13. UNIT AND BATCH COSTING

NO. OF PROBLEMS IN 41.5E OF CA INTER: CLASSROOM - 4, ASSIGNMENT - 5

NO. OF PROBLEMS IN 41E OF CA INTER: CLASSROOM - 7, ASSIGNMENT – 5

NO. OF PROBLEMS IN 42.5E OF CA INTER: CLASSROOM - 5, ASSIGNMENT - 7

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

No.	MODEL NAME	M-09 TO M-19
1.	UNIT COSTING	-
2.	BATCH COSTING	-

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-2	-	-	-	-	-	-
CR 2	ILL-7	-	-	-	-	-	-
CR 3	ILL-3	-	-	M18(N,O)	-	-	-
CR 4	PQ-2	ILL-5	-	-	-	-	-
CR 5	-	-	-	NOV19	-	-	-
ASG 1	ILL-1	-	-	-	-	-	-
ASG 2	ILL-2	ILL-6	-		-	-	-
ASG 3	PQ-4	-	-	-	-	-	-
ASG 4	-	-	-	M18(N,O)	-	-	-
ASG 5	ILL-4	ILL-4	-	-	-	-	-
ASG 6	-	-	-	-	M19(N) N18(N)	-	-
ASG 7	ILL-6	-	-	-	-	-	-

UNIT COSTING

i) Unit costing is a method of costing used where the output produced by an entity is identical and each unit of output require identical cost.

ii) This method of costing is followed by industries which produces single output or few variants of a single output.

$$\text{Cost per unit} = \frac{\text{Total Cost of Production}}{\text{No. of units produced}}$$

COST COLLECTION PROCEDURE IN UNIT COSTING:

The cost for production of output is collected element wise and posted in the cost accounting system for cost ascertainment. The element wise collection is done as below:

a) Collection of Materials Cost

b) Collection of Employees (labour) Cost

c) Collection of Overheads

TREATMENT OF SPOILED AND DEFECTIVE WORK:

Circumstance	Treatment
Loss due to normal reasons	When a normal rate of defectives has already been established and actual number of defectives is within the normal limit, the cost of rectification or loss will be charged to the entire output. If, on the other hand, the number of defective units substantially exceeds the normal limits, the cost of rectification or loss are written off in Costing Profit and Loss Account.
Loss due to abnormal reasons	In this case cost of rectification and loss is treated as abnormal cost and the cost of rectification or loss is written off as loss in costing Profit and Loss account.

WHAT IS BATCH COSTING?

Batch: Where the output of the job consists of homogeneous (similar) units, a lot of similar units may be used as a cost unit for ascertaining cost. Such lot or collection of units is called as a Batch.

Batch Costing: It is a form of Job Costing, where in cost is ascertained for a collection/lot of units called a batch. Separate cost sheets are maintained for each batch of production.

$$\text{Cost per unit} = \frac{\text{Total cost for the batch}}{\text{Number of items produced in the batch}}$$

Examples of industries where batch costing is applied: Pharmaceutical, Radio/TV/Computer.

CIRCUMSTANCES UNDER WHICH BATCH COSTING MAY BE ADOPTED

a) When the output of a job consists of a number of units and it is not economical to ascertain cost of every unit of output independently.

b) When certain physical characteristics like size, colour, taste, quality etc. are required uniformly over a collection of units e.g. garments of the same size, pharmaceuticals etc.

c) When an internal manufacturing order is made out for production of components/sub-parts-e.g. component parts of radio sets, watches etc.

WHAT IS ECONOMIC BATCH QUANTITY? HOW IS IT DETERMINED?

Economic Batch Quantity (EBQ) represents the optimum size for batch production. The determination of EBQ involves two types of costs. These are:

a) **Set-up Cost (or Preparation Cost):** The processing of a particular batch gives rise to clerical and machine set up costs followed by machine disassembly costs on completion of the batch. These costs are incurred in connection with each batch and are independent of the size of the batch.

b) **Carrying Cost (or Holding Cost):** The larger the batch size, the greater will be number of units in inventory. Hence the costs associated with holding/carrying the inventory like space, interest etc. will also be higher. These are carrying costs.

If batch size increases, there is an increase in the carrying cost but the set up cost per unit of product is reduced, this situation is reversed when the batch size decreases. Thus there is one particular batch size for which the total of set up and carrying costs are minimum. This size is known as economic or optimum batch quantity.

$$\text{EBQ} = \sqrt{\frac{2AS}{C}}$$

A = Annual requirement of finished goods, S = Set up costs per batch & C = Carrying cost per unit per annum.

PROBLEMS FOR CLASSROOM DISCUSSION

MODEL 1: UNIT COSTING

PROBLEM 1: Atharva Pharmacare Limited produced a uniform type of product and has a manufacturing capacity of 3,000 units per week of 48 hours. From the records of the company, the following data are available relating to output and cost of 3 consecutive weeks

Week Number	Units Manufactured	Direct Material (Rs.)	Direct Wages (Rs.)	Factory Overheads (Rs.)
1	1,200	9,000	3,600	31,000
2	1,600	12,000	4,800	33,000
3	1,800	13,500	5,400	34,000

Assuming that the company charges a profit of 20% on selling price, find out the selling price per unit when the weekly output is 2,000 units.   *(B) (NEW SM) (ANS.: SELLING PRICE PER UNIT: RS.35)*

(SOLVE PROBLEM NO 1 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question: What is the impact on the question if profit is 50% of selling price.

Note:_____

MODEL 2: BATCH COSTING

PROBLEM 2: (PRINTED SOLUTION AVAILABLE) A Company has an annual demand from a single customer for 50,000 litres of a paint product. The total demand can be made up of a range of colour to be produced in a continuous production run after which a set-up of the machinery will be required to accommodate the colour change. The total output of each colour will be stored and then delivered to the customer as single load immediately before production of the next colour commences.

The Set up costs are Rs. 100 per set up. The Service is supplied by an outside company as required.

The Holding costs are incurred on rented storage space which costs Rs. 50 per sq. meter per annum. Each square meter can hold 250 Litres suitably stacked.

You are required to calculate

i)   Calculate the total cost per year where batches may range from 4,000 to 10,000 litres in multiples of 1,000 litres and hence choose the production batch size which will minimize the cost.

ii) Use the economic batch size formula to calculate the batch size which will minimise total cost.

(B) (NEW SM, OLD SM) (ANS.: (I) TOTAL COST: RS. 1,414; (II) 7,071 LITRES)

(SOLVE PROBLEM NO 2, 3 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question: What is the impact on the question if setup price is Rs.150.

Note:_____

PROBLEM 3: Arnav Confectioners (AC) owns a bakery which is used to make bakery items like pastries, cakes and muffins. AC use to bake at least 50 units of any item at a time. A customer has given an order for 600 muffins. To process a batch of 50 muffins, the following cost would be incurred:

Direct materials   -   Rs. 500

Direct wages   -   Rs. 50

Oven set   -   up cost Rs.150

AC absorbs production overheads at a rate of 20% of direct wages cost. 10% is added to the total production cost of each batch to allow for selling, distribution and administration overheads.

AC requires a profit margin of 25% of sales value.

Determine the selling price for 600 muffins.   *(A) (NEW SM, OLD SM, SIMILAR: RTP M18 (N&O))*

(ANS.: SELLING PRICE: RS. 12,496) (SOLVE PROBLEM NO 4 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question: What is the impact on the question if profit margin of 20% of sales value.

PROBLEM 4: (PRINTED SOLUTION AVAILABLE) Rio Limited undertakes to supply 1000 units of a component per month for the months of January, February and March 2013. Every month a batch order is opened against which materials and labour cost are booked at actual. Overheads are levied at a rate per labour hour. The selling price is contracted at Rs. 15 per unit.

From the following data, present the profit per unit of each batch order and the overall position of the order for the 3000 units.

Month	Batch output (number)	Material cost (Rs.)	Labour cost (Rs.)
January 2013	1,250	6,250	2,500
February 2013	1,500	9,000	3,000
March 2013	1,000	5,000	2,000

Labour is paid at the rate of Rs.2 per hour. The other details are:

Month	Overheads (Rs.)	Total labour hours
January 2013	12,000	4,000
February 2013	9,000	4,500
March 2013	15,000	5,000

(B) (NEW SM, OLD SM) (ANS.: PROFIT: JAN – RS. 6,250; FEB – RS. 7,500; MARCH – RS. 5,000; OVERALL PROFIT – RS. 15,000)

(SOLVE PROBLEM NO 5 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question: What is the impact on the question, If selling price is 12?

Note:_____

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PROBLEM 5: BTL LLP. manufactures glass bottles for HDL Ltd., a pharmaceutical company, which is in Ayurvedic medicines business.

BTL can produce 2,00,000 bottles in a month. Set-up cost of each production run is Rs.5,200 and the cost of holding one bottle for a year is Rs.1.50.

As per an estimate HDL Ltd. can order as much as 19,00,000 bottles in a year spreading evenly throughout the year.

At present the BTL manufactures 1,60,000 bottles in a batch.

Required:

i) COMPUTE the Economic Batch Quantity for bottle production.

ii) COMPUTE the annual cost saving to BTL by adopting the EBQ of a production.   *(A) (RTP N19 (N&O))*

(ANS: I) 1,14,775 BOTTLES II) 7,918.75) (SOLVE PROBLEM NO 6, 7 OF ASSIGNMENT PROBLEMS AS REWORK)

Concept question: What is the impact on the question, If set up cost is 10,0000?

Note:_____

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PRINTED SOLUTIONS TO SOME SELECTIVE PROBLEMS

PROBLEM NUMBERS TO WHICH SOLUTIONS ARE PROVIDED:2,4

PROBLEM NO. 2

i)

Production Batch Size (Lt.)	Set-up costs per annum (Rs.)	Holding Costs per annum (Rs.)	Total Costs per annum (Rs.)
4,000	1,250	400	1,650
5,000	1,000	500	1,500

6,000	833	600	1,433
7,000	714	700	1,414
8,000	625	800	1,425
9,000	556	900	1,456
10,000	500	1000	1,500

As the total cost is minimum at 7,000 ltr. i.e. Rs.1,414, thus economic production lot would be 7,000 Liters.

ii) Economic Batch Quantity (EBQ):

$$EBQ = \sqrt{\frac{2DS}{C}}$$

Where, D = Annual demand for the product = 50,000 Litres

S = Setting up cost per batch = Rs100 per set-up

C = Carrying cost per unit of production

= Rs. 50 / 250 liters = 0.20 per liter per annum

$$= \sqrt{\frac{2 \times 50,000 \times 100}{0.2 \times 1}} = 7,071 \text{Liters}$$

Working Note:

For Production batch size of 7,000 litres

Number of set ups per year = 50,000 ÷ 7,000 = 7.14 or 8 set-ups

Hence, Annual Set up cost per year = 8 × Rs.100 = Rs.800

Average Quantity = 7,000 ÷ 2 = 3,500 litres

Holding Costs = (3,500 ltr. ÷250) × 50 = Rs.700

It can be seen that EBQ determined with mathematical formula (7,071 litres)

Slightly varies from the one determined by trial and error method (7,000 Litres)

PROBLEM NO. 4

Statement of Cost and Profit per unit of each batch

Particulars	Jan. 20X3	Feb. 20X3	March. 20X3	Total
a) Batch Output (Nos.)	1,250	1,500	1,000	3,750
b) Sales Value (@ 15 per unit)	18,750	22,500	15,000	56,250
Cost				
Material	6,250	9,000	5,000	20,250
Wages	2,500	3,000	2,000	7,500
Overheads	3,750	3,000	3,000	9,750
c) Total	12,500	15,000	10,000	37,500
d) Profit per batch (b) – (c)	6,250	7,500	5,000	18,750
e) Cost per unit (c) ÷ (a)	10	10	10	
f) Profit per unit (d) ÷ (a)	5	5	5	

Overall Position of the Order for 3,000 Units

Sales value (3,000 units × 15)	45,000
Less: Total cost (3,000 units ×10)	30,000
Profit	15,000

ASSIGNMENT PROBLEMS

MODEL 1: UNIT COSTING

PROBLEM 1: The following data relate to the manufacture of a standard product during the 4- week ended 28th February 20X8:

Raw Materials Consumed	Rs.4,00,000
Direct Wages	Rs.2,40,000
Machine Hours Worked	3,200 hours
Machine Hour Rate	Rs.40
Office Overheads	10% of works cost
Selling Overheads	Rs.20 per unit
Units produced and sold	10,000 at Rs.120 each

You are required to find out the cost per unit and profit for the 4 - week ended 28th February 20X8.

(B) (NEW SM) (ANS.: COST PER UNIT: 104.48 AND PROFIT: RS.1,55,200)

MODEL 2: BATCH COSTING

PROBLEM 2:

Monthly demand for a product	500 units
Setting-up cost per batch	Rs.60
Cost of manufacturing per unit	Rs.20
Rate of interest	10% p.a.
Determine economic batch quantity.	

(A) (NEW SM, OLD SM) (ANS.: 600 UNITS)

PROBLEM 3: A customer has been ordering 90,000 special design metal columns at the rate of 18,000 columns per order during the past years. The production cost comprises Rs.2,120 for material, Rs.60 for labour and Rs.20 for fixed overheads. It costs Rs.1,500 to set up for one run of 18,000 column and inventory carrying cost is 5%

i) FIND the most economic production run.

ii) CALCULATE the extra cost that company incur due to processing of 18,000 columns in a batch.

(B) (NEW SM) (ANS: I) 1,567 COLUMNS. II) 8,24,315)

PROBLEM 4: Arnav Confectioners (AC) owns a bakery which is used to make bakery items like pastries, cakes and muffins. AC use to bake at least 50 units of any item at a time. A customer has given an order for 600 cakes. To process a batch, the following cost would be incurred:

Direct materials - Rs. 5,000

Direct wages - Rs. 500 (irrespective of units)

Oven set- up cost - Rs.750 (irrespective of units)

AC absorbs production overheads at a rate of 20% of direct wages cost. 10% is added to the total production cost of each batch to allow for selling, distribution and administration overheads.

AC requires a profit margin of 25% of sales value.

You are required to compute:

i) Determine the price to be charged for 600 cakes.

ii) Calculate cost and selling price per cake.

iii) Determine what would be selling price per unit if the order is for 605 cakes.

(A) (RTP M18 (N&O) (ANS.: (I) 1,11,760; (II)139.70,186.27; (III)189.21)

PROBLEM 5: A jobbing factory has undertaken to supply 200 pieces of a component per month for the ensuing six months. Every month a batch order is opened against which materials and labour hours are booked at actual. Overheads are levied at a rate per labour hour. The selling price contracted for is Rs.8 per piece. From the following data present the cost and profit per piece of each batch order and overall position of the order for 1,200 pieces.

Month	Batch output	Material cost (Rs.)	Direct wages (Rs.)	Direct labour hours
January	210	650	120	240
February	200	640	140	280
March	220	680	150	280
April	180	630	140	270
May	200	700	150	300
June	220	720	160	320

The other details are:

Month	Chargeable expenses	Direct labour hours
January	12,000	4,800
February	10,560	4,400
March	12,000	5,000
April	10,580	4,600
May	13,000	5,000
June	12,000	4,800

(B) (NEW SM, OLD SM) (ANS.: RS. 6.52, RS. 1.48, RS. 7.26, RS. 0.74, RS. 6.83, RS. 1.17, RS. 7.73, RS. 0.27, RS. 8.15, RS. -0.15, RS. 7.64, RS. 0.36, RS. 7.34, RS. 0.66, OVERALL POSITION OF THE ORDER FOR 1,200 UNITS – RS. 792)

PROBLEM 6: Arnav Motors Ltd. manufactures pistons used in car engines. As per the study conducted by the Auto Parts Manufacturers Association, there will be a demand of 80 million pistons in the coming year. Arnav Motors Ltd. is expected to have a market share of 1.15% of the total market demand of the pistons in the coming year. It is estimated that it costs Rs.1.50 as inventory holding cost per piston per month and that the set-up cost per run of piston manufacture is Rs. 3,500.

i) Determine the optimum run size for piston manufacturing?

ii) Assuming that the company has a policy of manufacturing 40,000 pistons per run, calculate the extra costs company would be incurring as compared to the optimum run suggested in (i) above?

iii) Identify variability of cost with respect to unit and batch level from the following cost:

a) Inventory carrying cost; b) Designing cost for a job; c) Machine set-up cost to run production and d) Depreciation of factory building.

(B) (MTP2 N18 (N) - 10M, SIMILAR: MTP1 M19 (N) - 5M) (ANS.: (I) 18,915 UNITS (II) RS. 98,765)

PROBLEM 7: M/s. KBC Bearings Ltd. is committed to supply 48,000 bearings per annum to M/s. KMR Fans on a steady daily basis. It is estimated that it costs Rs. 1 as inventory holding cost per bearing per month and that the set up cost per run of bearing manufacture is Rs. 3,200 (i) What would be the optimum run size of bearing manufacture? (ii) What would be the interval between two consecutive optimum runs? (iii) Find out the minimum inventory cost?

(B) (NEW SM) (ANS.: (I) 5,060 UNITS; (II) 36.5 DAYS; (III) 30,360)

ADDITIONAL QUESTION BANK

MODEL 1: UNIT COSTING

PROBLEM 1: Wonder Ltd. has a capacity of 120,000 Units per annum as its optimum capacity. The production costs are as under

Direct Material - Rs. 90 per unit

Direct Labour - Rs.60 per unit

Overheads:

Fixed: Rs. 30,00,000 per annum

Variable: Rs.100 per unit

Semi Variable: Rs. 20,00,000 per annum up to 50% capacity and an extra amount of Rs. 4,00,000 for every 25% increase in capacity or part there of.

The production is made to order and not for stocks. If the production programme of the factory is as indicated below and the management desires a profit of Rs.20,00,000 for the year work out the average selling price at Which each unit should be quoted.

First 3 months: 50% capacity

Remaining 9 months: 80% capacity

Ignore Administration, Selling and Distribution overheads.

(B) (NEW SM) (ANS.: AVERAGE SELLING PRICE: RS. 337.356)

THE END