliveries} \times \text{Rs. } 200 - \text{Rs. } 3,900 \\
 &= \text{Rs. } 100 \text{ (A)}
 \end{aligned}$$

(2 marks)**(C)**

Identification of Bottleneck: Installation of cameras is the bottleneck in the operation cycle. The annual capacity for manufacturing and installation are given to be 750 camera units and 500 camera units respectively. Actual capacity utilization is 500 camera units, which is the maximum capacity for the installation process. Although, Z can additionally manufacture 250 camera units, it is constrained by the maximum units that can be installed. Therefore, the number of units manufactured is limited to 500 camera units, subordinating to the bottleneck installation operation. Therefore, Z should focus on improving the installation process. **(2 marks)**

(D)

- (i) Machine A is being used to the full capacity because, corresponding slack variable s_1 has a zero value in the solution.
- (ii) $C_j - Z_j$ for x_1 being -1, production of each unit of x_1 would cause a reduction of 1 rupee. Thus, the price for x_1 should be increased by at least 1 rupee to ensure no reduction of profits.
- (iii) When 2 hours are lost (due to repairs), then production of x_2 would decrease by 2 units and the total profit decrease by Rs. 10.
- (iv) The shadow price of hours on machine A and machine B are being Rs. 5 and Rs. 0 respectively, these are the maximum prices one would be prepared to pay for another hour of capacity for these two machines. **(4 marks)**

(E)

Working

The given problem is a balanced minimization transportation problem. The objective of the company is to minimize the cost. Let us find the initial feasible solution using Vogel's Approximation method (VAM).

	A	B	C	D	Supply	Diff.
X	25	50	100	25	100/0	5 5 5 5
Y	150	40	50	10	250/200/0	20 20 5 5
Z	100	100	25	35	200/100/0	10 5 5 -
Demand	250/150/0	100/0	150/5/0 0	50/0	550	
Diff.	5	30	5	15		
	5	-	5	15		
	5	-	5	-		
	5	-	15	-		

Since the number of allocations $m+n-1 (= 6)$, let us test the above solution for *optimality*.

(2 marks)

We have taken $u_3 = 0$ (as stated in question), and rest of the u_i 's, v_j 's and Δ_{ij} 's are calculated as below-

$(u_i + v_j)$ Matrix for Allocated / Unallocated Cells

(1 mark)

15	5	20	-5	$U_j = -5$
	20	35	10	10
30				
20	10	25	0	0
$V_j =$	20	10	25	0

Now we calculate $\Delta_{ij} = C_{ij} - (u_i + v_j)$ for non basic/ unallocated cells which are given in the table below-

Δ_{ij} Matrix

(1 mark)

10	45		30
	20		
		0	35

Answer to the Requirement

- (i) Since, all cells values in $\Delta_{ij} = C_{ij} - (u_i + v_j)$ matrix are non-negative, hence the solution is *optimum*.
- (ii) It may be noted that zero opportunity cost in cell (Z, C) indicates a case of alternative

optimum solution.

This question can also be solved by using other methods of finding **initial basic feasible solution**.

Answer 2:

(A)

(i) Cost incurred on Product 'G' upto point of separation is irrelevant for decision making as Product 'G' is a Joint Product. Joint Products are the result of same raw material & same process Operations.

Cost incurred after point of separation will be considered for decision making as specifically incurred for Product 'G'.

After further processing Product 'G' will contribute Rs.17 per unit toward 'Joint Production Cost'.

Calculation is as follows

Particulars	Amount (Rs.)
Selling Price per unit	37.00
Less: Cost after separation:	
Marginal Cost per unit	15.00
Fixed Cost per unit	5.00
Contribution toward 'Joint Production Cost'	17.00

Hence, further processing of Product 'G' is recommended.

(3 marks)

(ii) If Product 'G' is not a joint product with same cost structure. In this case there will be negative contribution on production of Product 'G'. The calculation is as follows→

Particulars	Amount (Rs.)
Selling Price per unit	37.00
Less: Marginal Cost (Rs. 30 + Rs. 15)	45.00
Contribution	(8.00)

Hence, production of Product 'G' will not be recommended.

(3 marks)

(B)

Statement Showing Standard Cost and Actual Cost of 320th Batch :

Standard Data			Actual Data			
Material						
SQ	SP	SQ × SP	AQ	AP	AQ × AP	SP × AQ
62.07 kgs.(Refer W.N. 1)	Rs. 55	Rs. 3,414	80 Kgs.	Rs. 50.00	Rs. 4,000	Rs. 4,400
Labour						
SH	SR	SH × SR	AH	AR	AH × AR	SR × AH
12.42 hours (Refer W.N.2)	Rs. 40	Rs. 497	20 hours	Rs. 50.00	Rs. 1,000	Rs. 800
Variable Overhead						
SH	SR	SH × SR	AH	AR	AH × AR	SR × AH
12.42 hours (Refer W.N.2)	Rs. 75	Rs. 932	20 hours	Rs. 90.00	Rs. 1,800	Rs. 1500

(3 marks)

Computation of Variances :

Material Cost Variance = Standard Material Cost – Actual Material Cost

$$= SQ \times SP - AQ \times AP$$

$$= Rs. 3,414 - Rs. 4,000 = Rs. 586 (A)$$

Material Usage Variance = Standard Cost of Standard Quantity – Standard cost of Actual Quantity

$$= SQ \times SP - AQ \times SP$$

$$= Rs. 3,414 - Rs. 4,400 = Rs. 986 (A)$$

Material Price Variance = Standard Cost of Actual Quantity – Actual Material Cost

$$= AQ \times SP - AQ \times AP$$

$$= Rs. 4,400 - Rs. 4,000 = Rs. 400 (F)$$

Labour Cost Variance = Standard Cost of Labour – Actual Cost of Labour

$$= SH \times SR - AH \times AR$$

$$= Rs. 497 - Rs. 1,000 = Rs. 503 (A)$$

Labour Efficiency variance = Standard Cost of Standard Time – Standard Cost for Actual Time

$$= SH \times SR - AH \times SR$$

$$= Rs. 497 - Rs. 800 = Rs. 303 (A)$$

Labour Rate Variance = Standard Cost for Actual Time – Actual Cost of Labour

$$= AH \times SR - AH \times AR$$

$$= Rs. 800 - Rs. 1,000 = Rs. 200 (A)$$

Variable Overhead Cost Variance = Standard Variable Overheads for Production –
Actual Variable Overheads

$$= Rs. 932 - Rs. 1,800 = Rs. 868(A)$$

Variable Overhead Efficiency Variance

= Standard Variable Overheads for Production –
Budgeted Variable Overheads for Actual Hours

$$= Rs. 932 - 20 \text{ Hours} \times Rs. 75$$

$$= Rs. 568 (A)$$

Variable Overhead Expenditure Variance

= Budgeted Variable Overheads for Actual Hours –
Actual Variable Overheads

$$= 20 \text{ Hours} \times \text{Rs. } 75 = \text{Rs. } 1,800$$

$$= \text{Rs. } 300 \text{ (A)}$$

(4.5 marks)

Working Note :

(1) Working note showing Standard Quantity of Material for 320th Batch.

Cumulative Number of Batches = 320

Average Kgs. of Material per batch = $100 \times 320^{-0.074}$

$$t = 100 \times 320^{-0.074}$$

$$\log t = \log 100 - 0.074 \times \log 320$$

$$\log t = \log 100 - 0.074 \times \log (2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5)$$

$$\log t = \log 100 - 0.074 \times [\log 2^6 + \log 5]$$

$$\log t = \log 100 - 0.074 \times [6\log 2 + \log 5]$$

$$\log t = 2 - 0.074 \times [6 \times 0.30103 + 0.69897]$$

$$\log t = 1.81462$$

$$t = \text{Antilog } (1.81462)$$

$$t = 65.26$$

Cumulative Number of Batches = 319

Average Kgs. of Material per batch = $100 \times 319^{-0.074}$

$$t = 100 \times 319^{-0.074}$$

$$\log t = \log 100 - 0.074 \times \log 319$$

$$\log t = \log 100 - 0.074 \times \log 319$$

$$\log t = 2 - 0.074 \times 2.50379$$

$$\log t = 1.81472$$

$$t = \text{Antilog } (1.81472)$$

$$t = 65.27$$

Standard Quantity of Material for 320th Batch = $320 \times 65.26 - 319 \times 65.27 = 62.07 \text{ Kgs.}$ **(1.5 marks)**

(2) Working note showing Standard Hours for 320th Batch.

Cumulative Number of Batches = 320

Average Labour Hours Per batch = $100 \times 320^{-0.322}$

$$t = 100 \times 320^{-0.322}$$

$$\log t = \log 100 - 0.322 \times \log 320$$

$$\log t = \log 100 - 0.322 \times \log (2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 5)$$

$$\log t = \log 100 - 0.322 \times [\log 2^6 + \log 5]$$

$$\log t = \log 100 - 0.322 \times [6 \log 2 + \log 5]$$

$$\log t = 2 - 0.322 \times [6 \times 0.30103 + 0.69897]$$

$$\log t = 1.19334$$

$$t = \text{Antilog } (1.19334)$$

$$t = 15.61$$

$$\text{Cumulative Number of Batches} = 319$$

$$\text{Average Labour Hours per batch} = 100 \times 319^{-0.322}$$

$$t = 100 \times 319^{-0.322}$$

$$\log t = \log 100 - 0.322 \times \log 319$$

$$\log t = 2 - 0.322 \times 2.50379$$

$$\log t = 1.19378$$

$$t = \text{Antilog } (1.19378)$$

$$t = 15.62$$

$$\text{Standard Hours for } 320^{\text{th}} \text{ Batch} = 320 \times 15.61 - 319 \times 15.62 = 12.42 \text{ hours}$$

(1 mark)

Answer 3:

(A)

Statement Showing Product Rank

Particulars	Super (Rs./u)	Bright (Rs./u)
Selling Price	384	525
Less: Direct Material	158	240
Less: Direct Labour p.u.		
Department A (Rs.40 × 1.5 hrs.; Rs.40 × 2 hrs.)	60	80
Department B (Rs.40 × 2.5 hrs.)	---	100
Department C (Rs.40 × 2 hrs.)	80	---
Less: Variable Overheads	32	45
Contribution (Rs./u)	54	60
Department A (hrs.)	1.5	2
Rate (p/h)	36	30
Rank	I	II

(2.5 marks)

Statement Showing Maximum Possible Production

Particulars	Max. Hours	Production Super (units)	Production Bright (units)
Department A (78 Workers × 300 Days × 8 hrs.)	1,87,200	57,600	50,400 (1,87,200-57,600×1.5)/2
Department B (54 Workers × 300 Days × 8 hrs.)	1,29,600	---	51,840 (1,29,600/2.5 hrs.)
Department C (48 Workers × 300 Days × 8 hrs.)	1,15,200	57,600 * (1,15,200/2 hrs.)	---
Max. Possible Production		57,600	50,400

* Based on rank and availability of hours in department C.

(2.5 marks)

(B)

Primary activities are the activities that are directly involved in transforming inputs into outputs and delivery and after-sales support to output. Following are the primary activities in the value chain of Sinopec Ltd:

- (i) **Inbound Logistics:** These activities are related to the material handling and warehousing. It also covers transporting raw material from the supplier to the place of processing inside the factory.
- (ii) **Operations:** These activities are directly responsible for the transformation of raw material into final product for the delivery to the consumers.
- (iii) **Outbound Logistics:** These activities are involved in movement of finished goods to the point of sales. Order processing and distribution are major part of these activities.
- (iv) **Marketing and Sales:** These activities are performed for demand creation and customer solicitation. Communication, pricing and channel management are major part of these activities.
- (v) **Service:** These activities are performed after selling the goods to the consumers. Installation, repair and parts replacement are some examples of these activities.

(5 marks)

(C)

Cost Classification

(i) Committed Cost

Reason: Company cannot negotiate the price of advertisement in future and it has to make payment as soon as advertisement is prepared.

(ii) Differential Cost

Reason: In case of decision making among two alternatives, every manager has to compare the difference in cost involved.

(iii) Sunk Cost

Reason: Research expense has already been incurred and it will not affect any decision making in future.

(iv) Opportunity Cost

Reason: Income from government securities is the amount that company has forgone to earn income from its investment in the project.

(v) Period Cost

Reason: Salary of chairman is paid irrespective of productivity of the company.

(vi) **Direct Cost**

Reason: Amount paid for water can be directly attributed to the cost of finished product that is clothes. **(6 marks)**

Answer 4:

(A)

Allocation of Random Numbers

Raw Material			Wages & Other Variable Overheads			Sales		
Mid Point	Cum. Prob.	Random Nos.	Mid Point	Cum. Prob.	Random Nos.	Mid Point	Cum. Prob.	Random Nos.
9	0.2	0 – 1	12	0.3	0 – 2	36	0.1	0
11	0.5	2 – 4	14	0.8	3 – 7	40	0.4	1 – 3
13	0.8	5 – 7	16	1.0	8 – 9	44	0.8	4 – 7
15	1.0	8 – 9				48	1.0	8 – 9

(4 marks)

Simulation Table

Month	Raw Material	Wages & Other V.O	Sales	Fixed Cost	Net Cash Flow	Cash Balancing (Opening Rs. 40 thousand)
1	11	12	36	15	-2	38
2	11	14	44	15	+4	42
3	9	16	44	15	+4	46
4	9	12	36	15	0	46
5	11	16	40	15	-2	44
6	13	16	48	15	+4	48

(4 marks)

(B)

The main advantages of Inter-firm Comparison are:

- (i) Such a comparison gives an overall view of the industry as a whole to its members. The present position of the industry, progress made during the past and the future of the industry.
- (ii) It helps a concern in knowing its strengths or weaknesses in relation to others so that remedial measures may be taken.
- (iii) It ensures an unbiased specialized reporting on particular problems of the concern.
- (iv) It develops cost consciousness among members of the industry.
- (v) It helps Government in effecting price regulation.
- (vi) It helps to improve the quality of products manufactured and to reduce the cost of production. It is thus advantageous to the industry as well as to the society. **(4 marks)**

(C)

Statement Showing 'Pareto Analysis'

Model	Sales (Rs. '000)	% of Total Sales	Cumulative Total	Model	Cont. (Rs.'000)	% of Total Cont.	Cumulative Total%
Pareto Analysis Sales				Pareto Analysis Contribution			
A001	5,100	35.05%	35.05%	B002	690	30.87%	30.87%
B002	3,000	20.62%	55.67%	E005	435	19.47%	50.34%
C003	2,100	14.43%	70.10%	C003	300	13.42%	63.76%
D004	1,800	12.37%	82.47%	D004	255	11.41%	75.17%
E005	1,050	7.22%	89.69%	F006	195	8.73%*	83.90%
F006	750	5.15%	94.84%	A001	180	8.05%	91.95%
G007	450	3.09%	97.93%	G007	120	5.37%	97.32%
H008	225	1.55%	99.48%	I009	45	2.01%	99.33%
I009	75	0.52%	100.00%	H008	15	0.67%	100.00%
	14,550	100.00%			2,235	100.00%	

(*) Rounding – off difference adjusted.

(4 marks)

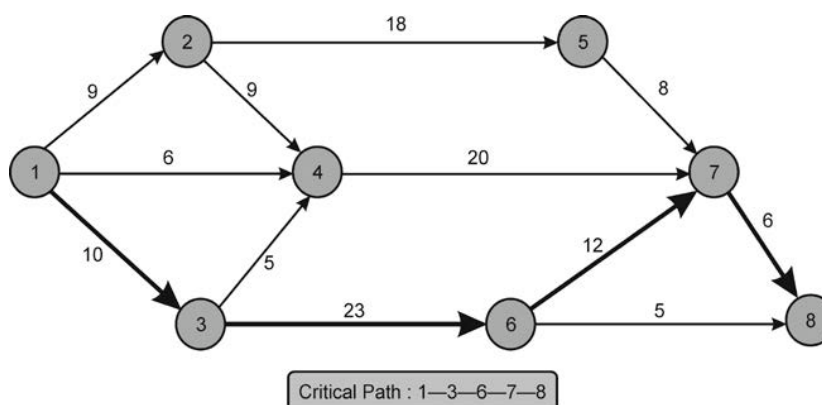
Answer 5:

(A)

(i) The new formulation of the problem is as follows:

- Activities 1–2, 1–3 and 1–4 completed in 9 Days, 10 Days and 6 Days respectively as per Original Schedule.
- Activity 2–4 needs 9 Days ($15 + 3 - 9$) instead of Original Schedule of 7 Days.
- Activity 3–6 needs 23 Days ($15 + 18 - 10$) instead of Original Schedule of 12 Days.
- Activity 6–7 needs higher duration of 12 Days instead of Original Planned 7 Days.
- Activity 6–8 needs lesser duration of 5 Days instead of Original Planned 7 Days.
- Activities 2–5, 3–4, 4–7, 5–7, 7–8 need 18 Days, 5 Days, 20 Days, 8 Days, 6 Days respectively as per Original Schedule.

The **updated network** based on the above listed activities will be as follows.



(5 marks)

(ii) Various Paths with Duration of updated network are as follows:

Path	Duration (Days)
1-2-5-7-8	41 (9 + 18 + 8 + 6)
1-2-4-7-8	44 (9 + 9 + 20 + 6)
1-4-7-8	32 (6 + 20 + 6)
1-3-4-7-8	41 (10 + 5 + 20 + 6)
1-3-6-7-8	51 (10 + 23 + 12 + 6)
1-3-6-8	38 (10 + 23 + 5)

Critical Path is 1-3-6-7-8 with

Duration of 51 Days.

(3 marks)

(B)

Projected Raw Material Issues (Kg)

	'A'	'B'	'C'
'X' (48,000 units-Refer Note)	60,000	24,000	---
'Y' (36,000 units-Refer Note)	<u>72,000</u>	-	<u>54,000</u>
Projected Raw Material Issues	<u>1,32,000</u>	<u>24,000</u>	<u>54,000</u>

Note:

- Based on this experience and the projected sales, the FML has budgeted production of 48,000 units of 'X' and 36,000 units of 'Y' in the sixth period.

$$=52,500 \times 40\% + 45,000 - 18,000 = 48,000$$

$$=27,000 \times 40\% + 42,000 - 16,800 = 36,000$$

- Production is assumed to be uniform for both products within each four-week period.

(3 marks)

Projected Inventory Activity and Ending Balance (Kg)

	'A'	'B'	'C'
Average Daily Usage	6,600	1,200	2,700
Beginning Inventory	96,000	54,000	84,000
Orders received:			
Ordered in 5 th period	90,000	-	60,000
Ordered in 6 th period	90,000	-	-
Sub Total	276,000	54,000	144,000
Issues	132,000	24,000	54,000
Projected ending inventory balance	144,000	30,000	90,000

(ii) Should the Division Y be willing to supply 39,600 units to Division X...? Statement Showing 'Minimum Average Transfer Price' per component (39,600)

Particulars	Rs.
Variable Cost	15.00
Loss of Contribution* [14,600 units × (Rs. 50 - Rs. 15 - Rs. 3)/ 39,600 units]	11.80
Transfer Price	26.80

(*) Division Y has surplus capacity to the extent of 25,000 units, for additional 14,600 units the Transfer Price must consider the Division Y's Variable Costs of Manufacturing the Component plus the Lost Contribution Margin (that will result from losing outside sales). **(2 marks)**

Company's Perspective

(2 marks)

Particulars	Rs.
Market Price per component	35.00
Relevant Cost for Transfer per component (from above)	26.80
Saving per component	8.20
Units	39,600
Total Savings	3,24,720

Advice

It is not in the interest of the Division Y to transfer 39,600 units to Division X at Price below the Minimum Average Transfer Price based on Opportunity Cost. However, from the Concern's Perspective, internal transfer between Divisions is beneficial as each unit to be transferred is offering a saving of Rs. 8.20. **(1 mark)**

(B)

- (i) **Invalid:** Kaizen Costing is the system of cost reduction procedures which involves making small and continuous improvements to the production processes rather than innovations or large-scale investment.
- (ii) **Valid:** The training of employees is very much a long-term and ongoing process in the Kaizen costing approach. Training enhances the abilities of employees.
- (iii) **Invalid:** Kaizen costing approach involves everyone from top management level to the shop floor employees. Every employee's active participation is a must requirement.
- (iv) **Invalid:** Though the aim of Kaizen Costing is to reduce the cost but at the same time it also aims to maintain the quality. Kaizen costing also aims to bring the clarity in roles and responsibilities for all employees. **(4 marks)**

(C)

Step 1

Reducing minimum from each column element (figure in '000s)-

(1 mark)

	R ₁	R ₂	R ₃	R ₄
C ₁	1	1	-	-
C ₂	-	0	-	0
C ₃	0	-	0	-
C ₄	-	-	2	1

Step 2

Reducing minimum from each row element (figure in '000s)-

(1 mark)

	R ₁	R ₂	R ₃	R ₄
C ₁	0	0	-	-
C ₂	-	0	-	0
C ₃	0	-	0	-
C ₄	-	-	1	0

Step 3

Draw the minimum number of lines to cover all zeros.

(1 mark)

	R ₁	R ₂	R ₃	R ₄
C ₁	0	0	-	-
C ₂	-	0	-	0
C ₃	0	-	0	-
C ₄	-	-	1	0

The minimum number of lines covering all zeroes is 4 which is equal to the order of the matrix, hence, the above matrix will give the optimal solution. Specific assignments in this case are as shown below:

Company	Route	(Rs.)
C ₁	R ₁	4,000
C ₂	R ₂	4,000
C ₃	R ₃	2,000
C ₄	R ₄	5,000
Total		15,000

The minimum cost is Rs. 15,000.

(1 mark)**Answer 7:****(A)****Statement Showing Selling Price**

	Perfect Competition	Monopoly
Units	6,000	1,200
Contribution (Rs. 1,06,000 + Rs. 74,000)	1,80,000	1,80,000
Contribution <i>per unit</i>	30	150
Variable Cost <i>per unit</i> (150 x 4/3)	---	200
Variable Cost <i>per unit</i>	200	---
Selling Price <i>per unit</i>	230	350

(4 marks)

(B)

Probability of Completing the Project by Schedule Time T_s is given by

$$Z = \frac{T_s - T_e}{\sigma_e} \quad (1 \text{ mark})$$

Probability if the Project is required to be completed in 15 weeks:

Probability if the Project is required to be completed in 15 weeks is given by

$$Z = [(15 - 18) / 3]$$

$$Z = -1$$

$$\text{Probability } (Z = -1) = 0.1587 \quad (1 \text{ mark})$$

Probability if the Project is required to be completed in 21 weeks:

Probability if the Project is required to be completed in 21 weeks is given by

$$Z = [(21 - 18) / 3]$$

$$Z = +1$$

$$\text{Probability } (Z = +1) = 0.8413 \quad (1 \text{ mark})$$

Probability that the Project may be completed not earlier than 15 weeks and not later than 21 weeks

$$= 0.8413 - 0.1587$$

$$= 0.6826$$

$$\text{Or } = 68.26\% \quad (1 \text{ mark})$$

(C)

Limitations of Uniform Costing are:

- (i) Sometimes it is not possible to adopt uniform standards, methods and procedures of costing in different firms due to differing circumstances in which they operate. Hence, the adoption of uniform costing becomes difficult in such firms.
- (ii) Disclosure of cost information and other data is an essential requirement of a uniform costing system. Many firms do not wish to share such information with their competitors in the same industry.
- (iii) Small firms in an industry believe that uniform costing system is only meant for big and medium size firms, because they cannot afford it.
- (iv) It induces monopolistic trend in the business, due to which prices may be increased artificially and supplies withheld. (4 marks)

(D)

Analysis of Costs for Evaluation of Proposal A against the Proposal B

Sl. No	Condition under which classification happens
(i)	Variable Cost per unit that will not differ between the options/ Variable Cost has already been incurred in the past.
(ii)	Fixed Cost that is not committed and differ between the options.
(iii)	Additional future cost/ Differs between alternatives.
(iv)	Costs already have been incurred and it will not affect any current or future action.

(4 marks)