MAIN MATERIAL / CA INTER / GR. 1 / BOOK 45 / COSTING – PART 6 / 42E

CHAPTERS INCLUDED – JOINT & BY PRODUCTS

(APPLICABLE TO MAY 2020 ATTEMPT OF CA INTER. SYNCHRONISED WITH JULY 2019 EDITION OF ICAI SM.

ISSUED ON 11/10/19)

10. JOINT AND BY PRODUCTS

NO. OF PROBLEMS IN 40E OF CA INTER: CLASSROOM - 9, ASSIGNMENT - 11

NO. OF PROBLEMS IN 41E OF CA INTER: CLASSROOM - 9, ASSIGNMENT – 11

NO. OF PROBLEMS IN 42E OF CA INTER: CLASSROOM - 8, ASSIGNMENT - 09

MODEL WISE ANALYSIS OF PAST EXAM PAPERS OF IPCC & CA INTER

NO.	MODEL NAME	M-09 TO N-12	M-13	N-13 TO N-14	N-15	N-15	M-16	N-16	M-17	N-17	M-18(O)	M-18(N)	N-18(O)	N-18(N)	M-19(N)	M-19(O)
1.	Apportionment of Joint Cost under Various Methods	-		-	-	-	-	-	-	-	-	-	-	-	-	-
2.	Further Processing Decision		-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.	Joint Products with Process Account	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.	By Products Treatment		-	-	8	-	8	-	-	8	-	-	-	-	5	-

SIGNIFICANCE OF EACH PROBLEM COVERED IN THIS MATERIAL

Problem No. in this material	Problem No. in NEW SM	Problem No. in OLD SM	Problem No. in OLD PM	RTP	MTP	Previous Exams	Remarks
CR 1	ILL-1	ILL-1	-	-	-	-	
CR 2	ILL-4	ILL-13	-	-	-	-	
CR 3	-	-	-	N14	M15	-	
CR 4	PQ-1	ILL-15	-	-	-	-	
CR 5	-	-	-	M16 M18(N,O) M19(N,O)	-	-	
CR 6	-	-	Q.NO6	-	-	-	
CR 7	-	-	-	-	-	M19(N)	
CR 8	-	-	-	-	-	M16	
ASG 1	-	-	-	-	-	-	
ASG 2	-	-	Q.NO2	-	-	-	
ASG 3	-	-	Q.NO9	-	M18	-	
ASG 4	-	-	-	-	-	M07	
ASG 5	-	-	-	M17,N18(N,O)	-	-	
ASG 6	-	-	Q.NO4	-	-	-	
ASG 7	-	-	-	-	-	N17	
ASG 8	-	-	Q.NO8	-	-	M15,13	
ASG 9	-	-	-	-	N16,N18(N)	-	

JOINT PRODUCTS: Two or more products of equal importance, produced, simultaneously from the same process, with each having a significant relative sale value are known as joint products. For

example, in the oil industry, gasoline, fuel oil, lubricants, paraffin, coal tar, asphalt and kerosene are all produced from crude petroleum. These are known as joint products.

CO - PRODUCTS: Two or more products which are contemporary but do not emerge necessarily from the same material in the same process. For instance, wheat and gram produced in two separate farms with separate processing of cultivation are the co-products. Similarly, timber boards made from different trees are co-products.

BY-PRODUCTS: Products recovered from material discarded in a main process, or from the production of some major products.

Examples of by-products are molasses in the manufacture of sugar, tar, ammonia and benzol obtained on carbonization of coal and glycerin obtained in the manufacture of soap.

The commonly used methods for apportioning total process costs upto the point of separation over the joint products are as follows:

a) Physical unit method

b) Average unit cost method

c) Survey method

d) Contribution margin method

e) Market value method:

    i) At the point of separation

    ii) After further processing

    iii) Net realisable value.

a) **Physical Unit Method:** This method is based on the assumption that the joint products are capable of being measured in the same units. Accordingly, joint costs here are apportioned on the basis of some physical base, such as weight or measure expressed in gallons, tonnes etc. In other words, the basis used for apportioning joint cost over the joint products is the physical volume of material present in the joint products at the point of separation. Any loss arising during the stage of processing is also apportioned over the products on the same basis. This method cannot be applied if the physical units of the two joint products are different. The main defect of this method is that it gives equal importance and value to all the joint products.

b) **Average Unit Cost Method:** Under this method, total process cost (upto the point of separation) is divided by total units of joint products produced. On division average cost per unit of production is obtained.

Average unit cost = Total process cost (upto the point of separation) ÷ Total units of joint product produced.

This is a simple method. The effect of application of this method is that all joint products will have uniform cost per unit. If this method is used as the basis for price fixation, then all the products may have more or less the same price. Under this method customers of high quality items are benefited as they have to pay less price on their purchase.

c) **Survey Method:** This method is also known as point value method. It is based on technical survey of all the factors involved in the production and distribution of products. Under this method joint cost are apportioned over the joint products, on the basis of percentage/ point values, assigned to the products according to their relative importance. The percentage or points used for the purpose are usually computed by management with the help of technical advisers. This method is considered to be more equitable than other methods.

d) **Contribution Margin Method:** According to this method, joint costs are segregated into two parts - variable and fixed. The variable costs are apportioned over the joint products on the basis of units produced (average method) or physical quantities. In case the products are further processed after the point of separation, then all variable cost incurred be added to the variable costs determined earlier. In this way total variable cost is arrived which is deducted from their respective sales values to ascertain their contribution. The fixed costs are then apportioned over the joint products on the basis of the contribution ratios.

e) <u>**Market Value Method:**</u> This is the most popular and convenient method because it makes use of a realistic basis for apportioning joint costs. Under this method joint costs are apportioned after ascertaining "what the traffic can bear". In other words, the products are made to bear a proportion of the joint cost on the basis of their ability to absorb the same. Market value means weighted market value i.e. units produced × price of a unit of joint product.

   i) **Market value at the point of separation:** This method is used for the apportionment of joint costs to joint products upto the split off point. It is difficult to apply this method if the market value of the products at the point of separation is not available. It is a useful method where further processing costs are incurred disproportionately. To determine the apportionment of joint costs over joint products, a factor known as multiplying factor is determined. This multiplying factor on multiplication with the sales values of each joint product gives rise to the proportion of joint cost.

   ii) **Market value after processing:** Here the basis of apportionment of joint cost is the total sales value of finished products

   iii) **Net realisable value method:** From the sales value of the joint products (at finished stage) the followings are deducted:

      ➤ Estimated profit margins,

      ➤ Selling and distribution expenses, if any, and

      ➤ Post-split off costs.

TREATMENT OF BY-PRODUCT COST IN COST ACCOUNTING:

By-product cost can be dealt in cost accounting in the following ways:

a) **When they are of small total value:** When the by-products are of small total value, the amount realised from their sale may be dealt in any one the following two ways:

   i) The sales value of the by-products may be credited to the Costing Profit and Loss Account and no credit be given in the Cost Accounts. The credit to the Costing Profit and Loss Account here is treated either as miscellaneous income or as additional sales revenue.

   ii) The sale proceeds of the by-product may be treated as deductions from the total costs. The sale proceeds in fact should be deducted either from the production cost or from the cost of sales.

b) **When the by-products are of considerable total value:** Where by-products are of considerable total value, they may be regarded as joint products rather than as byproducts. To determine exact cost of by-products the costs incurred upto the point of separation, should be apportioned over by-products and joint products by using a logical basis. In this case, the joint costs may be divided over joint products and byproducts by using relative market values; physical output method (at the point of split off) or ultimate selling prices (if sold).

c) **Where they require further processing:** In this case, the net realisable value of the by-product at the split-off point may be arrived at by subtracting the further processing cost from the realisable value of by-products.

   i) If total sales value of by-products at split-off point is small, it may be treated as per the provisions discussed above under (a).

   ii) In the contrary case, the amount realised from the sale of by-products will be considerable and thus it may be treated as discussed under (b).

PROBLEMS FOR CLASSROOM DISCUSSION

MODEL NO 1: APPORTIONMENT OF JOINT COST UNDER VARIOUS METHODS

PROBLEM 1:

a) A coke manufacturing company produces the following products by using 5,000 tonnes of coal @ Rs.15 per tonne into a common process.

Coke	3,500 tonnes
Tar	1,200 tonnes

| Sulphate of ammonia | 52 tonnes |
| Benzol | 48 tonnes |

Apportion the joint cost amongst the products on the basis of the physical unit method.

b) Find out the cost of joint products A, B and C using average unit cost method from the following data:

i) Pre-separation Joint Cost Rs. 60,000

ii) Production data:

Products	Units produced
A	500
B	200
C	300
	1,000

c) Find out the A and B using contribution margin method from the following data:

Sales:	
A :	100 kg @ Rs. 60 per kg.
B :	120 kg @ Rs. 30 per kg.
Joint costs:	
Marginal cost	Rs. 4,400
Fixed cost	Rs. 3,900

(A) (NEW SM, OLD SM) (ANS.: A) COKE - 54,690; TAR - 7,290; SULPHATE OF AMMONIA - 810; BENZOL - RS. 750 B) 30,000; 12,000; 18,000 C) 5,000; 3,300 (SOLVE PROBLEM NO 1 OF ASSIGNMENT PROBLEMS AS REWORK) (SOLVE PROBLEM NO 1 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question: What is the impact on the question If joint cost is Rs.1,00,000

Note:_____

PROBLEM 2:(PRINTED SOLUTION AVAILABLE): Inorganic Chemicals purchases salt and processes it into more-refined products such as Caustic Soda, Chlorine, and PVC (Polyvinyl chloride). During the month of April, 2000, Inorganic Chemicals purchased salt for Rs. 40,000. Conversion cost of Rs. 60,000 were incurred up to the split-off point, at which time two saleable products were produced: Caustic soda and chlorine. Chlorine can be further processed into PVC. The April production and sales information are as follows:

	Production	Sales	Sales Price Per Ton
Caustic Soda	1,200 tons	1,200 tons	Rs. 50
Chlorine	800 tons		
PVC	500 tons	500 tons	Rs. 200

All 800 tons of chlorine were further processed, at an incremental cost of Rs. 20,000 to yield 500 tons of PVC. There were no by products or scrap from this further processing of chlorine. There was no beginning or ending inventories of caustic soda, chlorine or PVC in April. There is an active market for chlorine. Inorganic Chemicals could have sold all its April production of chlorine at Rs. 75 a ton.

Required:

1. Calculate, how the joint costs of Rs.1,00,000 would be allocated between Caustic soda and Chlorine under each of the following methods:

   a) Sales value at split off.

   b) Physical Measure (tons).

   c) Estimated NRV.

2. Whether it is worthwhile to make further process of chlorine into PVC.

3. Lifetime Swimming Pool Products offer to purchase 800 tons of Chlorine in May, 2000 at Rs.75 per ton. This sale would mean that no PVC would be produced in May. How would accepting the offer affect May Operating Income?

(B) (NEW SM, OLD SM) (ANS.: 1. A) 50,000; 50,000 B) 60,000; 40,000 C) 42,857; 57,143 2. YES 3. INCREMENTAL PROFIT - RS. 20,000)

(SOLVE PROBLEM NO 2 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question: What is the impact on the question If joint cost is Rs.2,00,000

PROBLEM 3: (PRINTED SOLUTION AVAILABLE) Refinery Ltd. refines crude oil and produces two joint products Gasoline and HSD in the ratio of 4:6. The refining is done in three processes.

Crude oil is first fed in Process-A, from where the two products Gasoline and HSD are get separated. After separation from Process-A, Gasoline and HSD are further processed in Process- B and Process- C respectively. During the month of July, 2014, 4,50,000 Ltr. of crude oil were processed in Process-A at a total cost of Rs. 1,71,99,775.

In Process-B, Gasoline is further processed at a cost of Rs. 10,80,000.

In Process- C, HSD is further processed at a cost of Rs. 1,35,000.

The Input output ratio for each process is as follows:

Process- A1: 0.80

Process- B1: 0.95

Process- C1: 0.90

The details of sales during the month are:

	Gasoline	HSD
Quantity sold (Ltr.)	1,32,000	1,88,000
Sales price per Ltr. (Rs.)	68	46

There were no opening stocks. If these products were sold at split-off point, the selling price of Gasoline and HSD would be Rs. 64 and Rs. 41 per Ltr. respectively.

Required:

i) Prepare a statement showing the apportionment of joint cost to Gasoline and HSD in proportion of sales value at split off point.

ii) Prepare a statement showing the cost per Ltr. of each product indicating joint cost, processing cost and total cost separately.

iii) Prepare a statement showing the product wise profit or loss for the month.

(B) (RTP N14, MTP1 M15) (ANS.: (I) 87,71,200; 84,28,575 (II) 72.00 PER LTR.; 44.05 PER LTR (III) (5,29,600); 3,66,345)

(SOLVE PROBLEM NO 3 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question : What is the impact on the question If normal loss in process A,B,C are 20%, 25%, 5%.

Note:_____

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MODEL NO 2: FURTHER PROCESSING DECISION

PROBLEM 4: Sun-moon Ltd. produces 2,00,000; 30,000; 25,000; 20,000 and 75,000 units of its five products A, B, C, D and E respectively in a manufacturing process and sells them at Rs. 17, Rs. 13, Rs. 8, Rs. 10 and Rs. 14 per unit. Except product D remaining products can be further processed and then can be sold at Rs. 25, Rs. 17, Rs. 12 and Rs. 20 per unit in case of A, B, C and E respectively. Raw material costs Rs. 35,90,000 and other manufacturing expenses cost Rs. 5,47,000 in the manufacturing process which are absorbed on the products on the basis of their 'Net realisable value'. The further processing costs of A, B, C and E are Rs. 12,50,000; Rs.1,50,000; Rs. 50,000 and Rs. 1,50,000 respectively. Fixed costs are Rs. 4,73,000.

You are required to prepare the following in respect of the coming year:

a) Statement showing income forecast of the company assuming that none of its products are to be further processed.

b) Statement showing income forecast of the company assuming that products A, B, C and E are to be processed further.

c) Can you suggest any other production plan whereby the company can maximize its profits? If yes, then submit a statement showing income forecast arising out of adoption of that plan. *(B)*

(NEW SM, OLD SM) (ANS.:(I) 6,30,000 (B) 13,00,000; SUGGESTED TO FURTHER PROCESS PRODUCT A & C; TOTAL PROFIT-13,30,000)

(SOLVE PROBLEM NO 4,5 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question : What is the impact on the question If joint cost is apportioned based on market value at split of point

Note:_____

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PROBLEM 5: (PRINTED SOLUTION AVAILABLE) A company processes a raw material in its Department 1 to produce three products, viz.A, B and X at the same split-off stage. During a period 1,80,000 kgs of raw materials were processed in Department 1 at a total cost of ` 12,88,000 and the resultant output of A, B and X were 18,000 kgs, 10,000 kgs and 54,000 kgs respectively. A and B were further processed in Department 2 at a cost of `1,80,000 and `1,50,000 respectively. X was further processed in Department 3 at a cost of `1,08,000. There is no waste in further processing. The details of sales affected during the period were as under:

	A	B	X
Quantity Sold (kgs.)	17,000	5,000	44,000
Sales Value (`)	12,24,000	2,50,000	7,92,000

There were no opening stocks. If these products were sold at split -off stage, the selling prices of A, B and X would have been Rs. 50, Rs. 40 and Rs. 10 per kg respectively.

Required:

(i) Prepare a statement showing the apportionment of joint costs to A, B and X.

(ii) Present a statement showing the cost per kg of each product indicating joint cost and further processing cost and total cost separately.

(iii) Prepare a statement showing the product wise and total profit for the period.

(iv) State with supporting calculations as to whether any or all the products should be further processed or not.

(RTP MAY16, RTP MAY18,(N,O)RTP MAY19 (N,O) (ANS.: (I) A=6,30,000 B= 2,80,000 X=3,78,000;ii) JOINT COST A=35,B=28,X=7 FURTHER PROCESSING COST A=10,B=15,X=2 iii) 17,26,000,8,90,000 iv)A=12,B=(5),X=6)

(SOLVE PROBLEM NO 6 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question: What is the impact on the question If joint cost is Rs.15,00,000

Note:_____

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MODEL NO 3: JOINT PRODUCTS WITH PROCESS ACCOUNT

PROBLEM 6: Three joint products are produced by passing chemicals through two processes. Output from Process 1 is transferred to Process 2 from which the three joint products are produced and immediately sold. The data regarding the process for April 2002 is given below:

Particulars	Process I	Process II
Direct material (2,500 kilos at Rs.4 per Kilo)	Rs.10,000	---
Direct Labour	Rs.6,250	Rs.6,900
Overheads	Rs.4,500	Rs.6,900
Normal loss	10% of input	---
Scrap value of loss	Rs.2 per Kilo	---
Output	2,300 Kilo	Joint products A - 900 kilos

		B - 800 kilos C - 600 kilos

There were no opening /closing stocks in both process & selling prices of the output from process 2 were:

Products	Rs./ Kg.
A	24
B	18
C	12

1. Prepare process account.

2. Calculate the profit attributable to each joint product by apportioning total cost from process 2:

   a) According to weight of output.

   b) By the market value of production. *(C) (OLD PM)*

   (ANS.: A) A - 8,100; B - 2,400; C - (1,800); B) A - 4,350; B - 2,900; C - 1,450)

Concept question: What is the impact on the question If normal loss in process ii is 10%

Note:_____

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MODEL NO 4: BY PRODUCTS TREATMENT

PROBLEM 7: A factory engaged in the production of chemical Bomex and in the course of its manufacture a by-product Cromex is produced which after further processing has a commercial value. For the month of April 2019 the following are the summarised cost data

	Joint Expenses	Separate Expenses	
		Bomex	Cromex
Materials	1,00,000	6,000	4,000
Labour	50,000	20,000	18,000
Overheads	30,000	10,000	6,000
Selling Price per unit		100	40
Estimated profit per unit- on sale of Cromex			5
Number of units produced		2000 units	2000 units

The factory uses net realisable value method for apportionment of joint cost to by-products.

You are required to prepare statements showing :

(i) Joint cost allocable to Cromex

(ii) Product wise and overall profitability of the factory for April 2019

(NEW MAY 19) (ANS.: (I) 1,38,000 II) BOMEX=26,000, CROMIX=10,000,TOTAL=36,000)

(SOLVE PROBLEM NO 7,8 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question: What is the impact on the question If joint cost is Rs.2,00,000

Note:_____

PROBLEM 8: A factory producing article A also produces a by-product B which is further processed into finished product. The joint cost of manufacture is given below:

      Material   Rs. 5,000

Labour	Rs. 3,000
Overhead	Rs. 2,000
	Rs. 10,000

Subsequent cost in Rs. are given below:

	A	B
Material	3,000	1,500
Labour	1,400	1,000
Overhead	600	500
	5,000	3,000

| Selling prices are | A Rs. 16,000 |
| | B Rs. 8,000 |

Estimated profit on selling prices is 25% for A and 20% for B.

Assume that selling and distribution expenses are in proportion of sales prices; Show how you would apportion joint costs of manufacture and prepare a statement showing cost of production of A and B.

(A) (M 16-8M) (ANS.: COST OF PRODUCTION (IN RS.): A: 11,733; B: 6,267)

(SOLVE PROBLEM NO 9 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question: What is the impact on the question if selling expenses are distributed to process A&B in the rate of 1:1

Note:_____

PRINTED SOLUTIONS TO SOME SELECTIVE PROBLEMS

PROBLEM NUMBERS TO WHICH SOLUTIONS ARE PROVIDED: 2, 3, 5.

PROBLEM NO. 2

Sales value at split off method

Products	Sales in tonnes (a)	Selling price per tonne (b)	Sales revenue (c)=(a) × (b)	Joint cost apportioned
Caustic Soda	1,200	50	60,000	50,000
Chlorine	800	75	60,000	50,000

* Apportioned joint cost $= \dfrac{\text{Total sale value}}{\text{Total joint cost}} \times \text{Sale revenue of each product}$

Joint cost apportioned to Caustic Soda $= \dfrac{1,00,000}{1,20,000} \times 60,000 = \text{Rs.}50,000$

Joint cost apportioned to Chlorine $= \dfrac{1,00,000}{1,20,000} \times 60,000 = 50,000$

Physical measure method

Products	Sales in tonnes	Joint cost apportioned
Caustic Soda	1,200	60,000
Chlorine	800	40,000

Apportioned joint cost $= \dfrac{\text{Total joint cost}}{\text{Total physical value}} \times \text{Physical units of each product}$

Joint cost apportioned to Caustic Soda $= \dfrac{1,00,000}{2,000 \text{ tonnes}} \times 1,200 \text{ tonnes} = 60,000$

Joint cost apportioned to chlorine = $\dfrac{1,00,000}{2,000 \text{ tonnes}} \times 1,200$ tonnes = Rs.40,000

Estimated net realisable value method

Products	Sales in tonnes (a)	Further processing cost (Rs.)	Net realisable value	Apportioned Joint cost
Caustic Soda	60,000	-	60,000	42,857
Chlorine	1,00,000	20,000 (500 tonnes of PVC × Rs.200)	80,000	57,143
			1,40,000	1,00,000

**Apportioned joint cost = $\dfrac{\text{Total joint cost}}{\text{Total net realisable value}} \times$ Net realisable value of each product

Apportioned joint cost for Caustic Soda = $\dfrac{1,00,000}{1,40,000} \times 60,000$ = Rs.42,857

Apportioned joint cost for Chlorine = $\dfrac{1,00,000}{1,40,000} \times 80,000$ = Rs.57,143

Incremental revenue from further processing of Chlorine into PVC

((500 tonnes × Rs.200) - 800 tonnes × Rs.75)   Rs.40,000

Less: Incremental cost of further processing of Chlorine into PVC   Rs.20,000

Incremental operating income from further processing   Rs.20,000

The operating income of Inorganic Chemicals will be reduced by Rs.20,000 in August if it sells 800 tonnes of Chlorine to Lifetime Swimming Pool Products, instead of further processing of Chlorine into PVC for sale.

PROBLEM NO. 3

Calculation of quantity produced

	Process - A (in Ltr.)	Process - B (in Ltr.)	Process - C (in Ltr.)
Input	4,50,000	1,44,000	2,16,000
Normal Loss	(90,000) (20% of 4,50,000 ltr.)	(7,200) (5% of 1,44,000 ltr.)	(21,600) (10% of 2,16,000 ltr.)
	3,60,000	1,36,800	1,94,400
Production of Gasoline	1,44,000	136,800	--
Production of HSD	2,16,000	--	1,94,400

i) Statement of apportionment of joint cost on the basis of sale value at split-off point

Particulars	Gasoline	HSD
Output at split-off point (Ltr.)	1,44,000	2,16,000
Selling price per Ltr. (Rs.)	64	41
Sales value (Rs.)	92,16,000	88,56,000
Share in Joint cost (128:123)	87,71,200 $\left(\dfrac{\text{Rs.1,71,99,775}}{251} \times 128\right)$	84,28,575 $\left(\dfrac{\text{Rs.1,71,99,775}}{251} \times 123\right)$

ii) Statement of cost per Litre.

	Gasoline	HSD

Output (Ltr.)	1,36,800	1,94,400
Share in joint cost (in Rs.)	87,71,200	84,28,575
Cost per Ltr. (in Rs.) (Joint cost)	64.11	43.36
Further processing cost (in Rs.)	10,80,000	1,35,000
Further processing cost per Ltr. (in Rs.)	7.89	0.69
Total cost per Ltr. (in Rs.)	72.00	44.05

iii) Statement of profit

Particulars	Gasoline	HSD
Output (Ltr.)	1,36,800	1,94,400
Sales (Ltr.)	1,32,000	1,88,000
Closing stock (Ltr.)	4,800	6,400

Particulars	Amount (Rs.)	Amount (Rs.)
Sales @ Rs. 68 and Rs. 46 for Gasoline and HSD respectively	89,76,000	86,48,000
Add: Closing stock (Ltr.) (at full cost)	3,45,600	2,81,920
Value of production	93,21,600	89,29,920
Less: Share in joint cost	87,71,200	84,28,575
Further processing	10,80,000	1,35,000
Profit/ (Loss)	(5,29,600)	3,66,345

PROBLEM NO. 5

i) Statement showing the apportionment of joint costs to A, B and X

Products	A	B	C	TOTAL
Output (kg)	18,000	10,000	54,000	
Sales value at the point of split off (Rs.)	9,00,000 (50 x 18,000)	4,00,000 (40 x 10,000)	5,40,000 (10 x 54,000)	18,40,000
Joint cost apportionment on the basis of sales value at the point of split off (Rs.)	6,30,000 $\frac{12,88,000}{18,40,000}$ X9,00,000	2,80,000 $\frac{12,88,000}{18,40,000}$ X4,00,000	3,78,000 $\frac{12,88,000}{18,40,000}$ X5,40,000	12,88,000

ii) Statement showing the cost per kg. of each product

(indicating joint cost; further processing cost and total cost separately)

Products	A	B	X
Joint costs apportioned (Rs.) : (I)	6,30,000	2,80,000	3,78,000
Production (kg) : (II)	18,000	10,000	54,000
Joint cost per kg (Rs.): (I ÷ II)	35	28	7
Further processing Cost per kg. (Rs.)	10 $\frac{1,80,000}{18,000 KGS}$	15 $\frac{1,50,000}{10,000 KGS}$	2 $\frac{1,08,000}{54,000 KGS}$
Total cost per kg (Rs.)	45	43	9

iii) Statement showing the product wise and total profit for the period

Products	A	B	X	TOTAL
Sales value (Rs.)	12,24,000	2,50,000	7,92,000	
Add: Closing stock value (Rs.) (Refer to Working note 2)	45,000	2,15,000	90,000	
Value of production (Rs.)	12,69,000	4,65,000	8,82,000	26,16,000
Apportionment of joint cost (Rs.)	6,30,000	2,80,000	3,78,000	
Add: Further processing cost (Rs.)	1,80,000	1,50,000	1,08,000	
Total cost (Rs.)	8,10,000	4,30,000	4,86,000	17,26,000
Profit (Rs.)	4,59,000	35,000	3,96,000	8,90,000

Working Notes:

1.

Products	A	B	X
Sales value (Rs.)	12,24,000	2,50,000	7,92,000
Quantity sold (Kgs.)	17,000	5,000	44,000

2.Valuation of closing stock:

Since the selling price per kg of products A, B and X is more than their total costs, therefore closing stock will be valued at cost.

Products	A	B	X	Total
Closing stock (kgs.)	1,000	5,000	10,000	
Cost per kg (Rs.)	45	43	9	
Closing stock value (Rs.)	45,000 (`45 x 1,000 kg)	2,15,000 (`43 x 5,000 kg)	90,000 (`9x10,000 kg)	3,50,000

(iv) Calculations for processing decision

Products	A	B	X
Selling price per kg at the point of split off (Rs.)	50	40	10
Selling price per kg after further processing (Rs.) (Refer to working Note 1)	72	50	18
Incremental selling price per kg (Rs.)	22	10	8
Less: Further processing cost per kg (Rs.)	(10)	(15)	(2)
Incremental profit (loss) per kg (Rs.)	12	(5)	6

Product A and X has an incremental profit per unit after further processing, hence, these two products may be further processed. However, further processing of product B is not profitable hence, product B shall be sold at split off point.

ASSIGNMENT PROBLEMS

MODEL NO 1: APPORTIONMENT OF JOINT COST UNDER VARIOUS METHODS

PROBLEM 1: In a process line of Tulip Ltd., three joint products are produced. For the month of May the following data was available.

Product	L	M	N
Selling price per Kg.	5	10	20
Post - separation point costs	10,000	5,000	15,000
Output in Kgs.	2,500	1,000	1,500

Pre-separation point costs - Rs. 20,000. The joint products are manufactured in one common process, after which they are separated and may undergo further individual processing. Joint costs are apportioned according to weight. Show estimated profit/loss of each product and in total.

(B) (ANS.: PROFIT/LOSS: L - RS. (7,500); M - RS. 1,000; N - RS. 9,000; TOTAL - RS. 2,500)

PROBLEM 2: The Sunshine Oil Company purchases crude vegetables oil. It does refining of the same. The refining process results in four products at the split off point: M, N, O and P. Product O are fully processed at the split off point. Product M, N and P can be individually further refined into 'Super M', 'Super N' and 'Super P'. In the most recent month (March, 2014), the output at split off point was:

Product M	3,00,000 gallons
Product N	1,00,000 gallons
Product O	50,000 gallons
Product P	50,000 gallons

The joint cost of purchasing the crude vegetables oil and processing it were Rs. 40,00,000. Sunshine had no beginning or ending inventories. Sales of Product O in March, 2014 were Rs. 20,00,000. Total output of products M, N and P was further refined and then sold. Data related to March, 2014 are as follows:

	Further Processing Costs to Make Super Products	Sales
Super M'	Rs. 80,00,000	Rs. 1,20,00,000
Super N'	Rs. 32,00,000	Rs. 40,00,000
Super P'	Rs. 36,00,000	Rs. 48,00,000

Sunshine had the option of selling products M, N and P at the split off point. This alternative would have yielded the following sales for the March, 2014 production:

Product M	Rs. 20,00,000
Product N	Rs. 12,00,000
Product P	Rs. 28,00,000

You are required to answer:

a) How the joint cost of Rs. 40,00,000 would be allocated between each product under each of the following methods (i) sales value at split off; (ii) physical output (gallons); and (iii) estimated net realizable value?

b) Could Sunshine have increased its March, 2014 operating profits by making different decisions about the further refining of product M, N or P? Show the effect of any change you recommend on operating profits. *(B) (OLD PM) (ANS.: (A) 10,00,000, 24,00,000, 20,00,000; B) PROCESS FURTHER - PRODUCT M)*

PROBLEM 3: SV chemicals Limited processes 9,00,000 kgs. of raw material in a month purchased at Rs. 95 per kg in department X. The input output ratio of department X is 100 : 90. Processing of the material results in two joint products being produced 'P$_1$' and 'P$_2$' in the ratio of 60 : 40. Product 'P$_1$' can be sold at split off stage or can be further processed in department Y and sold as a new product 'YP$_1$'. The input output ratio of department Y is 100 : 95. Department Y is utilized only for further processing of product 'P$_1$' to product 'YP$_1$'. Individual departmental expenses are as follows:

	Dept. X (in lakhs)	Dept. Y (in lakhs)
Direct Materials	95.00	14.00
Direct Wages	80.00	27.00
Variable Overheads	100.00	35.00
Fixed Overheads	75.00	52.00
Total	350.00	128.00

Further, selling expenses to be incurred on three products are:

Particulars	Amount (in lakhs)
Product 'P$_1$'	28.38
Product 'P$_2$'	25.00
Product 'YP$_1$'	19.00

Selling price of the products 'P$_1$' and 'P$_2$' at split off point is Rs. 110 per kg and Rs. 325 per kg respectively. Selling price of new product 'YP$_1$' is Rs. 150 per kg.

You are required to:

i) Prepare a statement showing apportionment of joint costs, in the ratio of value of sales, net of selling expenses.

ii) Prepare a Statement showing profitability at split off point.

iii) Prepare a Statement of profitability of 'YP$_1$'.

iv) Determine that would you recommend further processing of P$_1$?

(Old pm)(A)(MTP M18)

(ANS.: I) P$_1$: RS. 397.65 LAKHS; P$_2$: RS. 807.35 LAKHS; II) P$_1$: 108.57 LAKHS; P$_2$: 220.65 LAKHS; III) PROFIT: 84.90 LAKHS; IV) DECREASE IN PROFIT: 23.67 LAKHS)

MODEL NO 2: FURTHER PROCESSING DECISION

PROBLEM 4: A Company produces two joint products P and Q in 70:30 ratio from basic raw materials in department A. The input output ratio of department A is 100: 85. Product P can be sold at the split of stage or can be processed further at department B and sold as product AR. The input output ratio is 100:90 of department B. The department B is created to process product A only and to make it product AR.

The selling prices per kg. are as under:

Product P   Rs. 85

Product Q   Rs. 290

Product AR   Rs. 115

The production will be taken up in the next month.

Raw materials 8,00,000 Kgs.

Purchase price Rs. 80 per Kg.

Particulars	Dept. A Rs. Lacs	Dept. B Rs. Lacs
Direct materials	35.00	5.00
Direct labour	30.00	9.00
Variable overheads	45.00	18.00
Fixed overheads	40.00	32.00
Total	150.00	64.00
	Rs. in Lacs	
Selling Expenses:		
Product P	24.60	
Product Q	21.60	
Product AR	16.80	

Required:

i) Prepare a statement showing the apportionment of joint costs.

ii) State whether it is advisable to produce product AR or not.

(B) (M 07) (ANS.: (I) JOINT COST OF P IS 316 LAKHS; Q IS 474 LAKHS; (II) IT IS BENEFICIAL TO INCREASE PROFIT 31.86 LAKHS)

PROBLEM 5: In an Oil Mill four products emerge from a refining process. The total cost of input during the quarter ending March 2016 is Rs.1,48,000. The output, sales and additional processing costs are as under:

Products	Output in Litres	Additional processing cost after split off (Rs.)	Sales value (Rs.)
ACH	8,000	43,000	1,72,500
BCH	4,000	9,000	15,000
CSH	2,000	–	6,000
DSH	4,000	1,500	45,000

In case these products were disposed-off at the split off point that is before further processing, the selling price per litre would have been:

ACH (Rs.)	BCH (Rs.)	CSH (Rs.)	DSH (Rs.)
15.00	6.00	3.00	7.50

Prepare a statement of profitability based on:

i) If the products are sold after further processing is carried out in the mill.

ii) If they are sold at the split off point.   *(RTP M 17, RTP N18 (N&O))*

(B) (ANS.: (I) PROFIT AFTER FURTHER PROCESSING (IN RS.): ACH: 30,833; BCH: (13,733); CSH: 1,067; DSH: 18,833; (II) PROFIT AT SPLIT OFF POINT (IN RS.): ACH: 21,333; BCH: 4,267; CSH: 1,067; DSH: 5,333)

PROBLEM 6: In a chemical manufacturing company, three products A, B and C emerge at a single split offstage in department P. Product A is further processed in department Q, product B in department R and product C in department S. There is no loss in further Processing of any of the three products. The cost data for a month are as under:

Cost of raw materials introduced in department P   Rs. 12,68,800

Direct Wages Department (Rs.)

P	3,84,000
Q	96,000
R	64,000
S	36,000

Factory overheads of Rs. 4,64,000 are to be apportioned to the departments on direct wage basis.

During the month under reference, the company sold all three products after processing them further as under:

Products	A	B	C
Output sold (kg.)	44,000	40,000	20,000
Selling Price per kg. (Rs.)	32	24	16

There is no opening or closing stocks. If these products were sold at the split off stage, that is, without further processing, the selling prices would have been Rs. 20, Rs. 22 and Rs. 10 each per kg respectively for A, B and C.

Required:

i) Prepare a statement showing the apportionment of joint costs to joint products.

ii) Present a statement showing product-wise and total profit for the month under reference as per the company's current processing policy.

iii) What processing decision should have been taken to improve the profitability of the company?

iv) Calculate the product-wise and total profit arising from your recommendation in (iii) above.

(B) (OLD PM) (ANS.: (I) 8,80,000; 8,80,000; 2,00,000 (II) 3,55,200; (35,200); 55,200; 3,75,200 (III) PRODUCTS A & C ARE TO BE FURTHER PROCESS (IV) 3,55,200; NIL; 55,200; 4,10,400)

MODEL NO 4: BY PRODUCTS TREATMENT

PROBLEM 7: A Ltd. produces 'M' as a main product and gets two by products - 'P' and 'Q' in the course of processing. Following information are available for the month of October, 2017:

Particulars	M	P	Q
Cost after separation (in Rs.)	-	60,000	30,000
No. of units produced	4500	2500	1500
Selling price (per unit) (in Rs.)	170	80	50
Estimated Net profit to sales	-	30%	25%

The joint cost of manufacture up to separation point amounts to Rs. 2,50,000.

Selling expenses amounting to Rs. 85,000 are to be apportioned to the three products in the ratio of sales units.

There is no opening and closing stock.

Prepare the statement showing:

i) Allocation of joint cost.

ii) Product wise overall profitability and

iii) Advise the company regarding results if the byproduct 'P' is not further processed and is sold at the point of separation at Rs. 60 per unit without incurring selling expenses. *(A) (N17 - 8M)*

(ANS.: (I) RS. 55,000, RS. 11,250; (II) RS. 5,36,250, RS. 60,000, RS. 18,750; (III) INCREMENTAL PROFIT: RS. 35,000; IT IS ADVISABLE THAT NOT TO MAKE FURTHER PROCESS)

PROBLEM 8: A company manufactures one main product (M1) and two by-products B1 and B2. For the month of January 2013, following details are available:

Total Cost upto separation Point Rs. 2,12,400

	M1	B1	B2
Cost after separation (in Rs.)	-	35,000	24,000
No. of units produced	4,000	1,800	3,000
Selling price per unit (in Rs.)	100	40	30
Estimated net profit as percentage to sales value	-	20%	30%
Estimated selling expenses as percentage to sales value	20%	15%	15%

There is no beginning or closing inventories.

Prepare statement showing:

i) Allocation of joint cost; and

ii) Product-wise and overall profitability of the company for January 2013.

(A) (OLD PM, M15 8M & M 13 8M) (ANS.: (I) B₁ 11,800; B₂- 25,500 (II) 1,44,900; 14,400; 27,000; OVERALL PROFIT: RS. 1,86,300)

PROBLEM 9: Three products X, Y and Z along with a byproduct B are obtained again in a crude state which require further processing at a cost of Rs. 5 for X; Rs. 4 for Y; and Rs. 2.50 for Z per unit before sale. The byproduct is however saleable as such to a nearby factory. The selling prices for the three main products and byproduct, assuming they should yield a net margin of 25 percent of cost, are fixed at Rs. 13.75 Rs. 8.75 and Rs. 7.50 and Re. 1.00 respectively - all per unit quantity sold.

During a period, the joint input cost including the material cost was Rs. 90,800 and the respective outputs were:

X	8,000 units
Y	6,000 units
Z	4,000 units
B	1,000 units

By product should be credited to the joint cost and only the net joint costs are to be allocated to the main products.

Calculate the joint cost per unit of each product and the margin available as a percentage on cost.

(C) (MTP N16, MTP1 N18 (N)) (ANS.: (I) RS.6.75, RS.3.38, RS.3.94; (II) 17.02%, 18.56%, 16.46%)

ADDITIONAL QUESTION BANK

PROBLEM 1: A company's plant processes 1,50,000 kg. of raw material in a month to produce two products, viz, 'P' and 'Q'. The cost of raw material is Rs. 12 per kg. The processing costs per month are:

Particulars	Rs.
Direct Materials	90,000
Direct Wages	1,20,000
Variable Overheads	1,00,000
Fixed Overheads	1,00,000

The loss in process is 5% of input and the output ratio of P and Q which emerge simultaneously is 1:2. The selling prices of the two products at the point of split off are: P Rs. 12 per kg. and Q Rs. 20 per kg. A proposal is available to process P further by mixing it with other purchased materials. The entire current output of the plant can be so processed further to obtain a new product 'S'. The price per kg of S is Rs. 15 and each kg of output of S will require one kilogram of input P. The cost of processing of P into S (including other materials) is Rs. 1,85,000 per month.

You are required to prepare a statement showing the monthly profitability based both on the existing manufacturing operations and on further processing.

Will you recommend further processing?

(B) (OLD PM)

(ANS.: PROFIT BASED ON EXISTING OPERATIONS: P - 60,000; Q - 2,00,000. PROFIT AFTER FURTHER PROCESSING: P - 17,500; Q - 2,00,000)

Note:_____

_____

PROBLEM 2: P ltd., Chocolates manufactures and distributes chocolate products. It purchases Cocoa beans and processes them into two intermediate products:

Chocolate powder liquor base

Milk-chocolate liquor base

These two intermediate products become separately identifiable at a single split off point. Every 500 pounds of cocoa beans yields 20 gallons of chocolate - powder liquor base and 30 gallons of milk-chocolate liquor base.

The chocolate powder liquor base is further processed into chocolate powder. Every 20 gallons of chocolate-powder liquor base yields 200 pounds of chocolate powder.

The milk chocolate liquor base is further processed into milk-chocolate. Every 30 gallons of milk chocolate liquor base yields 340 pounds of milk chocolate.

Production and sales data for October, 2013 are:

Cocoa beans processed   7,500 pounds

Costs of processing Cocoa beans to split off point   Rs. 7,12,500

(Including purchase of beans)

	Production	Sales	Selling price
Chocolate powder	3,000 pounds	3,000 pounds	Rs. 190 per pound
Milk chocolate	5,100 Pounds	5,100 Pounds	Rs. 237.50 per pound

The October, 2013 separable costs of processing chocolate-powder liquor into chocolate powder are Rs. 3,02,812.50. The October 2013 separable costs of processing milk-chocolate liquor base into milk-chocolate are Rs. 6,23,437.50.

P full processes both of its intermediate products into chocolate powder or milk chocolate. There is an active market for these intermediate products. In October, 2013, P could have sold the chocolate powder liquor base for Rs.997.50 a gallon and the milk-chocolate liquor base for Rs. 1,235 a gallon.

Required:

a) Calculate how the joint cost of Rs. 7,12,500 would be allocated between the chocolate powder and milk-chocolate liquor bases under the following methods:

   i) Sales value at split off point

   ii) Physical measure (gallons)

   iii) Estimated net realisable value, (NRV) and

   iv) Constant gross-margin percentage NRV.

b) What is the gross-margin percentage of the chocolate powder and milk-chocolate liquor bases under each of the methods in requirements (i) above?

c) Could P have increased its operating income by a change in its decision to fully process both of its intermediate products? Show your computations.

(A) (OLD PM) (ANS.: (I) (A) 2,49,375, 463,125; (B)2,85,000, 4,27,500; (C)2,22,656, 4,89,844;(D) 2,21,588, 4,90,912 (II) 3.125%; (3.125%); 7,8125% ;10.29%; 8.49%, 8.09%(III) P INCREASE OPERATING INCOME - 32,062.50)

PROBLEM 3: A company produces two joint products X and Y, from the same basic materials. The processing is completed in three departments.

Materials are mixed in Department I. At the end of this process X and Y get separated. After separation X is completed in the Department II and Y is finished in Department III. During a period 2,00,000 kg. of raw material were processed in Department I, at a total cost of Rs. 8,75,000, and the resultant 60% becomes X and 30% becomes Y and 10% normally lost in processing.

In Department II 1/6th of the quantity received from Department I is lost in processing. X is further processed in Department II at a cost of Rs. 1,80,000.

In Department III further new material added to the material received from Department I and weight mixture is doubled, there is no quantity loss in the department. Further processing cost (with material cost) in Department III is Rs. 1,50,000.

The details of sales during the year are:

	Product X	Product Y
Quantity sold (kg.)	90,000	1,15,000
Sales price per kg (Rs.)	10	4

There were no opening stocks. If these products sold at split-off-point, the selling price of X and Y would be Rs. 8 and Rs. 4 per kg respectively.

Required:

a) Prepare a statement showing the apportionment of joint cost to X and Y in proportion of sales value at split off point.

b) Prepare a statement showing the cost per kg of each product indicating joint cost, processing cost and total cost separately.

c) Prepare a statement showing the product wise profit for the year.

d) On the basis of profits before and after further processing of product X and Y, give your comment that products should be further processed or not.

(A) (OLD PM) (ANS.: A) 7,00,000, 1,75,000, B) 8.8, 2.708, C) 1,08,000, 1,48,540, D) X - 2,60,000,1,08,000, Y - 65,000,1,48,540)

THE END