REVISIONARY TEST PAPER

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INTERMEDIATE

GROUP - II

THE INSTITUTE OF COST ACCOUNTANTS OF INDIA

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INTERMEDIATE EXAMINATION

(REVISED SYLLABUS - 2008)

GROUP - II

Paper-8 : COST AND MANAGEMENT ACCOUNTING

Q. 1. (a) Select the correct answer in each of the following :

(i) The forex component of imported material cost is converted :

    (A) At rate on the date of settlement.

    (B) At rate on the date of transaction.

    (C) At rate on date of delivery.

    (D) Non of the above.

(ii) Material cost variance is ₹ 550(A) and material price variance is ₹ 150(F), the material usage variance should be :

    (A) ₹ 400(A)

    (B) ₹ 400(F)

    (C) ₹ 700(A)

    (D) ₹ 700(F)

(iii) Maximum possible productive capacity of a plant when no operating time is lost , is its

    (A) Practical capacity

    (B) Theoretical capacity

    (C) Normal capacity

    (D) Capacity based on sales expectancy

(iv) When production is below standard specification or quality and cannot be rectified by incurring additional cost, it is called

    (A) Defective

    (B) Spoilage

    (C) Waste

    (D) Scrap

(v) CAS 8 requires each type of utility to be treated as :

    (A) separate cost object

    (B) not part of cost as not include in material

    (C) not part of cost as they do not form part of product

    (D) treated as administrative overheads.

   (vi) Selling and distribution overhead doesnot include:

     (A) Cost of warehousing

     (B) Repacking cost

     (C) Trasportation cost

     (D) Demurrage charges.

   (vii) Joint costs are allocated :

     (A) Based on a measure of the number of units, weight, or volume of joint products.

     (B) Based on the values attributed to the joint products.

     (C) Both of the above.

     (D) None of the above.

   (viii) When overtime is required for meeting urgent orders, overtime premium should be

     (A) Charged to Costing Profit and Loss A/c.

     (B) Charged to overhead costs.

     (C) Charged to respective jobs.

     (D) None of the above.

   (ix) Credit is given to the process account at a predetermined value of the byproduct under the—

     (A) Standard cost method

     (B) Reserve cost method

     (C) Opportunity cost method

     (D) Sales value

   (x) Exchange losses or gains after purchase transaction is complete is treated as :

     (A) Product cost.

     (B) Overhead cost.

     (C) Purchase cost.

     (D) Finance cost

Q. 1. (b) Fill in the blanks with appropriate word(s) :

    (i) In Cost Accounting, abnormal losses are transferred to _____ .

   (ii) Reorder level = _____ .

   (iii) The technical term for charging of overheads to cost units is known as _____ .

   (iv) In brick kiln, cost unit is _____ .

    (v) Under _____ system, there is no need of reconciliation of cost and financial accounts.

   (vi) _____ determines the priorities in functional budgets.

   (vii) Gang composition variance is a sub variance of _____ variance.

   (viii) When P/V ratio is 30% and M/S ratio is 40%, the profit is _____ % of sales.

   (ix) In contract costing , work in progress certified is valued at _____ while uncertified work is valued at _____ .

    (x) Cost sheet is a document which provides for assembly of the detailed cost of a _____ .

Q. 1. (c) Match each item in Column A with appropriate item in Column B :

Column A		Column B	
(i)	Cost reduction	(A)	Cost book keeping
(ii)	Break even point	(B)	Multiple costing
(iii)	Differential costing	(C)	Not assigned to products
(iv)	Control accounts	(D)	Value analysis
(v)	Car manufacture	(E)	Administration overhead
(vi)	Equivalent production	(F)	WIP
(vii)	Period cost	(G)	Decision making
(viii)	Director's remuneration	(G)	Current ratio
(ix)	Liquidity	(I)	Labour turnover
(x)	Flux method	(J)	No profit no loss

Answer 1. (a)

  (i) (B) **At rate on the date of transaction.**

 (ii) (C) ₹ **700(A)**

       Let M1=Actual cost of material used, M2= Standard cost of material used, M3=Standard cost of material in standard proportion, M4= Standard material cost of output.

       Material Price variance= M1-M2 = 550(A)———(i)

       Material Cost variance= M1- M4 = 150(F)————(ii)

       Subtracting (ii) from (i)

       Material usage variance = M2-M4 = 700(A)

 (iii) (C) **Normal capacity**

       Theoretical capacity is the denominator-level concept that is based on producing at full efficiency all the time., Practical capacity is a denominator-level concept that reduces the theoretical capacity by unavoidable operating interruptions such as scheduled maintenance time, shutdowns for holidays and so on. Normal capacity measures the denominator level in terms of demand for the output of the plant. Normal capacity utilization is a concept based on the level of capacity utilization that specifies the average customer demand over a time period, that includes seasonal, cyclical and trend factors.

 (iv) (B) **Spoilage**

       (1) Spoiled goods-goods that do not meet production standards and are either sold for their salvage value or discarded; (2) Defective units-goods that do not meet standards and are sold at a reduced price or reworked and sold at the regular or a reduced price; (3) Waste-material that is lost in the manufacturing process by shrinkage, evaporation, etc.; and (4) Scrap-by-product of the manufacturing process that has a minor market value.

  (v) (A) **separate cost object**

 (vi) (D) **Demurrage charges.**

 (vii) (C) **Both of the above.**

(viii) (C) **Charged to respective jobs.**

       When cost is incurred for specified job, the cost should be charged to that job only.

(ix) (A) **Standard cost method**

(x) (D) **Finance cost.**

Answer 1. (b)

(i)   Costing Profit and Loss A/c

(ii) maximum consumption × maximum reorder period

(iii) absorption

(iv) 1000 bricks

(v)   integral

(vi) Key factor

(vii) Labour efficiency

(viii) 12

(ix) contract price, cost

(x) cost centre or cost unit

Answer 1. (c)

(i) — (D)

(ii) — (J)

(iii) — (G)

(iv) — (A)

(v) — (B)

(vi) — (F)

(vii) — (C)

(viii) — (E)

(ix) — (H)

(x) — (I)

Q. 2. (a) The cost structure of an article the selling price of which is ₹ 45,000 is as follows :

Direct Materials	**50%**
Direct Labour	**20%**
Overheads	**30%**

An increase of 15% in the case of materials and of 25% in the cost of labour is anticipated. These increased costs in relation to the present selling price would cause a 25% decrease in the amount of profit per article.

Your are required :

(1) To prepare a statement of profit per article at present, and

(2) The revised selling price to produce the same percentage of profit to sales as before.

(b) Distinguish between :

(i) 'Cost centre' and 'cost unit'.

(ii) Bill of material and material requisition note.

Answer 2. (a)

Working Notes :

1. Let 'x' be the total cost and 'y' be the profit for an article whose selling price is ₹ 45,000

   Hence x + y = ₹ 45,000   (A)

2.   **Statement Showing Present and anticipated cost per article**

Item	Present Cost	Increase		Anticipated cost
	₹	₹	₹	₹
(1)	(2)	(3)	(4)	(5) = (2) + (4)
Direct Material Cost	0.5x	15	0.075x	0.575x
Direct Labour	0.2x	25	0.050x	0.250x
Overheads	0.3x	—	—	0.300x
	x		0.125x	1.125x

3. The increase in the cost of direct material and direct labour has reduced the profit by 25 per cent (as selling price remained unchanged). The increase is cost and reduction in profit can be represented by the following relation :

   1.125x + 0.75y = ₹ 45,000   (B)

4. On solving relations (A) and (B) as obtained under working notes 1 and 3 above we get.

   We get

   x = ₹ 30,000

   y = ₹ 15,000

     (1)   **Present Statement of Profit Per Article**

	₹	₹
Direct Material Cost	0.5x	15,000
Direct Labour Cost	0.2x	6,000
Overheads	0.3x	9,000
Total Cost		30,000
Profit		15,000
Selling Price		45,000

Note : Profit as a percentage of Cost Price = 50%

            (₹ 15,000/₹ 30,000) × 100

          Profit as a percentage of Selling Price = 33-1/3%

            (₹ 15,000/₹ 45,000) × 100

(2)   **Statement of Revised Selling Price**

	₹	₹
Direct Material Cost	0.575x	17,250
Direct Labour Cost	0.250x	7,500
Overheads	0.300x	9,000
Total Anticipated Cost		33,750
Profit (33-1/3% of selling price)		16,875
Selling Price		50,625
(₹ 33,750 × 100) 66.66		

Answer 2. (b) (i)

Cost Centre	Cost Unit
The term Cost Centre is defined as a location, person or an item of equipment or a group of these for which costs may be ascertained and used for the purposes of Cost Control. Cost Centres can be personal Cost Centres, impersonal Cost Centres, operation cost and process Cost Centres. Thus each sub-unit of an organisation is known as a Cost Centre, if cost can be ascertained for it. In order to recover the cost incurred by a Cost Centre, it is necessary to express it as the cost of output.	The term Cost Unit is defined as a unit of quantity of product, service or time (or a combination of these) in relation to which costs may be ascertained or expressed. It can be for a job, batch, or product group. The unit of output in relation to which cost incurred by a Cost Centre is expressed is called a Cost Unit.
Each sub-unit of an organisation is known as a Cost Centre, if cost can be ascertained for it. In order to recover the cost incurred by a Cost Centre, it is necessary to express it as the cost of output.	The unit of output in relation to which cost incurred by a Cost Centre is expressed is called a Cost Unit.

(ii)

Bill of material	Material requisition note
It is a comprehensive list of materials with exact description and specifications, required for a job or other production units. This also provides information about required quantities so that if there is any deviation from the standards, it can easily be detected. It is prepared by the Engineering or Planning Department in a standard form.	It is a formal written demand or request, usually from the production department to store for the supply of specified materials, stores etc. It authorises the storekeeper to issue the requisitioned materials and record the same on bin card.
The purpose of bill of material is to act as a single authorisation for the issue of all materials and stores items mentioned in it. It provides an advance intimation to store department about the requirements of materials. It reduces paper work. It serves as a work order to the production department and a document for computing the cost of material for a particular job or work order to the cost department.	The purpose of material requisition note is to draw material from the store by concerned departments.

Q. 3. (a) (i) ABC Ltd has received an offer of quantity discounts on his order of materials as under :

Price per tonne ₹	Tonnes Nos.
1,200	Less than 500
1,180	500 and less than 1,000
1,160	1,000 and less than 2,000
1,140	2,000 and less than 3,000
1,120	3,000 and above.

The annual requirement for the material is 5,000 tonnes. The ordering cost per order is ₹ 1,200 and the stock holding cost is estimated at 20% of material cost per annum. You are required to complete the most economical purchase level.

(ii) What will be your answer to the above question if there are no discount offered and the price per tonne is ₹ 1,500?

(b) What is material handling cost? How will you deal it in Cost Accounts?

Answer 3. (a)

(i)

Total Annual Requirement	Order size (units)	No. of Orders	Cost of Inventory S × Per unit cost	Ordering Cost	Carrying Cost p.u. p. a.	Total Cost
(A)	q	(A)		(A) × ₹ 1200 ₹	$\frac{1}{2}$ ×q×20% of cost per unit ₹	(4+5+6) ₹
1	2	3	4	5	6	7
5000 units	400	12.5	60,00,000 (5,000 × ₹ 1200)	15,000	48,000 (200 × ₹ 240)	60,63,000
	500	10	59,00,000 (5,000 × ₹ 1180)	12,000	59,000 (250 × ₹ 236)	59,71,000
	1,000	5	58,00,000 (5,000 × ₹ 1160)	6,000	1,16,000 (500 × ₹ 232)	59,22,000
	2,000	2.5	57,00,000 (5,000 × ₹ 1140)	3,000	2,28,000 (1,000 × ₹ 228)	59,31,000
	3,000	1.666	56,00,000 (5,000 × ₹ 1120)	2,000	3,36,000 (1500 × ₹ 224)	59,38,000

The above table shows that the total cost of 5000 units including ordering and carrying cost is minimum (₹ 59,22,000) when the order size is 1000 units. Hence the most economical purchase level is 1000 units.

(ii) $EOQ = \sqrt{\dfrac{2 \times A \times O}{C}}$ Where A is the annual inventory requirement, O, is the ordering cost per order and C is the carrying cost per unit per annum.

$$= \sqrt{\dfrac{2 \times 5000 \times ₹1200}{20\% \times ₹1500}} = 200 \text{ tonnes}$$

Answer 3. (b)

Material handling cost refers to the expenses involved in receiving, storing, issuing and handling materials. To deal with this cost in cost accounts there are two prevalent approaches as under :

First approach suggests the inclusion of these costs as part of the cost of materials by establishing a separate material handling rate e.g., at the rate of percentage of the cost of material issued or by using a separate material handling rate which may be established on the basis of weight of materials issued.

Under another approach these costs may be included along with those of manufacturing overhead and be charged over the products on the basis of direct labour or machine hours.

Q. 4. (a) The following data are available in respect of material X for the year ended 31st March 2012.

	₹
Opening stock	90,000
Purchase during the year	2,70,000
Closing stock	1,10,000

Calculate —

(i) Inventory turnover ratio; and

(ii) the number of days for which the average inventory is held.

(b) At what price per unit would Part No. G 112 be entered in the Stores Ledger, if the following invoice was received from a supplier :

Invoice	₹
200 units Part No. G112 @ ₹ 5	1,000.00
Less: 20% discount	200.00
	800.00
Add: Excise Duty @ 10%	80.00
	880.00
Add Packing charges (5 non-returnable boxes)	50.00
	930.00

Notes:

(i) A 2% discount will be given for payment in 30 days.

(ii) Documents substantiating payment of excise duty is enclosed for claiming MODVAT credit.

(c) From the details given below, calculate

(i) Re-ordering level

(ii) Maximum level

(iii) Minimum level

(iv) Danger level

Re-ordering quantity is to be calculated on the basis of following information :

Cost of placing a purchase order is ₹ 20

Number of units to be purchased during the year is 5,000.

Purchase price per unit inclusive of transportation cost is ₹ 50.

Annual cost of storage per unit is ₹ 5.

Details of lead time :   Average 10 days, Maximum 15 days, Minimum 6 days. For emergency purchases 4 days.

Rate of consumption :   Average: 15 units per day, Maximum : 20 units per day.

Answer 4. (a)

(i) Inventory turnover ratio (Refer to working note) $= \dfrac{\text{Cost of stock of raw material consumed}}{\text{Average stock of raw material}}$

$= \dfrac{₹\,2,50,000}{₹\,1,00,000} = 2.5$

(ii) Average number of days for which the average inventory is held $= \dfrac{365 \text{ days}}{\text{Inventory turnover ratio}} = \dfrac{365 \text{ days}}{2.5}$

$= 146 \text{ days}$

Working note :

		₹
Opening stock of raw material on 1.4.2011	=	90,000
Add: Material purchases during the year	=	2,70,000
Less: Closing stock of raw material	=	1,00,000
Cost of stock of raw material consumed		2,50,000

Average stock of raw material $= \dfrac{1}{2}\left\{ \begin{array}{l} \text{Opening stock of} + \text{Closing stock of} \\ \text{raw material} \qquad \text{raw material} \end{array} \right\}$

$= \dfrac{1}{2}\{₹\,90,000 + ₹\,1,10,000\} = ₹\,1,00,000$

Answer 4. (b)

200 units net cost after trade discount	800
Add: Packing charges	50
Total cost for 200 units	850

Cost per unit $= \dfrac{₹\,850}{200} = ₹\,4.25$

Answer 4. (c)

Basic data :

O (Ordering Cost per order)		=	₹ 20
A (Number of units to be purchased annually)		=	5,000 units
P (Purchase price per unit inclusive of transportation cost)		=	₹ 50
C (Annual cost of storage per unit)		=	₹ 5

Workings :

(i) Re-ordering level (ROL) = Maximum usage × Maximum re-order per period   period

= 20 units per day × 15 days

= 300 units

(ii) Maximum level = $ROL + ROQ - \left[\begin{array}{c}\text{Minimum rate} \\ \text{of consumption}\end{array} \times \begin{array}{c}\text{Minimum reorder} \\ \text{period}\end{array}\right]$

(Refer to working note 1 and 2)

= $300 \text{ units} + 200 \text{ units} - \left[\begin{array}{c}10 \text{ units} \\ \text{per day}\end{array} \times \begin{array}{c}\text{Average reorder} \\ \text{period}\end{array}\right]$

= 440 units

(iii) Minimum level = $ROL - \left[\begin{array}{c}\text{Average rate} \\ \text{of consumption}\end{array} \times \begin{array}{c}\text{Average reorder} \\ \text{period}\end{array}\right]$

= 300 units – (15 units per day × 10 days)

= 150 units

(iv) Danger level = Average consumption × Lead time for emergency purchases

= 15 units per day × 4 days

= 60 units

Working Notes :

1. ROQ = $\sqrt{\dfrac{2AO}{C}} = \sqrt{\dfrac{2 \times 5,000 \text{ units} \times ₹\,20}{₹\,5}}$

= 200 units

2. Average rate of consumption = $\dfrac{\text{Minimum rate of consumption (x) + Maximum rate of consumption}}{2}$

15 units per day = $\dfrac{x + 20 \text{ units per day}}{2}$

or x = 10 units per day

Q. 5. (a) Discuss the accounting treatment of Idle time and overtime wages.

(b) The cost accountant of Zed Ltd. has computed labour turnover rates for the quarter ended 31st March, 2012 as 10%, 5% and 3% respectively under Flux method, 'Replacement method' and 'Separation method'. If the number of workers replaced during that quarter is 30, find out the number of (i) workers recruited and joined and (ii) workers left and discharged.

Answer 5. (a)

Accounting treatment of idle time wages in cost accounts :

Normal idle time is treated as a part of the cost of production. Thus, in the case of direct workers, an allowance for normal idle time is built into the labour cost rates. In the case of indirect workers, normal idle time is spread over all the products or jobs through the process of absorption of factory overheads.

Abnormal idle time: It is defined as the idle time which arises on account of abnormal causes; e.g. strikes; lockouts; floods; major breakdown of machinery; fire etc. Such an idle time is uncontrollable.

The cost of abnormal idle time due to any reason should be charged to Costing Profit & Loss Account.

Accounting treatment of overtime premium in cost accounts :

If overtime is resorted to at the desire of the customer, then the overtime premium may be charged to the job directly.

- If overtime is required to cope with general production programme or for meeting urgent orders, the overtime premium should be treated as overhead cost of particular department or cost center which works overtime.
- Overtime worked on account of abnormal conditions should be charged to costing Profit & Loss Account.
- If overtime is worked in a department due to the fault of another department the overtime premium should be charged to the latter department.

Answer 5. (b)

Working Note :

Average number of workers on roll:

Labour turnover rate (under Replacement method) $= \dfrac{\text{No. of replacements}}{\text{Average number of workers on roll}} \times 100$

$\text{Or} \qquad = \dfrac{5}{10} = \dfrac{30}{\text{Average number of workers on roll}}$

Average number of workers on roll $= \dfrac{30 \times 100}{5} = 600$

(i) Number of workers recruited and joined :

Labour turnover rate (Flux method) $= \dfrac{\text{No. of separations (S)} + \text{No. of accessions (A)}}{\text{Av. number of workers on roll}} \times 100$

(Refer to Working Note)

$\text{Or} \quad \dfrac{10}{100} \quad = \dfrac{18 + A}{600}$

$\text{Or} \quad A \qquad = \left[\dfrac{6000}{100} - 18\right] = 42$

No. of workers recruited and joined 42.

(ii) Number of workers left and discharged :

Labour turnover rate (Separation method) $= \dfrac{\text{No. of separations (S)}}{\text{Av. number of workers on roll}} \times 100$

(Refer to working note)

$$\dfrac{3}{100} = \dfrac{S}{600}$$

Or S = 18

Hence, number of workers left and discharged comes to 18.

Q. 6. (a) A job can be executed either through workman A or B. A takes 32 hours to complete the job while B finishes it in 30 hours. The standard time to finish the job is 40 hours.

The hourly wage rate is same for both the workers. In addition workman A is entitled to receive bonus according to Halsey plan (50%) sharing while B is paid bonus as per Rowan plan. The works overheads are absorbed on the job at ₹ 7.50 per labour hour worked. The factory cost of the job comes to ₹ 2,600 irrespective of the workman engaged.

Find out the hourly wage rate and cost of raw materials input. Also show cost against each element of cost included in factory cost.

(b) The management of SS Ltd. wants to have an idea of the profit lost/foregone as a result of labour turnover last year.

Last year sales accounted to ₹ 66,000,000 and the P/V Ratio was 20%. The total number of actual hours worked by the direct labour force was 3.45 lakhs. As a result of the delays by the Personnel Department in filling vacancies due to labour turnover, 75,000 potential productive hours were lost. The actual direct labour hours included 30,000 hours attributable to training new recruits, out of which half of the hours were unproductive. The costs incurred consequent on labour turnover revealed on analysis the following :

	₹
Settlement cost due to leaving	27,420
Recruitment costs	18,725
Selection costs	12,750
Training costs	16,105

Assuming that the potential production lost due to labour turnover could have been sold at prevailing prices, ascertain the profit foregone/lost last year on account of labour turnover.

Answer 6. (a)

Working notes :

1. Time saved and wages :

Workmen	A	B
Standard time (hrs.)	40	40
Actual time taken (hrs.)	32	30
Time saved (hrs.)	08	10
Wages paid @ ₹ x per hr. (₹)	32x	30x

2. Bonus Plan :

	Halsey	Rowan
Time saved (hrs.)	8	10
Bonus (₹)	4x	7.5x
	$\left[\dfrac{8 \text{ hrs} \times ₹\ x}{2}\right]$	$\left[\dfrac{10 \text{ hrs}}{40 \text{ hrs}} \times 30\text{hrs} \times ₹\ x\right]$

3. Total wages :
   Workman A: 32x + 4x = ₹ 36x
   Workman B: 30x + 7,5x = ₹ 37.5x

Statement of factory cost of the job

Workmen	A	B
	₹	₹
Material cost	y	y
Wages	36x	37.5x
(Refer to working note 3)		
Works overhead	240	225
Factory cost	2,600	2,600

The above relations can be written as follows :

$36x + y + 240 = 2{,}600$ …. (i)

$37.5x + y + 225 = 2{,}600$ ….. (ii)

Answer 6. (b)

Working notes :

1. Actual productive hours   3,30,000
   (Actual hours worked – Unproductive training hours)
   (3,45,000 hrs. – 15,000 hrs.)

2. Sales per productive hour (₹)   20
   (Total Sales/Actual productive hours)
   (₹ 66,00,000/3,30,000 hrs.)

3. Potential productive hours lost   75,000

4. Sales foregone (₹)   15,00,000
   (75,000 hours × ₹ 20)

5. Contribution foregone (₹)   3,00,000
   P/V ratio × Sales foregone)
   (20% × ₹ 15,00,000)

Statement of Profit foregone
as a result of labour turnover of M/s. SS Ltd.

	₹
Contribution foregone	3,00,000
(Refer to working note 5)	
Settlement cost due to leaving	27,420
Recruitment costs	18,725
Selection costs	12,750
Training costs	16,105
Total profit foregone	3,75,000

Subtracting (i) from (ii) we get

$$1.5x - 15 = 0$$
or $1.5 x = 15$
or $x = ₹ 10$ per hour

On substituting the value of x in (i) we get y = ₹ 2,000

Hence the wage rate per hour is ₹ 10 and the cost of raw material input is ₹ 2,000 on the job.

Q. 7. (a) A departmental store has several departments. What bases would you recommend for apportioning the following items of expense to its departments :

 (i) Fire insurance of Building.

 (ii) Rent

(iii) Delivery Expenses.

(iv) Purchase Department Expenses.

 (v) Credit Department Expenses.

(vi) General Administration Expenses.

(vii) Advertisement.

(viii) Sales Assistants Salaries.

 (ix) Personal Department expenses.

 (x) Sales Commission

(b) PQ Ltd. is a manufacturing company having three production departments, 'A' 'B' and 'C' and two service departments 'S1' and 'S2'. The following is the budget for December 2011 :

	Total ₹	A ₹	B ₹	C ₹	S1 ₹	S2 ₹
Direct Material		1,000	2,000	4,000	2,000	1,000
Direct Wages		5,000	2,000	8,000	1,000	2,000
Factory rent	4,000					
Power	2,500					
Depreciation	1,000					
Other overheads	9,000					
Additional information						
Area (Sq. ft.)		500	250	500	250	500
Capital Value (₹ Lacs) of assets		20	40	20	10	10
Machine hours		1,000	2,000	4,000	1,000	1,000
Horse power of machines		50	40	20	15	25

A technical assessment or the apportionment of expenses of service departments is as under :

	A	B	C	S1	S2
	%	%	%	%.	%
Service Dept. 'S1'	45	15	30	-	10
Service Dept. 'S2'	60	35	-	5	-

Required :

(i) A statement showing distribution of overheads to various departments.

(ii) A statement showing re-distribution of service departments expenses to production departments.

(iii) Machine hours rates of the production departments 'A', 'B' and 'C'.

Answer 7. (a)

Items of expenses	Basis For apportioning
Fire Insurance of Building.	Floor Area
Rent	Floor Area
Delivery Expenses.	Volume or Distance or Weight
Purchase department Expenses	No. of Purchase order/Value of Purchases
Credit Department Expenses.	Credit Sales Value
General Administration Expenses.	Works cost
Advertisement.	Actual sales
Sales Assistants Salaries.	Actual/Time devoted
Personal Department expenses.	No. of Employees
Sales Commission	Actual

Answer 7. (b)

(i)   **Overhead Distribution Summary**

	Basis	Total ₹	A ₹	B ₹	C ₹	S1 ₹	S2 ₹
Direct materials	Direct	-	-	-	-	2,000	1,000
Direct wages	„					1,000	2,000
Factory rent	Area	4,000	1,000	500	1,000	500	1,000
Power	H.P X M/c Hrs.	2,500	500	800	800	150	250
Depreciation	Cap. Value	1,000	200	400	200	100	100
Other Overheads	M/c hrs.	9,000	1,000	2,000	4,000	1,000	1,000
		–	2,700	3,700	6,000	4,750	5,350

(ii)   **Redistribution of Service Department's expenses:**

	A ₹	B ₹	C ₹	S1 ₹	S2 ₹
Total Overheads	2,700	3,700	6,000	4,750	5,350
Dept . X overhead apportioned in the ratio (45 : 15 : 30 : 10)	2,138	712	1,425	- 4,750	475
Dept . Y overhead apportioned in the ratio (60: 35 : — : 5)	3,495	2,039	—	291	- 5,825
Dept . X overhead apportioned in the ratio (45 : 15 : 30 : 10)	131	44	87	- 291	29
Dept . Y overhead apportioned in the ratio (60: 35 : — : 5)	17	10	—	2	- 29
Dept . X overhead apportioned in the ratio (45 : 15 : 30 : 10)	1	—	1	- 2	—
	8,482	6,505	7,513	–	–

(iii) **Machine Hour rate**

Machine hours	1,000	2,000	4,000
Machine hour rate (₹)	8.48	3.25	1.88

Q. 8. (a) In FBG Ltd, factory overhead was recovered at a pre- determined rate of ₹ 25 per man – day. The total factory overhead expenses incurred and the man-days actually worked were ₹ 41.50 lacs and 1.5 lacs man-days respectively. Out of the 40,000 units produced during a period, 30,000 were sold.

On analysing the reasons, it was found that 60% of the unabsorbed overheads were due to defective planning and the rest were attributable to increase in overhead costs.

How would unabsorbed overheads be treated in Cost Accounts?

(b) KBC Ltd manufacturing two products furnishes the following data for a year.

Product	Annual output (Units)	Total Machine hours	Total number of purchase orders	Total number of set-ups
A	5,000	20,000	160	20
B	60,000	1,20,000	384	44

The annual overheads are as under :

	₹
Volume related activity costs	5,50,000
Set up related costs	8,20,000
Purchase related costs	6,18,000

You are required to calculate the cost per unit of each Product A and B based on :

 (i) Traditional method of charging overheads.

(ii) Activity based costing method.

Answer 8. (a)

Computation of Unabsorbed Overheads

Man – days worked	1,50,000
	₹
Overhead actually incurred	
Less : Overhead absorbed @ ₹ 25%/- per man - day	41,50,000
(₹ 25 × 1,50,000)	37,50,000
Unabsorbed Overheads	4,00,000
Unabsorbed Overheads due to defective planning	2,40,000
(i.e 60% of ₹ 4,00,000)	
Balance of Unabsorbed Overheads	1,60,000

Treatment of Unabsorbed Overheads in Cost Accounts

  (i) The unabsorbed overheads of ₹ 2,40,000 due to defective planning to be treated as abnormal and therefore be charged to Costing Profit and Loss Accounts.

  (ii) The balance unabsorbed overheads of ₹ 1,60,000 be charged to production i.e. 40,000 units at the supplementary overhead absorption rate i.e. ₹ 4/- per unit.

   (Refer to Working Note)

	₹
Charge to Costing Profit and Loss Account as part of the cost of units sold (30,000 units @ ₹ 4/-p.u.)	1,20,000
Add : To Closing stock of finished goods	40,000
(10,000 units @ ₹ 4/- p.u.)	
Total	1,60,000

Working Note :

$$\text{Supplementary Overhead Absorption Rate} = \frac{₹\,1,60,000}{₹\,40,000}$$

$$= ₹\,4/\text{- p.u.}$$

Answer 8. (b)

Working notes :

1. $\text{Machine hour rate} = \dfrac{\text{Total annual overheads}}{\text{Total machine hours}}$

$$= \frac{₹\,19,88,000}{1,40,000\ \text{hours}} = ₹\,14.20\ \text{per hour}$$

2. $\text{Machine hour rate} = \dfrac{\text{Total annual overhead cost for volume related activities}}{\text{Total machine hours}}$

$$= \frac{₹\,5,50,000}{1,40,000\ \text{hours}} = ₹\,3.93\ \text{(approx.)}$$

3. Cost of one set-up $= \dfrac{\text{Total costs related to set–ups}}{\text{Total number of set–ups}}$

$= \dfrac{₹8,20,000}{64 \text{ set–ups}} = ₹\ 12,812.50$

4. Cost of a purchase order $= \dfrac{\text{Total costs related to purchases}}{\text{Total number of purchase order}}$

$= \dfrac{₹\ 6,18,000}{544 \text{ orders}} = ₹\ 1,136.03$

(i)   **Statement showing overhead cost per unit**
(based on traditional method of charging overheads)

Products	Annual output (units)	Total machine hours	Overhead cost component (*Refer to W, Note 1*) ₹	Overhead cost per unit ₹
A	5,000	20,000	2,84,000 (20,000 hrs. × ₹ 14.20)	56.80 (₹ 2,84,000 / 5,000 units)
B	60,000	1,20,000	17,04,000 (1,20,000 hrs.× ₹ 14.20)	28.40 (₹ 17,04,000/60,000 units)

(ii)   **Statement showing overhead cost per unit**
(based on activity based costing method)

Products	Annual output units	Total Machine Hours	Cost related to volume activities	Cost related to purchases	Cost related to set-ups	Total cost	Cost per unit
			₹	₹	₹	₹	₹
	(a)	(b)	(c)	(d)	(e)	(f)=[(c)+(d)+(e)]	(g)=(f)/(a)
A	5,000	20,000	78,600 (20,000 hrs × ₹ 3.93)	1,81,764.80 (160 orders × ₹ 1136.03)	2,56,250 (20 set ups × ₹ 12,812.50)	5,16,614.80	103.32
B	60,000	1,20,000	4,71,600 (1,20,000 hrs × ₹ 3.93)	4,36,235.52 (384 orders × ₹ 1136.03)	5,63,750 (44 set ups × ₹ 12,812.50)	14,71,585.52	24.53

Note : Refer to working notes 2,3 and 4 for computing costs related to volume activities, set-ups and purchases respectively.

Q. 9. (a) What do you understand by Batch Costing? In which industries it is applied?

(b) Discuss the process of estimating profit/loss on incomplete contracts.

(c) P and E are engaged in construction and erection of a bridge under a long-term contract. The cost incurred upto 31.03.2012 was as under :

	₹ in lacs
Fabrication	
Direct Material	**280**
Direct Labour	**100**
Overheads	**60**
	440
Erection costs to date	**110**
	550

The contract price is ₹ 11 crores and the cash received on account till 31.03.2012 was ₹ 6 crores.

The technical estimate of the contract indicates the following degree of completion of work. Fabrication – Direct Material – 70%, Direct Labour and Overheads 60% Erection – 40%.

You are required to estimate the profit that could be taken to Profit and Loss Account against this partly completed contract as at 31.03.2012.

Answer 9. (a)

Batch Costing is a form of job costing. In this, the cost of a group of products is ascertained. The unit of cost is a batch or a group of identical products instead of a single job, order or contract. Separate cost sheets are maintained for each batch of products by assigning a batch number. The cost per unit is ascertained by dividing the total cost of a batch by the number of items produced in that batch.

Batch costing is employed by companies manufacturing in batches. It is used by readymade garment factories for ascertaining the cost of each batch of cloths made by them. Pharmaceutical or drug industries, electronic component manufacturing units, radio manufacturing units too use this method of costing for ascertaining the cost of their product.

Answer 9. (b)

Process of estimating profit / loss on incomplete contracts

(i) If completion of contract is less than 25% no profit should be taken to profit and loss account.

(ii) If completion of contract is upto 25% or more but less than 50% then

$$1/3 \times \text{Notional Profit} \times \frac{\text{Cash received}}{\text{Work certified}}$$

may be taken to profit and loss account.

(iii) If completion of contract is 50% or more but less than 90% then

$$2/3 \times \text{Notional Profit} \times \frac{\text{Cash received}}{\text{Work certified}}$$

may be taken to profit and loss account

(iv) If completion of contract is greater than or equal to 90% then one of the following formulas may be used for taking the profit to profit and loss account.

1. $\text{Estimated Profit} \times \dfrac{\text{Work certified}}{\text{Contract price}}$

2. $\text{Estimated Profit} \times \dfrac{\text{Work certified}}{\text{Contract price}} \times \dfrac{\text{Cash received}}{\text{Work certified}}$

3. $\text{Estimated Profit} \times \dfrac{\text{Cost of the work to date}}{\text{Estimated total cost}}$

4. $\text{Estimated Profit} \times \dfrac{\text{Cost of the work to date}}{\text{Estimated total cost}} \times \dfrac{\text{Cash received}}{\text{Work certified}}$

5. $\text{Notional Profit} \times \dfrac{\text{Work certified}}{\text{Contract price}}$

Answer 9. (c)

Estimation of Profit to be taken to Profit and Loss Account against partly completed contract as at 31.03.2012.

$\text{Profit to be taken to P/L Account} = \dfrac{2}{3} \times \text{Notional profit} \times \dfrac{\text{Cash received}}{\text{Work certified}}$

(Refer to working notes 1,2,3 & 4)

$= \dfrac{2}{3} \times ₹\,92.48 \text{ lacs} \times \dfrac{₹\,600 \text{ lakhs}}{₹\,642.48 \text{ lakhs}}$

$= ₹\,57.576 \text{ lacs}$

Working Notes :

1. **Statement showing estimated profit to date and future profit on the completion of contract**

Particulars	Cost to date		Further Costs		Total Cost
	% Completion to date	Amount ₹ (a)	% completion to be done	Amount ₹ (b)	₹ (a)+(b)
Fabrication costs :					
Direct material	70	280.00	30	120.00	400.00
Direct labour	60	100.00	40	66.67	166.67
Overheads	60	60.00	40	40.00	100.00
Total Fabrication cost (A)		440.00		226.67	666.67
Erection cost: (B)	40	110.00	60	165.00	275.00
Total estimated costs: (A+B)		550.00		391.67	491.67
Profit (Refer to working note 2)		92.48		65.85	158.33
		642.48		457.52	1,100.00

2. Profit to date (Notional Profit) and future profit are calculated as below :

Profit to date (Notional Profit) = $\dfrac{\text{Estimated profit on the whole contract} \times \text{Cost to date}}{\text{Total Cost}}$

$$= \dfrac{₹\,158.33 \times ₹\,550}{₹\,941.67}$$

= ₹ 92.48 (lacs)

Future Profit = ₹ 158.33 – ₹ 92.48

= ₹ 65.85

3. Work certified :

= Cost of the contract to date + Profit to date

= ₹ 550 + ₹ 92.49 = ₹ 642.48 lacs

4. Degree of Completion of Contract to date:

$$= \dfrac{\text{Cost of the Contract to date}}{\text{Contract Price}} \times 100$$

$$= \dfrac{₹\,642.48\,\text{lacs}}{₹\,1{,}100\,\text{lacs}} \times 100$$

= 58.40%

Q. 10. (a) "The value of scrap generated in a process should be credited to the process account." Do you agree with this statement? Give reasons.

(b) In a manufacturing company, a product passes through 5 operations. The output of the 5th operation becomes the finished product. The input, rejection, output and labour and overheads of each operation for a period are as under :

Operation	Input (units)	Rejection (units)	Output(units)	Labour and Overhead (₹)
1	21,600	5,400	16,200	1,94,400
2	20,250	1,350	18,900	1,41,750
3	18,900	1,350	17,550	2,45,700
4	23,400	1,800	21,600	1,40,400
5	17,280	2,880	14,400	86,400

You are required to :

 (i) Determine the input required in each operation for one unit of final output.

 (ii) Calculate the labour and overhead cost at each operation for one unit of final output and the total labour and overhead cost of all operations for one unit of final output.

Answer 10. (a)

This statement is not correct The value of scrap (as normal loss) received from its sale is credited to the process account. But the value of scrap received from its sale under abnormal conditions should be credited to Abnormal Loss Account.

Answer 10. (b)

(i)   **Statement of Input required in each operation for one unit of final output:**

(Refer to Working Note)

Operation	Output (Units)	Rejection ofoutput in %	Input required
5	1	20	1.20 ($1 \times \frac{120}{100}$)
4	1.20	8.33	1.30 ($1.20 \times \frac{108.33}{100}$)
3	1.30	7.69	1.40 ($1.30 \times \frac{107.69}{100}$)
2	1.40	7.14	1.50 ($1.40 \times \frac{107.14}{100}$)
1	1.50	33.33	2.00 ($1.50 \times \frac{133.33}{100}$)

Working Note :

Input required for final output

Operation	Input (units)	Rejection (units)	Output (units)	Rejection as % of output	Input required for final output
1	21,600	5,400	16,200	33.33	2.00
2	20,250	1,350	18,900	7.14	1.50
3	18,900	1,350	17,550	7,69	1.40
4	23,400	1,800	21,600	8.33	1.30
5	17,280	2,880	14,400	20.00	1.20

(ii)   **Statement of labour and overhead cost**
at each operation for one unit of final output

Operation	Input (Units) (₹)	Labour & Overheads (₹)	Labour & Overhead per unit of input (₹)	Input units required for one unit or final output	Labour and Overhead cost per unit of final output (₹)
(a)	(b)	(c)	(d) = (c)/(b)	(e)	(f) = (d)×(e)
1	21,600	1,94,400	9	2.00	18.00
2	20,250	1,41,750	7	1.50	10.50
3	18,900	2,45,700	13	1.40	18.20
4	23,400	140,400	6	1.30	7.80
5	17,280	86,400	5	1.20	6.00
					60.50

Total labour and overhead cost of all operations for one unit of final output is ₹ 60.50.

Q. 11. (a) Following information is available regarding process A for the month of February, 2012 : Production Record.

Units in process as on 1.2.2012	**4,000**

(All materials used, 25% complete for labour and overhead)

New units introduced	**16,000**
Units completed	**14,000**
Units in process as on 28.2.2012	**6,000**

(All materials used, 33-1/3% complete for labour and overhead)

Cost Records

	₹
Work-in-process as on 1.2.2012	
Materials	**6,000**
Labour	**1,000**
Overhead	**1,000**
	8,000
Cost during the month	
Materials	**25,600**
Labour	**15,000**
Overhead	**15,000**
	55,600

Presuming that average method of inventory is used, prepare :

 (i) Statement of equivalent production.

 (ii) Statement showing cost for each element.

(iii) Statement of apportionment of cost.

(iv) Process cost account for process A.

 (b) Explain briefly the procedure for the valuation of Work-in-process.

Answer 11. (a)

(i) **Statement of equivalent production**
(Average cost method)

Particulars			Equivalent Production					
Input	Output	Units	Materials		Labour		Overheads	
(Units)			% completion	Equivalent units	% completion	Equivalent units	% completion	Equivalent units
20,000	Completed	14,000	100	14,000	100	14,000	100	14,000
	WIP	6,000	100	6,000	33-1/3	2,000	33-1/3	2,000
20,000		20,000		20,000		16,000		16,000

(ii)   **Statement showing cost for each element**

Particulars	Materials	Labour	Overhead	Total
Cost of opening work-in-progress (₹)	6,000	1,000	1,000	8,000
Cost incurred during the month (₹)	25,600	15,000	15,000	55,600
Total cost (₹) : (A)	31,600	16,000	16,000	63,600
Equivalent units : (B)	20,000	16,000	16,000	
Cost per equivalent unit (₹) :C = (A/B)	1.58	1	1	3.58

(iii)   **Statement of apportionment of cost**

		₹	₹
Value of output transferred: (a) 14,000 units@ ₹ 3.58			50,120
Value of closing work-in-progress: (b)			
Material	6,000 units @ ₹ 1.58	9,480	
Labour	2,000 units @ Re. 1	2,000	
Overhead	2,000 units @ Re. 1	2,000	13,480
Total cost : (a+b)			63,600

(iv) Process cost account for process A:

Process A Cost Account

Particulars	Units	₹	Particulars	Units	₹
To Opening WIP	4,000	8,000	By Completed units	14,000	50,120
To Materials	16,000	25,600	By Closing WIP	6,000	13,480
To Labour		15,000			
To Overhead		15,000			
	20,000	63,600		20,000	63,600

Answer 11. (b)

The valuation of work-in-process can be made in the following three ways, depending upon the assumptions made regarding the flow of costs.

 – First-in-first out (FIFO) method
 – Last-in-first out (LIFO) method
 – Average cost method

A brief account of the procedure followed for the valuation of work-in-process under the above three methods is as follows;

FIFO method : According to this method the units first entering the process are completed first. Thus the units completed during a period would consist partly of the units which were incomplete at the beginning of the period and partly of the units introduced during the period.

The cost of completed units is affected by the value of the opening inventory, which is based on the cost of the previous period. The closing inventory of work-in-process is valued at its current cost.

LIFO method : According to this method units last entering the process are to be completed first. The completed units will be shown at their current cost and the closing-work in process will continue to appear at the cost of the opening inventory of work-in-progress along with current cost of work in progress if any.

Average cost method : According to this method opening inventory of work-in-process and its costs are merged with the production and cost of the current period, respectively. An average cost per unit is determined by dividing the total cost by the total equivalent units, to ascertain the value of the units completed and units in process.

Q. 12. (a) **The yield of a certain process is 80% as to the main product, 15% as to the by-product and 5% as to the process loss. The material put in process (5,000 units) cost ₹ 23.75 per unit and all other charges are ₹ 14,250, of which power cost accounted for $33\frac{1}{3}$ %. It is ascertained that power is chargeable as to the main product and by-product in the ratio of 10 : 9.**

Draw up a statement showing the cost of the by-product.

(b) **Distinguish between Joint products and By-products.**

Answer 12. (a)

Yield per 5,000 input units

	Yield in Percentage	Yield in Units
Main product	80%	4,000
By product	15%	750
Process loss	5%	250

Statement Showing the Cost of the By-Product

Particulars	₹
Cost of Material	18,750
$(5,000 \times ₹\ 23.75) \times \dfrac{750}{4,750}$	
Other Charges (except power)	1,500
$(₹\ 14,250 \times 66\frac{2}{3}\ \%) \times \dfrac{750}{4,750}$	
Power	2,250
$(₹\ 14,250 \times 33\frac{1}{3}\ \%) \times \dfrac{9}{19}$	
Total Cost	22,500

Answer 12. (b)

Joint Products are defined as the products which are produced simultaneously from same basic raw materials by a common process or processes but none of the products is relatively of more importance or value as compared with the other. For example spirit, kerosene oil, fuel oil, lubricating oil, wax, tar and asphalt are the examples of joint products.

By products, on the other hand, are the products of minor importance jointly produced with other products of relatively more importance or value by the common process and using the same basic materials. These products remain inseparable upto the point of split off. For example in Dairy industries, butter or cheese is the main product, but butter milk is the by-product.

Points of Distinction :

(1) Joint product are the products of equal economic importance, while the by-products are of lesser importance.

(2) Joint products are produced in the same process, whereas by-products are produced from the scrap or the discarded materials of the main product.

(3) Joint products are not produced incidentally, but by-products emerge incidentally also.

Q. 13. (a) Q Ltd operates a chemical process which produces four products: A, B, C and D from a basic raw material. The company's budget for a month is as under :

	₹
Raw materials consumption	17,520
Initial processing wages	16,240
Initial processing overheads	16,240

Product	Production Kgs.	Sales ₹	Additional Processing Costs after split-off ₹
A	16,000	1,09,600	28,800
B	200	5,600	–
C	2,000	30,000	16,000
D	360	21,600	6,600

The company presently intends to sell product L at the point of split-off without further processing. The remaining products, A, C and D are to be further processed and sold. However, the management has been advised that it would be possible to sell all the four products at the split-off point without further processing and if this course was adopted, the selling prices would be as under :

Product	A	B	C	D
Selling Price ₹ Per kg.	4.00	28.00	8.00	40.00

The joint costs are to be apportioned on the basis of the sales value realisation at the point of split-off.

Required :

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

(ii) Present a statement showing the product wise and total budgeted profit or loss based on the proposal to sell product B at the split-off point and products A, C and D after further processing.

(iii) Prepare a statement to show the product wise and total profit or loss if the alternative strategy to sell all the products at split-off stage was adopted.

Recommend any other alternative which in your opinion can increase the total profit further. Calculate the total profit as also the product wise profit or loss, based on your recommendation.

(b) Define Product costs. Describe three different purposes for computing product costs.

Answer 13. (a)

(i)   **Statement showing Apportionment of Joint Costs**

Products	A	B	C	D	Total (₹)
Production (Kgs.): (A)	16,000	200	2,000	360	
Selling Price at split off point(Rs./Kg.): (B)	4	28	8	40	
Sales value at split off point(Rs.): (C) = (A X B)	64,000	5,600	16,000	14,400	1,00,000
Joint Cost apportionment	32,000	2,800	8,000	7,200	50,000
(Refer to Working Note)					

(ii)   **Statement of Total Budgeted Profit or Loss**

**(Based on the proposal to sell B at the split off
point and products A, C and D after further processing)**

Products	A ₹	B ₹	C ₹	D ₹	Total ₹
Sales Revenue: (A)	1,09,600	5,600	30,000	21,600	1,66,800
Joint Cost: (B)	32,000	2,800	8,000	7,200	50,000
(Refer to Working Note)					
Addl. Processing Cost: (C)(after split off)	28,800	—	16,000	6,600	51,400
Total Cost: (D) = (B + C)	60,800	2,800	24,000	13,800	1,01,400
Profit: (A – D)	48,800	2,800	6,000	7,800	65,400

(iii)   **Statement of Profit or Loss**

(When all the products are sold at split-off stage)

Products	A ₹	B ₹	C ₹	D ₹	Total ₹
Sales revenue	64,000	5,600	16,000	14,400	1,00,000
Less : Joint Cost					
(*Refer to Working Note*)	32,000	2,800	8,000	7,200	50,000
Profit	32,000	2,800	8,000	7,200	50,000

(iv)   **Statement of Profit or Loss**

(On the basis of another alternative)

Products	A ₹	B ₹	C ₹	D ₹	Total ₹
Incremental sales revenue on further processing	45,600	–	14,000	7,200	
	(₹ 1,09,600 – ₹ 64,000)		(₹ 30,000 – ₹ 16,000)	(₹ 21,600 – ₹ 14,400)	
Less: Additional processing Cost	28,800	–	16,000	6,600	
Profit (Loss)	16,800	–	(2,000)	600	

Since further processing of A and D adds to profit, therefore the recommended mix that would increase total profit is to process products A and D further and sell products B and C at the split - off point.

Profit and Loss statement based on recommended alternative

Products	A **Process further & sell** ₹	B **Sell at split off** ₹	C **Sell at split off** ₹	D **Process further & sell** ₹	Total ₹
Profit at split off point: (I)	32,000	2,800	8,000	7,200	
Incremental profit on sale after further processing: (II)	16,800	—	—	600	
Total : (III) = (I + II)	48,800	2,800	8,000	7,800	67400

Working Note :

Joint Cost

= Raw material consumption + Initial processing wages + Initial processing overheads

= ₹ 17,520 + ₹ 16,240 + ₹ 16,240 = ₹ 50,000

Joint Cost apportionment (On the basis of sales value at split off point)

$$= \frac{\text{Joint Cost}}{\text{Total sales value}} \times \text{Sales value of the product}$$

Products	Joint Cost apportionment
A	$\frac{₹\,50,000}{₹\,1,00,000} \times ₹\,64,000 = ₹\,32,000$
B	$\frac{₹\,50,000}{₹\,1,00,000} \times ₹\,5,600 = ₹\,2,800$
C	$\frac{₹\,50,000}{₹\,1,00,000} \times ₹\,16,000 = ₹\,8,000$
D	$\frac{₹\,50,000}{₹\,1,00,000} \times ₹\,14,000 = ₹\,7,200$

Product	Apportioned Joint Cost	Sale value at split off	Profit at split off	Further processing	Final Sale value	Total Cost=AJC+FPC	Final pofit/(loss)
A	32000	64000	32000	28800	109600	60800	48800
B	2800	5600	2800	-	5600	2800	2800
C	8000	16000	8000	16000	30000	24000	6000
D	7200	14400	7200	6600	21600	13800	7800
Total	**50000**	**100000**	**50000**	**51400**	**166800**	**101400**	**65400**

Answer 13. (b)

Product costs are inventoriable costs. These are the costs, which are assigned to the product. Under marginal costing variable manufacturing costs and under absorption costing, total manufacturing costs constitute product costs.

Purposes for computing product costs :

The three different purposes for computing product costs are as follows :

   (i) *Preparation of financial statements* : Here focus is on inventoriable costs.

(ii) *Product pricing* : It is an important purpose for which product costs are used. For this purpose, the cost of the areas along with the value chain should be included to make the product available to the customer.

(ii) *Contracting with government agencies* : For this purpose government agencies may not allow the contractors to recover research and development and marketing costs under cost plus contracts.

Q. 14. (a) Coal is transported from two mines – 'P' and 'Q' and unloaded at plots in a Railway Station. Mine P is at a distance of 10 kms, and Q is at a distance of 15 kms. from railhead plots. A fleet of lorries of 5 tonne carrying capacity is used for the transport of mineral from the mines. Records reveal that the lorries average a speed of 30 kms. per hour, when running and regularly take 10 minutes to unload at the railhead. At mine 'P' loading time averages 30 minutes per load while at mine 'Q' loading time averages 20 minutes per load.

Drivers' wages, depreciation, insurance and taxes are found to cost ₹ 9 per hour operated. Fuel, oil, tyres, repairs and maintenance cost ₹ 1.20 per km.

Draw up a statement, showing the cost per tonne-kilometer of carrying coal from each mine.

(b) In order to develop tourism, XYZ airline has been given permit to operate three flights in a week between A and B cities (both side). The airline operates a single aircraft of 160 seats capacity. The normal occupancy is estimated at 60% through out the year of 52 weeks. The one-way fare is ₹ 7,200. The cost of operation of flights are :

Fuel cost (variable)	₹ 96,000 per flight
Food served on board on non-chargeable basis	₹ 125 per passenger
Commission	5% of fare applicable for all booking
Fixed cost :	
Aircraft lease	₹ 3,50,000 per flight
Landing Charges	₹ 72,000 per flight

Required :

 (i) Calculate the net operating income per flight.

 (ii) The airline expects that its occupancy will increase to 108 passengers per flight if the fare is reduced to ₹ 6,720. Advise whether this proposal should be implemented or not.

Answer 14. (a)

Statement showing the cost per tonne-kilometer of carrying mineral from each mine

	Mine P ₹	Mine Q ₹
Fixed cost per trip (Driver's wages, depreciation, insurance and taxes)		
P: 1 hour 20 minutes @ ₹ 9 per hour	12	
Q:1 hour 30 minutes @ ₹ 9 per hour		13.50
(Refer to working note 1)		
Running and maintenance cost:		
(Fuel, oil, tyres, repairs and maintenance)		
P: 20 kms ₹ 1.20 per km.	24	
Q: 30 kms. ₹ 1.20 per km.		36.00
Total cost per trip	36	49.50
Cost per tonne – km	0.72	0.66
(Refer to working note 2)	(₹ 36/50 tonnes kms)	(₹ 49.50/75 tonnes kms)

Working notes :

	Mine P	Mine Q
1. Total operated time taken per trip	40 minutes	60 minutes
Running time to & from	$\left(20\,kms. \times \dfrac{60\,minutes}{30\,kms}\right)$	$\left(30\,kms. \times \dfrac{60\,minutes}{30\,kms}\right)$
Unloading time	10 minutes	10 minutes
Loading time	30 minutes	20 minutes
Total operated time	80 minutes or	90 minutes or
	1 hour 20 minutes	1 hour 30 minutes
2. *Effective tones – kms*	50	75
	(*5 tonnes × 10 kms*)	(*5 tonnes × 15 kms.*)

Answer 14. (b)

	No. of passengers 160 × 60/100 = 96	₹	₹
(i)	Fare collection 96 × 7,200		6,91,200
	Variable costs:		
	Fuel		96,000
	Food 96 × 125		12,000
	Commission 5%		34,560
	Total variable Costs		1,42,560
	Contribution per flight		5,48,640
	Fixed costs: Lease	3,50,000	
	Crew	72,000	4,22,000
	Net income per flight		1,26,640
(ii)	Fare collection 108 × 6,720		7,25,760
	Variable costs:		
	Fuel		96,000
	Food 108 × 125		13,500
	Commission @ 5%		36,288
	Contribution		5,79,972

There is an increase in contribution by ₹ 31,332. Hence the proposal is acceptable.

Q. 15. (a) PQR Limited has collected the following data for its two activities. It calculates activity cost rates based on cost driver capacity.

Activity	Cost Driver	Capacity	Cost
Power	Kilowatt hours	50,000 kilowatt hours	₹ 2,00,000
Quality Inspections	Number of Inspections	10,000 Inspections	₹ 3,00,000

The company makes three products M, S and T. For the year ended March 31, 2004, the following consumption of cost drivers was reported:

Product	Kilowatt hours	Quality Inspections
P	10,000	3,500
Q	20,000	2,500
R	15,000	3,000

Required :

   (i) Compute the costs allocated to each product from each activity.
   (ii) Calculate the cost of unused capacity for each activity.
   (iii) Discuss the factors the management considers in choosing a capacity level to compute the budgeted fixed overhead cost rate.

(b) Give three examples of Cost Drivers of following business functions in the value chain :

   (i) Research and development
   (ii) Design of products, services and processes
   (iii) Marketing

Answer 15. (a)

(i) **Statement of cost allocation to each product from each activity**

		Product		
	P ₹	Q ₹	R ₹	Total ₹
Power *(Refer to working note)*	40,000 *(10,000 kwh x ₹ 4)*	80,000 *(20,000 kwh x ₹ 4)*	60,000 *(15,000 kwh x ₹ 4)*	1,80,000
Quality Inspections *(Refer to working note)*	1,05,000 *(3,500 inspections x ₹ 30)*	75,000 *(2,500 inspections x ₹ 30)*	90,000 *(3,000 inspections x ₹ 30)*	2,70,000

Working note :

Rate per unit of cost driver :

Power　　　　　　　　　　:　　　　　(₹ 2,00,000 / 50,000 kwh) = ₹ 4/kwh

Quality Inspection　　　:　　　　　(₹ 3,00,000 / 10,000 inspections) = ₹ 30 per inspection

(i) **Computation of cost of unused capacity for each activity :**

	₹
Power (₹ 2,00,000 – ₹ 1,80,000)	20,000
Quality Inspections (₹ 3,00,000 – ₹ 2,70,000)	30,000
Total cost of unused capacity	50,000

(ii) **Factors management consider in choosing a capacity level to compute the budgeted fixed overhead cost rate :**

• Effect on product costing & capacity management

• Effect on pricing decisions.

• Effect on performance evaluation

• Effect on financial statements

• Regulatory requirements.

• Difficulties in forecasting chosen capacity level concepts.

Answer 15. (b)

A cost driver is any factor whose change causes a change in the total cost of a related cost object. In other words, a change in the level of cost driver will cause a change in the level of the total cost of a related cost object.

The cost drivers for business functions viz. Research & Development; Design of products, services and processes; Marketing are as follows :

Business functions	Cost Drivers
(i) Research & Development	– Number of research projects
	– Personnel hours on a project
	– Technical complexities of the projects
(ii) Design of products, services and processe	– Number of products in design
	– Number of parts per product
	– Number of engineering hours
(iii) Marketing	– Number of advertisement run
	– Number of sales personnel
	– Sales revenue
	– Number of products and volume of sales (in quantitative terms)

Q. 16. (a) P Q R S Co. Ltd. produces and sells four products P, Q, R and S. These products are similar and usually produced in production runs of 10 units and sold in a batch of 5 units. The production details of these products are as follows :

Product	P	Q	R	S
Production (Units)	100	110	120	150
Cost per unit :				
Direct material (₹)	30	40	35	45
Direct labour (₹)	25	30	30	40
Machine hour (per unit)	5	4	3	4

The production overheads during the period are as follows :

		₹
Factory works expenses	22,500	
Stores receiving costs	8,100	
Machine set up costs	12,200	
Cost relating to quality control	4,600	
Material handling and dispatch	9,600	57,000

The cost drivers for these overheads are detailed below :

Cost	Cost drivers
Factory works expenses	Machine hours
Stores receiving costs	Requisitions raised
Machine set up costs	No. of production runs
Cost relating to quality control	No. of production runs
Material handling and dispatch	No. of orders executed

The number of requisitions raised on the stores was 25 for each product and number of orders executed was 96, each order was in a batch of 05 units.

Required :

(i) Total cost of each product assuming the absorption of overhead on machine hour basis;

(ii) Total cost of each product assuming the absorption of overhead by using activity base costing; and

(iii) Show the differences between (i) and (ii) and comment.

(b) Discuss the different stages in the Activity –based Costing.

Answer 16. (a)

(i) **Statement showing total cost of each product assuming absorption of overheads on Machine Hour Rate Basis.**

Particulars	P	Q	R	S	Total
Output (units)	100	110	120	150	480
Direct material (₹)	30	40	35	45	150
Direct Labour (₹)	25	30	30	40	125
Direct labour- Machine hrs	5	4	3	4	
Overhead @ ₹ 30/- per Machine hr	150	120	90	120	480
Total cost per unit (₹)	205	190	155	205	755
Total cost (₹)	20500	20900	18600	30750	90750

$$\text{Overhead Rate} = \frac{\text{Total Overhead Cost}}{\text{Total Machine Hrs.}} = \frac{₹\ 57,000}{1,900} = ₹\ 30 \text{ per unit}$$

(ii) **Total Overheads** ₹

Factory works expenses	22,500	Factory exp per unit	22,500/1,900 = ₹ 11.84
Stores receiving cost	8,100	Stores receiving cost	8100/100 = ₹ 81
Machine set up costs	12,200	Machine set-up cost	12,200/48 = ₹ 254.1
Costs relating to quality control	4,600	Cost relating to QC	4,600/48 = ₹ 95.83
Expense relating to material handling & dispatch	9,600	Material handling & dispatch	9,600 / 96 = ₹ 100
Total	57,000		

Statement showing total cost of each product assuming Activity Based Costing.

Particulars	P	Q	R	S	Total
Output (Units)	100	110	120	150	480
No. of production runs	10	11	12	15	48
No. of stores requisition	25	25	25	25	100
No. of sales orders	20	22	24	30	96
Unit costs - Direct material (₹)	30.00	40.00	35.00	45.00	
Unit costs - Direct labour (₹)	25.00	30.00	30.00	40.00	
Unit costs - Factory works expenses (₹)	59.20	47.36	35.52	47.36	
Unit costs - Stores receiving cost (₹)	20.25	18.41	16.88	13.50	
Unit costs - Machine set-up cost (₹)	25.42	25.42	25.42	25.42	
Unit costs – QC (₹)	9.58	9.58	9.58	9.58	
Unit costs – Material Handling (₹)	20.00	20.00	20.00	20.00	
Unit cost (₹)	189.45	190.77	172.40	200.86	
Total cost (₹)	18,945	20,984.7	20,688.00	30,129	

(iii)   **Statement showing differences (in ₹)**

Particulars	P	Q	R	S
(a) Unit cost MHR	205	190	155	205
(b) Unit cost ABC	189.45	190.77	172.40	200.86
(c) Unit cost - difference = (a) - (b)	15.55	-0.77	-17.40	4.14
Total cost MHR	20,500	20,900	18,600	30,750
Total cost ABC	18,945	20,985	20,688	30,128

The difference is that A consumes comparatively more of Machine hours.

The use of activity based costing gives different product costs than what were arrived at by utilising traditional costing. It can be argued that Product costs using ABC are more precise as overheads have been identified with specific activities.

Answer 16. (b)

Different stages in activity –based costing are as follows :

  (i) Identify the different activities within the organization.
 (ii) Relate the overheads cost to the identified activities.
(iii) Support activities are then spread across the primary activities.
 (iv) Determine the activity cost drivers.
  (v) Calculate the activity cost driver rates.

Compute the overhead cost to be charged over the product by using cost driver rates.

Q. 17. (a) A fire destroyed some accounting records of a company. You have been able to collect the following from the spoilt papers/records and as a result of consultation with accounting staff in respect of January 2012 :

    (i) Incomplete Ledger Entries :

Raw-Materials Account

	₹		₹
Beginning Inventory	32,000		

Work-in-Progress Account

	₹		₹
Beginning Inventory	9,200	Finished Stock	1,51,000

Creditors Account

	₹		₹
		Opening Balance	16,400
Closing Balance	16,200		

Manufacturing Overheads Account

	₹		₹
Amount Spent	29,600		

Finished Goods Account

	₹		₹
Opening Inventory	24,000		
		Closing Inventory	30,000

  (ii) *Additional Information :*

      (1) The cash-book showed that ₹ 89,200 have been paid to creditors for raw-material.

      (2) Ending inventory of work-in-progress included material ₹ 5,000 on which 300 direct labour hours have been booked against wages and overheads.

      (3) The job card showed that workers have worked for 7,000 hours. The wage rate is ₹ 10 per labour hour.

      (4) Overhead recovery rate was ₹ 4 per direct labour hour.

  You are required to complete the above accounts in the cost ledger of the company.

  (b) What are the reasons for disagreement of profits as per cost accounts and financial accounts? Discuss.

Answer 17. (a)

(i)   **Creditors Account**

Dr.   *Cr.*

Particulars	₹	Particulars	₹
To Cash & Bank (I)	89,200	By Balance b/d	16,400
To Balance c/d	19,200	By Purchases	92,000
(Balancing figure)			
	1,08,400		1,08,400

Work-in-progress Account

Dr.   *Cr.*

Particulars	₹	Particulars	₹
To Balance b/d	9,200	By Finished stock	1,51,000
To Raw-materials	53,000	By Balance c/d	
(Balancing figure)		Material (2): ₹ 5,000	
To Wages (3)	70,000	Labour (2): ₹ 3,000	9,200
(7,000 hrs. × ₹ 10)		(300 hrs. × 4 hrs)	
To Overheads (4)	28,000	Overheads (2)	1,200
(7,000 hrs. × ₹ 4)		(300 hrs. × ₹ 4)	
	1,60,200		1,60,200

Raw-materials Account

Dr.   *Cr.*

Particulars	₹	Particulars	₹
To Balance b/d	32,000	By Work-in-progress	53,000
To Purchase	92,000	(As above)	
(As above)		By Balance c/d	71,000
	1,24,000		1,24,000

Finished Goods Account

Dr.   *Cr.*

Particulars	₹	Particulars	₹
To Balance b/d	24,000	By Cost of sales	1,45,000
		(Balancing figure)	
To W.I.P.	1,51,000	By Balance c/d	30,000
(As above)			
	1,75,000		1,75,000

Manufacturing Overheads Account

Dr.   *Cr.*

Particulars	₹	Particulars	₹
To Sundries	29,600	By W.I.P.	28,000
		(7000 × ₹ 4)	
		By Under-absorbed Overheads A/c	1,600
	29,600		29,600

Answer 17. (b)

Reasons for disagreement of profits as per cost and financial accounts

The various reasons for disagreement of profits shown by the two sets of books viz., cost and financial may be listed as below :

1. Items appearing only in financial accounts

    The following items of income and expenditure are normally included in financial accounts and not in cost accounts. Their inclusion in cost accounts might lead to unwise managerial decisions. These items are :

    (i) Income :
    - (a) Profit on sale of assets
    - (b) Interest received
    - (c) Dividend received
    - (d) Rent receivable
    - (e) Share Transfer fees

    (ii) Expenditure :
    - (a) Loss on sale of assets
    - (b) Uninsured destruction of assets
    - (c) Loss due to scrapping of plan and machinery
    - (d) Preliminary expenses written off
    - (e) Goodwill written off
    - (f) Underwriting commission and debenture discount written off
    - (g) Interest on mortgage and loans
    - (h) Fines and penalties

    (iii) Appropriation :
    - (a) Dividends
    - (b) Reserves
    - (c) Dividend equalization fund, Sinking fund etc.

2. Items appearing only in cost accounts

    There are some items which are included in cost accounts but not in financial account.

    These are :
    - (a) Notional interest on capital;
    - (b) Notional rent on premises owned.

3. Under or over-absorption of overhead

In cost accounts overheads are charged to production at pre-determined rates where in financial accounts actual amount of overhead is charged, the difference gives rise under-or over-absorption; causing a difference in profits.

4. Different bases of stock valuation

In financial books, stocks are valued at cost or market price, whichever is lower. In cost books, however, stock of materials may be valued on FIFO or LIFO basis and work-in-progress may be valued at prime cost or works cost. Differences in store valuation may thus cause a difference between the two profits.

5. Depreciation

The amount of depreciation charge may be different in the two sets of books either because of the different methods of calculating depreciation or the rates adopted. In company accounts, for instance, the straight line method may be adopted whereas in financial accounts It may be the diminishing balance method.

Q. 18. (a)) The financial records of M M Ltd. reveal the following for the year ended 30-6-2012 :

		₹ *in '000*
Sales (20,000 units)		4,000
Materials		1,600
Wages		800
Factory Overheads		720
Office and Administrative Overheads		416
Selling and Distribution Overheads		288
Finished Goods (1,230 units)		240
Work-in-progress	48	
Labour	32	
Overheads (Factory)	32	112
Goodwill written off		320
Interest on Capital		32

In the Costing records, factory overhead is charged at 100% wages, administration overhead 10% of factory cost and selling and distribution overhead at the rate of ₹ 16 per unit sold.

Prepare a statement reconciling the profit as per cost records with the profit as per financial records of the company.

(b) A manufacturing company disclosed a net loss of ₹ 3,47,000 as per their cost accounts for the year ended March 31, 2012. The financial accounts however disclosed a net loss of ₹ 5,10,000 for the same period. The following information was revealed as a result of scrutiny of the figures of both the sets of accounts.

		₹
(i)	Factory Overheads under-absorbed	40,000
(ii)	Administration Overheads over-absorbed	60,000
(iii)	Depreciation charged in Financial Accounts	3,25,000
(iv)	Depreciation charged in Cost Accounts	2,75,000
(v)	Interest on investments not included in Cost Accounts	96,000
(vi)	Income-tax provided	54,000
(vii)	Interest on loan funds in Financial Accounts	2,45,000

Prepare a Memorandum Reconciliation Account.

Answer 18. (a)

Profit & Loss Account of Modern Manufacturers
for the year ended 30-6-2012

(₹ *in '000*)

Particulars	₹	Particulars	₹
To Materials	1,600	By Sales (20,000 units)	4,000
To Wages	800	By Closing Stock	
To Factory Overheads	720	By Finished Goods	240
To Office and Admn. Overheads	416	(1230 units)	
To Selling & Distribution Overheads	288	Work-in-Progress	112
To Goodwill written off	320		
To Interest on Capital	32		
To Net Profit	176		
	4,325		4,352

Profit as per Cost Record

	(₹ *in '000*)
Materials	1,600
Wages	800
Prime Cost	2,400
Factory Overhead	800
(100% of wages)	
Gross Factory Cost	3,200
Less : Closing WIP	112
Factory Cost	3,088
(21,230 units)	
Add : Office & Administrative Overhead	308.80
(10% of Factory Cost)	
Total Cost of output	3,396.80
Less : Closing stock (1,230 units) of Finished Goods	196.80
(See Working Note 1)	
Cost of Production of 20,000 units	3,200.00
Selling and Distribution overhead	320.00
(@ ₹ 16 p u.)	
Cost of sales	3,520.00
(20,000 units)	
Sales Revenue	4,000.00
(20,000 units)	
Profit	480.00

Reconciliation Statement

Particulars	₹ ('000)	₹ ('000)
Profit as per Cost Accounts		480
Add : Factory overhead Overabsorbed	80	
(800-720)		
Selling and Distribution Overhead Overabsorbed	32	
(320-288)		
Closing stock overvalued in Financial Accounts	43.20	152.2
(240-196.8)		635.20
Less : Office & Administrative Overhead underabsorbed	107.20	
(416-308.80)		
Goodwill written off	320.00	
Interest on Capital	32.00	459.20
Profit as per Financial Accounts		176.00

Working Note :

1. Cost per unit of finished good = $\dfrac{\text{Total Cost of output}}{\text{Total number of units produced}}$

    $= \dfrac{₹\,3396.80\,\text{Thousand}}{21,230\,\text{units}} = ₹\,160$

    Cost of 1230 units $= ₹\,160 \times 1230 = ₹\,1,96,800$

Answer 18. (b)

Memorandum Reconciliation Account

Dr.   Cr.

Particulars	₹	Particulars	₹
To Net Loss as per Costing books	3,47,000	By Administration overheads over recovered in cost accounts	60,000
To Factory overheads under absorbed in Cost Accounts	40,000	By Interest on investment not included in Cost Accounts	96,000
To Depreciation under charged in Cost Accounts	50,000	By Transfer fees in Financial books	24,000
To Income-Tax not provided in Cost Accounts	54,000	By Stores adjustment (Credit in financial books)	14,000
To Interest on Loan Funds in Financial Accounts	2,45,000	By Dividend received in financial books	32,000
		By Net loss as per Financial books	5,10,000
	7,36,000		7,36,000

Q. 19. (a) HFC Chemicals Ltd. produces GDX. The standard ingredients of 1 kg. of GDX are :

      0.65 kg. of ingredient G @ ₹ 4.00 per kg.

      0.30 kg. of ingredient D @ ₹ 6.00 per kg.

      <u>0.20</u> kg. of ingredient X @ ₹ 2.50 per kg.

      <u>1.15</u> kg.

Production of 4,000 kg. of GDX was budgeted for August, 2012. The production of GDX is entirely automated and production costs attributed to GDX production comprise only direct materials and overheads. The GDX production operation works on a JIT basis and no ingredient of GDX inventories are held.

Overheads were budgeted August, 2012 for the GDX production operation as follows :

Activity	Total amount
Receipt of deliveries from suppliers (standard delivery qty. is 460 kg.)	₹ 4,000
Despatch of goods to customers (standard dispatch qty. is 100 kg.)	₹ 8,000
	<u>₹ 12,000</u>

In August, 2012, 4,200 kg. of GDX were produced and cost details were as follows :

• **Materials used :**

  2,840 kg. of G, 1,210 kg. of D and 860 kg of X

   Total cost ₹ 20,380

• **Actual overhead costs :**

12 Supplier deliveries (cost ₹ 4,800) were made, and 38 customer dispatches (cost ₹ 7,800) were processed.

Prepare a variance analysis for GDX production costs in August, 2012: separate the material cost variance into price, mixture and yield components; separate the overhead cost variance into expenditure, capacity and efficiency components using consumption of ingredient G as the overhead absorption base.

(b) ABC Ltd worked 10% more days than budgeted and achieved 25% more output than original budget. But it was observed that the average capacity utilization was only 90%. Find out the efficiency in operations.

Answer 19. (a)

Standard costs of material per kg. of output (0.65 kg. × ₹ 4) + (0.3 kg × ₹ 6) + (0.2 kg × ₹ 2.50) = ₹ 4.90

Standard overhead rate   = ₹ 12,000/ Budgeted standard qty. of ingredient G (4,000 × 0.65)

               = ₹ 4.6154 per kg. of ingredient G

Standard overhead rate per kg of output of GDX = ₹ 0.65 kg × ₹ 4.6154 = ₹ 3

	₹
Standard cost of actual output :	
Materials (4,200 × ₹ 4.90)	20,580
Overheads (4,200 × ₹ 3)	<u>12,600</u>
	<u>33,180</u>
Actual cost of output :	
Materials	20,380
Overheads (₹ 7,800 + ₹ 4,800)	<u>12,600</u>
	<u>32,980</u>

Variance calculations :

Materials price variance	= (Standard price – Actual price) × Actual quantity
	= (Standard price x Actual quantity) – Actual cost
	= (₹ 4 × 2,840) + (₹ 6 × 1,210) + (₹ 2.50 × 860) – ₹ 20,380
	= ₹ 20,770 – ₹ 20,380
	= ₹ 390 F

Material yield variance	= (Actual yield – Standard yield) × Standard materials cost per unit of output
	= (4,200 – 4,910 materials used / 1.15) × ₹ 4.90
	= 341 A

Material mix variance = (Actual quantity in actual mix at standard prices) – (Actual quantity in standard mix at standard prices)

G (4,910 × 0.65/1.15 = 2,775 – 2,840) × ₹ 4   = 260 (A)
D (4,910 × 0.30/1.15 = 1,281 – 1210) × ₹ 6   = 426 (F)
X (4,910 × 0.20/1.15 = 854 – 860) × ₹ 2.50   = 15 (A)   151 (F)

Overhead efficiency variance	= (Standard quantity of ingredient G – Actual quantity) × Standard overhead rate per kg. of ingredient G
	= [(4200 × 0.65) – 2840] × ₹ 4.6154
	= 508 (A)

Overhead capacity variance	= (Budgeted input of ingredient G – Actual input) × standard overhead rate per kg of ingredient G
	= [(4000 × 0.65) – 2,840] × ₹ 4.6154 = 1,108 (F)

Overhead expenditure variance	= Budgeted cost – Actual cost
	= ₹ 12,000 – ₹ 12,600
	= 600 A

Reconciliation of standard cost and actual cost of output :

Particulars	₹	₹
Standard cost of actual production		33,180
Material variances :		
Material price variance	390 (F)	
Material yield variance	341 (A)	
Materials mix variance	151 (F)	200 (F)
Overhead variances :		
Overhead efficiency variance	508 (A)	
Overhead capacity variance	1,108 (F)	
Overhead expenditure variance	600 (A)	Nil
Actual cost		32,980

Answer 19. (b)

Activity or Volume Ratio = Capacity Ratio × Efficiency Ratio × Calender Ratio

or 125%　　　　　　　　= 90% × Efficiency Ratio × 110%

Solving the equation, we get,

Efficiency Ratio = 125.00%/ (90% × 110%) = 126.26%

Q. 20. (a) Chief Accountant of a TDH Ltd was given the following information regarding the Overheads for June 2012 —

　(i) **Overhead (OH) Cost Variance ₹ 1400 (A)**

　(ii) **Overhead Volume Variance ₹ 1000(A)**

(iii) **Budgeted Hours for June, 2012-1200 hours**

(iv) **Budgeted Overheads for June 2012- ₹ 6000**

　(v) **Actual Rate of Recovery of Overheads ₹ 8 per hour.**

You are required to assist him in computing the following for the month of June, 2012.

　(I) **Overhead Expenditure Variance**

　(II) **Actual Overheads incurred**

(III) **Actual Hours for Actual Production**

(IV) **Overheads Capacity Variance**

　(V) **Overhead Efficiency Variance**

(VI) **Standard hours for Actual Production.**

(b) ABC Ltd. produces jams and other products. The production pattern for all the products is similar, first the fruits are cooked at a low temperature and then subsequently blended with glucose syrup. Citric acid and pectin are added henceforth to help setting.

There is huge competition in the market because of which margins are tight. The firm operates a system of standard costing for each batch of jam.

The standard cost data for a batch of jam are :

Fruit extract	**400 kg. @ ₹ 0.16 per kg.**
Glucose syrup	**700 kg @ ₹ 0.10 per kg.**
Pectin	**99 kg. @ ₹ 0.332 per kg.**
Citric acid	**1 kg. @ ₹ 2.00 per kg.**
Labour	**18 hrs. @ ₹ 3.25 per hour**

Standard processing loss 3%

As a consequence of unfavourable weather in the relevant year for the concerned crop., normal prices in the trade were ₹ 0.19 per kg. for fruit extract although good buying could achieve some savings. The actual price of syrup had also gone up by 20% from the standards established. This was because of increase in customs duty for sugar.

The actual results for the batch were :

Fruit extract	**428 kg. @ ₹ 0.18 per kg.**
Glucose syrup	**742 kg. @ ₹ 0.12 per kg.**
Pectin	**125 kg. @ ₹ 0.328 per kg.**
Citric acid	**1 kg. @ ₹ 0.95 per kg.**
Labour	**20 hours @ ₹ 3.00 per hour**

Actual output was 1,164 kg. of Jam.

 (a) Calculate the ingredients planning variances that are deemed uncontrollable;

 (b) Calculate the ingredients operating variances that are deemed controllable;

Calculate the total variances for the batch.

Answer 20. (a)

Since OH Capacity and Efficiency Variances are to be computed, Fixed OH Variances are to be analysed.

 (i) Fixed OH Standard Rate per hour = Budgeted Fixed OH/Budgeted Hours = ₹ 6000/1200 = ₹ 5 per hour. (WN 1)

 (ii) Fixed Volume Variance = Absorbed Fixed OH (i.e Std. Hr. × Std Rate /hr. **less** Budgeted Fixed OH

$$= ₹ 1000(A)$$

Given, Budgeted Fixed OH = ₹ 6000/-, Std. rate/hr. = ₹ 5/-(WN 1),

(Std Hr × ₹ 5) – 6000 = (–) 1000

So, Std Hr (SH) = 1000 hrs. (WN2)

 (iii) Fixed OH Cost Variance = ₹ 1400(A) and volume variance = ₹ 1000(A),

Expenditure variance = (bal.fig) = ₹ 400(A)

Fixed OH Expenditure variance = Budgeted Fixed OH less Actual Fixed OH = 400(A)

Since Budgeted Fixed OH is ₹ 6000/-(A)

We get, 6000- Actual Fixed OH = (–) ₹ 400

Hence, Actual Fixed OH = ₹ 6400 (WN 3)

 (iv) Actual Hours for Actual production= Actual Fixed OH/ Actual Rate per hr = ₹ 6400/₹ 8 = 800 hours. (WN4)

Fixed Overhead Computation Chart

AO × SR pu = SH × SR ph	AH × SR	Budgeted Fixed OH	Actual Fixed OH
(1)	(2)	(3)	(4)
1000(WN2) × 5/hr (WN1) = ₹ 5000	800 hrs (WN4) × ₹ 5/hr (WN 1) = ₹ 4000	₹ 6000 (given)	₹ 6400 (WN3)

 (I) OH Expenditure Variance = ₹ 400(A)

 (II) Actual OH incurred = ₹ 6400 (WN 3)

 (III) Actual Hrs for actual production = 800 hrs (WN 4)

 (IV) Overheads Capacity Variance = Fixed OH for actual hrs at std rate **less** budgeted fixed OH

$$= ₹ 4000 – ₹ 6000 = ₹ 2000(A)$$

 (V) Overhead Efficiency Variance = ₹ 5000 – ₹ 4000 (1-2)

$$= ₹ 1000(F)$$

 (VI) Std. hrs for actual production = 1000 hrs.(WN 2)

Answer 20. (b)

Statement showing original, revised and actual data

	Original standard		Revised standard		Actual	
Fruit extract	400 x Re. 0.16 =	₹ 64	400 x Re. 0.19 =	₹ 76	428 x ₹ 0.18 =	₹ 77.04
Glucose syrup	700 x Re. 0.10 =	₹ 70	700 x Re. 0.12 =	₹ 84	742 x ₹ 0.12 =	₹ 89.04
Pectin	99 x Re. 0.332 =	₹ 32.868	99 x ₹ 0.332 =	₹ 32.868	125 x ₹ 0.328 =	₹ 41
Citric acid	1 x ₹ 2.00 =	₹ 2.00	1 × ₹ 2 =	₹ 2.00	1 × Re. 0.95 =	Re 0.95
		168.868		194.868		208.03
Labour	18 × ₹ 3.25 =	58.50	20 × ₹ 3.00 =	₹ 60.00	20 × ₹ 3.00 =	₹ 60.00
		227.368		253.368		268.03

Original Input = (400 + 700 + 99 + 1)	=	1200
Less – 3% process loss	=	36
Original output		1,164

Actual Input = (428 + 742 + 125 + 1)	=	1296
Less – Process loss	=	132
Actual output		1,164

(a) Planning variance = original cost – revised cost

Fruit extract	= 64 – 76	=	₹ 12 A
Glucose syrup	= 70 – 84	=	₹ 14 A
Total	= 227.368 – 253.368	=	₹ 26 A

(b) Ingredient operating variance = **Revised – Actual**

= ₹ 194.868 – ₹ 208.03 = ₹ 13.162 A

For calculation of variances

Actual cost of actual material	(a)	=	₹ 208.03	
Standard cost of material used	(b)	=	428 × 0.19 =	81.32
			742 × 0.12 =	89.04
			125 × 0.332 =	41.50
			1 × 2.00 =	2.00
				213.86

Standard cost of material if it had been used in standard proportion (c)

(400 / 1,200) × 1,296 × 0.19	=	82.08
(700 / 1200) × 1,296 × 0.12	=	90.72
(99 / 1200) × 1,296 × 0.332	=	35.497
(1/ 1,200) × 1,296 × 2	=	2.16
		₹ 210.457

Standard material cost of output (d) = (194.868 / 1,164) x 1,164   = 194.868

1. Material price variance   = (a) – (b) = ₹ 208.03 – ₹ 213.86 = ₹ 5.83 F

2. Material usage variance   = (b) – (d) = ₹ 213.86 – ₹ 194.868 = ₹ 18.992 A

3. Labour cost variance   = Actual cost – Standard cost

   = ₹ 60.00 – ₹ 58.50 = ₹ 1.50 A

  1. Mixture variance   = (b) – (c) = ₹ 213.86 – ₹ 210.457 = ₹ 3.403 A

  2. Yield variance = (c) – (d)   = ₹ 210.457 – ₹ 194.868 = ₹ 15.589

   Total variance   = Original standard cost – Actual cost

   = ₹ 227.368 – ₹ 268.03   = ₹ 40.662 A

Q. 21. (a) Distinguish between Indifference Point and Break –Even Point

(b) ABC Ltd. maintains a margin of safety of 37.5% with an overall contribution to sales ratio of 40%. Its fixed costs amount to ₹ 5,00,000. Calculate the following :

  (i) Break Even Sales

  (ii) Total Sales

  (iii) Total Variable Cost

  (iv) Current Profits

New 'Margin of Safety' if the sales volume is increased by 7.5 %.

Answer 21. (a)

Indifference Point	Break- Even Point (BEP)
(i) Indifference point is the level of Sales at which Total Costs and Profits of two options are equal.	BEP is the level of sales at which the Total Contribution equals the Fixed Costs. Hence, there is neither a Profit nor a Loss to the Firm.
(ii) Indifference Point = (Difference in Fixed Costs/ Difference in PV ratio)	BEP= Fixed Cost/PV ratio
(iii) It is the activity level at which Total cost under two alternatives are equal.	It is the activity level where total revenue is equal to total cost
(iv) Used to choose between two alternative options for achieving the same objective.	Used for profit planning.

Answer 21. (b)

  (i) Break Even Sales = Fixed Cost / (Profit/Volume Ratio)

    = ₹ 5, 00,000/40%

    = ₹ 12, 50, 000

  (ii) Total Sales = Break Even Sales + Margin of Safety

    Margin of Safety = Actual Sales – Break-Even Sales

    Let the actual sales be 100, Margin of Safety is 37.5%

    Hence Break even sales will be ₹ 62.5

Now, if the Break even sales are ₹ 62.5, actual sales are ₹ 100, hence if Break even sales are ₹ 12.5 lakhs, actual sales will be 100/62.5 × 12.5 = ₹ 20 lacs.

(iii) Contribution = Sales – Variable Cost. As the contribution is 40% of sales, the variable cost is 60% of sales and so variable cost will be 60% of ₹ 20 lacs, i.e. ₹ 12 lacs.

(iv) Current Profits = Sales – [Fixed Cost + Variable Cost]

= ₹ 20,00,000 – [₹ 12, 00,000 + ₹ 5,00,000]

= ₹ 3,00,000

(v) New Margin of Safety if the sales volume is increased by 7.5%

New Sales Volume = ₹ 20,00,000 + 7.5% of ₹ 20,00,000 = ₹ 21,50,000

Hence, New Margin of Safety = ₹ 21,50,000 – BEP Sales ₹ 12,50,000

= ₹ 9,00,000.

Q. 22. (a) RJD Ltd. has prepared the following budget estimates for a financial year —

Sales units	**15000**
Sales value	**₹ 150000**
Fixed Expenses	**₹ 34000**
Variable costs	**₹ 6/- per unit**

Calculate Profit / Volume Ratio, BEP, Margin of Safety.

Calculate revised Profit / Volume Ratio, BEP, Margin of Safety in each of the following cases :

(i) **Decrease of 10% in Selling price.**

(ii) **Increase of 10% Variable Cost**

(iii) **Increase in sales volume by 2000 units.**

(iv) **Increase of ₹ 6000/- in Fixed Costs.**

(b) What do you understand by the following terms :

(i) **Key factor or Limiting Factor.**

(ii) **Margin of Safety.**

Answer 22. (a)

Working Notes :

Present Selling Price (SP) p.u.= ₹ 150000/15000 = ₹ 10p.u

Present Contribution p.u. = Selling Price p.u – Variable Costs p.u = ₹ 10 – ₹ 6 = ₹ 4 p.u

Profit / Volume Ratio = Contribution p.u/Sales Price p.u × 100

* BEQ = Fixed Costs/Contribution p.u

Computation of PVR, BEP and MOS

Particulars	PVR	BEQ = Refer WN	BES = BEQ* × SP p.u	MOS (Qty)	MOS (₹)
For data given	(10–6)/10 = 40%	₹ 34000/₹ 4 = 8500 units	8500× ₹ 10 = ₹ 85000	15000–8500 = 6500 units	6500× ₹ 10 = ₹ 65000
Decrease of 10% in Selling price.	(9-6)/9 = 33.33%	₹ 34000/₹ 3 = 11333 units	11333 × ₹ 9 = ₹ 101997 units	15000-11333 = 3667 units	3667 × ₹ 9 = ₹ 33003
Increase of 10% Variable Cost	(10-6.6)/10 = 34%	₹ 34000/₹ 3.4=10000 units	10000 × ₹ 10 = ₹ 100000	15000-10000 = 5000 units	5000 × ₹ 10 = 50000
Increase in sales volume by 2000 units.	(10-6)/10 = 40%	₹ 34000/₹ 4 = 8500 units	8500 × ₹ 10 = ₹ 85000	17000-8500 = 8500 units	8500 × ₹ 10 = ₹ 85000
Increase of ₹ 6000 in Fixed Costs.	(10-6)/10 = 40%	₹ 34000/₹ 3.4 = 10000 units	10000 × ₹ 10 = ₹ 100000	15000-10000 = 5000 units	5000 × ₹ 10 = ₹ 50000

Answer 22. (b)

(i) The marginal costing technique provides that the product with highest contribution per unit is preferred. This inference holds true so long as it is possible to sell as much as it can produce. But sometimes an organisation can sell all it produces but production is limited due to scarcity of raw material, labour, electricity, plant capacity or capital.

These are called key factors or limiting factors. A key factor or limiting factor puts a limit on production and profit of the firm. In such situation, management has to take a decision whose production is to be increased, decreased or stopped. In such cases, selection of the product is done on the basis of contribution per unit of scarce factor of production. The key factor or scarce factor should be utilized in such a manner that contribution per unit of scarce resource is the maximum.

Mathematically,

$$\text{Profitability} = \frac{\text{Contribution}}{\text{Key Factor}}$$

For example, if raw material is the limiting factor, the profitability of each product is determined by contribution per Kg of raw material. If machine capacity is a limiting factor then contribution per machine hour is calculated. It electricity is the limiting factor, then contribution per unit of electricity of each product is calculated.

In case of Key factor situation, procedure of decision making is as under :

• Identify key factor

• Compute Total Contribution

• Compute Contribution per unit of Key Factor

• Rank the products based on Contribution per unit of key factor

• Allocate the key resources on basis of ranks.

(ii) Margin of safety (MOS) is the excess of budgeted or actual sales over the break even volume of sales. It states the amount by which sales can drop before losses begin to be incurred. The higher the margin of safety, the lower the risk of not breaking even.

Margin of Safety = Total budgeted or actual sales – Break even sales

or, $\dfrac{\text{Profit}}{\text{PV Ratio}}$

or, $\dfrac{\text{Profit}}{\text{Contribution per unit}}$.
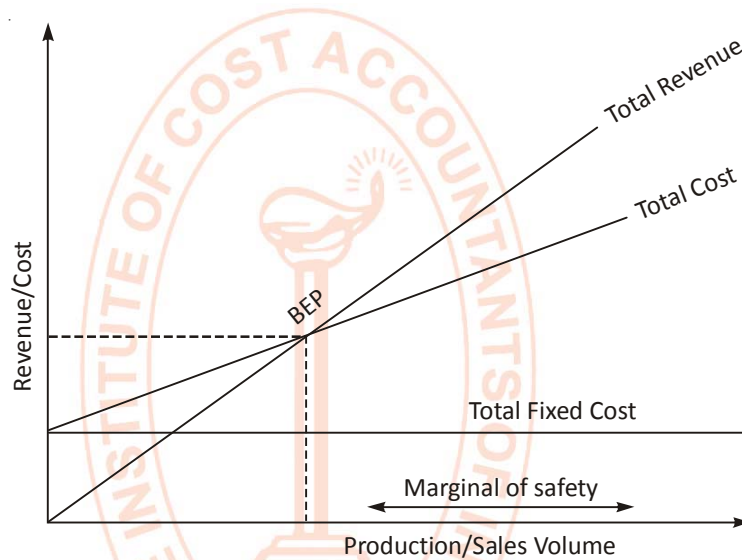
Q. 23. (a) A company produces three products. The General Manager has prepared the following draft budget for the next year.

	Products		
	A	**B**	**C**
Number of units	30000	20000	40000
Selling price (₹/unit)	40	80	20
P/V Ratio	20%	40%	10%
Raw material cost as percentage to sales value	40%	35%	45%
Maximum sales potential (units)	40000	30000	50000

The company uses the same raw material in all the three products and the price per kg. of the raw material is ₹ 2.

The company envisages profit of 10% on the budgeted turnover before interest and depreciation which are fixed. Interest and depreciation are estimated at ₹ 3,00,000 and ₹ 1,00,000 respectively. The draft budget makes full utilization on the available raw material which is in short supply.

The Managing Director is not satisfied with the budgeted profitability and hence he has passed on the aforesaid draft budget to you for review.

Required :

  (i) Set an optimal product mix for the next year and find its profit.

 (ii) The company has been able to locate a source for the purchase of an additional 20,000 kgs. of raw materials at an enhanced price. The transport cost of this additional quantity of raw material is ₹ 10,000. What is the maximum price per kg. that can be offered by the company for the additional quantity of raw material.

(b) What are the limitations of Marginal Costing system?

Answer 23. (a)

Details	A	B	C
Sales	₹ 1200000	₹ 1600000	₹ 800000
P/V Ratio	20%	40%	10%
Contribution	240000	640000	80000
Number of units	30000	20000	40000
Contribution per unit	₹ 8	₹ 32	₹ 2
Selling price (₹/unit)	40	80	20
Raw material cost as percentage to sales value	40%	35%	45%
Raw material cost per unit	₹ 16	₹ 28	₹ 9
Consumption of material per unit in kg. (Price ₹ 2 per Kg)	8 kg	14 kg	4.5 kg
Contribution per kg	Re. 1.00	Re. 2.28	Re. 0.44
Ranking based on contribution per kg.	II	I	III

Total material, for which the optimum utilization is to be attempted based on key factor consideration

Products	No. of units produced	Consumption per unit(kg)	Total consumption(kg)
A	30000	8	240000
B	20000	14	280000
C	40000	4.5	180000

(i) Optimal product mix for next year

Product	Maximum	Proposed No.	Consumption units (kg)	Material used (kg)	Material balance (kg)	Contribution per kg	Total
B	30000	30000	14	420000	280000	2.2857	960000
A	40000	35000	8	280000	-	1.0000	280000
Total contribution							1240000
Less: Fixed cost (Refer to note)							1000000
Profit by optimal mix							240000

*Rs. 32/ 14 = 2.2857

Note :

Turnover	₹ 36,00,000
Profit before interest and depreciation 10% of ₹ 36 lakhs	3,60,000
Less : Interest and depreciation	4,00,000
Loss	40,000

We know that :

Sales – Variable cost = Fixed cost + Profit

Or,   Contribution = Fixed cost + Profit

Or,   Contribution = Fixed cost – Loss

Or,   Contribution + Loss = Fixed cost

Or,   Fixed cost = ₹ 9,60,000 + ₹ 40,000 = ₹ 10,00,000

(ii) Raw material cost of A	₹ 16
Price per kg.	₹ 2
Raw material consumed per unit of A = 16 kg / 2 =	8 kg
Additional quantity available	20,000 kg
Additional unit of A to be produced = 20,000 / 8 =	2,500 units

Since only 35,000 units are produced by optimum plan proposed in (i) and maximum production limit of product A is 40,000, company can purchase this additional quantity of raw material for production of product A.

Additional contribution per unit of A = ₹ 8	
Additional contribution will be 2,500 units × ₹ 8	₹ 20,000
Less : Transport cost	10,000
Balance available for price increase	10,000

Maximum additional price = 10,000 / 20,000 = ₹ 0.50 per kg.

Or, Maximum price = ₹ 2.00 + 0.50 = ₹ 2.50 per kg.

Answer 23. (b)

The limitations of Marginal Costing system are as follows :

(i) The classification of total costs into fixed and variable cost is difficult. Most of the expenses are neither totally fixed or variable.

(ii) In this technique fixed costs are totally eliminated for the valuation of inventory of finished and semi-finished goods. Such elimination affects the profitability adversely. Overheads of fixed nature cannot be altogether be excluded particularly in large contracts while valuing WIP.

(iii) In marginal costing historical data is used while management decisions are related to future events.

(iv) It does not provide any standard for the evaluation of performance.

(v) Selling price fixed on the basis of marginal cost will be useful only for short period of time. Hence sales staff may be cautioned against incorrect pricing decisions while giving them information on marginal cost.

(vi) Marginal costing ignores time factor and investment. The effect of time value of money is not analysed by Marginal Costing. For example, marginal cost of two jobs may be same but time taken for completion and cost of machines may differ.

Q. 24. (a) The monthly budgets for manufacturing overhead of a concern for two levels of activity were as follows :

Capacity	60%	100%
Budgeted production (units)	600	1,000
Wages	₹ 1,200	₹ 2,000
Consumable stores	900	1,500
Maintenance	1,100	1,500
Power and fuel	1,600	2,000
Depreciation	4,000	4,000
Insurance	1,000	1,000
	9,800	12,000

You are required to :

(i) Indicate which of the items are fixed, variable and semi variable

(ii) Prepare a budget for 80% capacity; and

(iii) Find the total cost, both fixed and variable, per unit of output at 60%, 80% and 100% capacity.

(b) (i) What do you understand by the term performance budgeting?

(ii) What are the types of functional budgets?

Answer 24. (a)

(i) Fixed :

Depreciation	- Since it remains constant at both the given levels.
Insurance	- Same as above.

Variable :

Wages	- Because it is ₹ 2 per unit at both the given levels.
Consumable stores	- Because it is ₹ 1.50 per unit at both the given levels.

Semi-variable :

Maintenance	- Since it is neither fixed nor the quantum of increase is proportionate to the increase in volume.
Power and fuel	- Same as above.

(ii) First of all, find out the variable portion of semi-variable overhead.

Working notes :

Maintenance :

Variable portion = Change in production/ Change in overhead

= ₹ 400 ÷ 400 = Re. 1 per unit.

Fixed portion   = ₹ 1,100 – (600 units × Re. 1) = ₹ 500

At 80% capacity level = (800 units × Re. 1) + ₹ 500 = ₹ 1,300

Power and fuel :

Variable portion	= ₹ 400 ÷ 400 = Re. 1 per unit.
Fixed portion	= ₹ 1,600 – (600 units × Re. 1) = ₹ 1,000
At 80% capacity level	= (800 units × Re. 1) + ₹ 1,000 = ₹ 1,800

Budget for 80% capacity level

Budgeted production (80% capacity)	800 units
Wages @ ₹ 2 per unit	1,600
Consumables stores @ ₹ 1.5 per unit	1,200
Maintenance : – as per above working	1,300
Power and fuel : – do –	1,800
Depreciation	4,000
Insurance	1,000
Total	10,900

To sum up, the variable cost per unit works out to ₹ 5.50. It consists of wages – ₹ 2, consumable stores – ₹ 1.50, maintenance – Re. 1 and power and fuel – Re. 1. The total fixed cost comes to ₹ 6,500 i.e. maintenance ₹ 500 + power and fuel ₹ 1,000 + depreciation ₹ 4,000 + insurance ₹ 1,000.

		Capacity		
(iii)	Total cost per unit	60%	80%	100%
	Production (units)	600	800	1,000
			₹ Per unit	
	Variable cost	5.50	5.50	5.50
	Fixed cost (₹ 6,500 ÷ production)	10.83	8.13	6.50
	Total	16.33	13.63	12.00

It should be noted that total cost (both fixed and variable) per unit is required and nor total cost at different capacity levels.

Answer 24. (b)

(i) It is budgetary system where the input costs are related to the performance i.e. the end results. This budgeting is used extensively in the Government and Public Sector Undertakings. It is essentially a projection of the Government activities and expenditure thereon for the budget period. This budgeting starts with the broad classification of expenditure according to functions such as education, health, irrigation, social welfare etc. Each of the functions is then classified into programs, sub classified into activities or projects. The main features of performance budgeting are as follows :

— Classification into functions, programs or activities

— Specification of objectives for each program

— Establishing suitable methods for measurement of work as far as possible.

— Fixation of work targets for each program.

Objectives of each program are ascertained clearly and then the resources are applied after specifying them clearly. The results expected from such activities are also laid down. Annual,

quarterly and monthly targets are determined for the entire organization. These targets are broken down for each activity center. The next step is to set up various productivity or performance ratios and finally target for each program activity is fixed. The targets are compared with the actual results achieved. Thus the procedure for the performance budgets include allocation of resources, execution of the budget and periodic reporting at regular intervals.

The budgets are initially compiled by the various agencies such as Government Department, public undertakings etc. Thereafter these budgets move on to the authorities responsible for reviewing the performance budgets. Once the higher authorities decide about the funds, the amount sanctioned are communicated and the work is started. It is the duty of these agencies to start the work in time, to ensure the regular flow of expenditure, against the physical targets, prevent over runs under spending and furnish report to the higher authorities regarding the physical progress achieved.

In the final phase of performance budgetary process, progress reports are to be submitted periodically to higher authorities to indicate broadly, the physical performance to be achieved, the expenditure incurred and the variances together with explanations for the variances.

(ii) The functional budgets are prepared for each function of the organization. These budgets are normally prepared for a period of one year and then broken down to each month.

Functional budgets are broadly grouped under following heads :

(A) *Physical Budgets* : Budgets that contain information in terms of physical units about sales, production,etc,for example, quantity of sales, quantity of production, etc.

(B) *Cost Budgets* : Budgets which provide cost information in respect of manufacturing, sales, administration, R&D Cost Budgets.

(C) *Profits Budgets* : Budgets that enable ascertainment of profit, for e.g sales budget, profit and loss budget etc.

(D) *Financial Budget* : A budget which facilitates to ascertain the Financial Position of a concern, for eg. Cash budget, Capital Expenditure Budget etc.

Q. 25. (a) RST Ltd has its own power plant, which has two users, Cutting Department and Welding Department. When the plans were prepared for the power plant, top management decided that its practical capacity should be 1,50,000 machine hours. Annual budgeted practical capacity fixed costs are ₹ 9,00,000 and budgeted variable costs are ₹ 4 per machine-hour. The following data are available :

	Cutting Department	Welding Department	Total
Actual Usage in 2002-03 (Machine hours)	**60,000**	**40,000**	**1,00,000**
Practical capacity for each department (Machine hours)	**90,000**	**60,000**	**1,50,000**

Required :

(i) Allocate the power plant's cost to the cutting and the welding department using a single rate method in which the budgeted rate is calculated using practical capacity and costs are allocated based on actual usage.

(ii) Allocate the power plant's cost to the cutting and welding departments, using the dual -rate method in which fixed costs are allocated based on practical capacity and variable costs are allocated based on actual usage.

(iii) **Allocate the power plant's cost to the cutting and welding departments using the dual-rate method in which the fixed-cost rate is calculated using practical capacity, but fixed costs are allocated to the cutting and welding department based on actual usage. Variable costs are allocated based on actual usage.**

(iv) **Comment on your results in requirements (i), (ii) and (iii).**

(b) **Based on the following information prepare a Cash Budget for PQR Ltd. :** ₹

	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Opening cash balance	10000	–	–	–
Collection from customers	125000	150000	160000	221000
Payments :				
Purchase of materials	20000	35000	35000	54200
Other expenses	25000	20000	20000	17000
Salary and wages	90000	95000	95000	109200
Income tax	5000	–	–	–
Purchase of machinery	–	–	–	20000

The company desires to maintain a cash balance of ₹ 15,000 at the end of each quarter. Cash can be borrowed or repaid in multiples of ₹ 500 at an interest of 10% per annum. Management does not want to borrow cash more than what is necessary and wants to repay as early as possible. In any event, loans cannot be extended beyond four quarters. Interest is computed and paid when the principal is repaid.

Assume that borrowing take place at the beginning and payments are made at the end of the quarters.

Answer 25. (a)

Working notes :

1. Fixed practical capacity cost per machine hour:

Practical capacity (machine hours)	1,50,000
Practical capacity fixed costs (₹)	9,00,000
Fixed practical capacity cost per machine hour	₹ 6

(₹ 9,00,000 / 1,50,000 hours)

2. Budgeted rate per machine hour (using practical capacity):

= Fixed practical capacity cost per machine hour + Budgeted variable cost per machine hour

= ₹ 6 + ₹ 4 = ₹ 10

(i) **Statement showing Power Plant's cost allocation to the Cutting & Welding departments by using single rate method on actual usage of machine hours.**

	Cutting Department ₹	Welding Department ₹	Total ₹
Power plants cost allocation by using actual usage (machine hours) (Refer to working note 2)	6,00,000 (60,000 hours × ₹ 10)	4,00,000 (40,000 hours × ₹ 10)	10,00,000

(ii) Statement showing Power Plant's cost allocation to the Cutting & Welding departments by using dual rate method.

	Cutting Department ₹	Welding Department ₹	Total ₹
Fixed Cost (Allocated on practical capacity for each department i.e.) : (90,000 hours : 60,000 hours)	5,40,000 $\left(\dfrac{₹9,00,000\times3}{5}\right)$	3,60,000 $\left(\dfrac{₹9,00,000\times2}{5}\right)$	9,00,000
Variable cost (Based on actual usage of machine hours)	2,40,000 (60,000 hours × ₹ 4)	1,60,000 (40,000 hours × ₹ 4)	4,00,000
Total cost	7,80,000	5,20,000	13,00,000

(iii) Statement showing Power Plant's cost allocation to the Cutting & Welding Departments using dual rate method

	Cutting Department ₹	Welding Department ₹	Total ₹
Fixed Cost Allocation of fixed cost on actual usage basis (Refer to working note 1)	3,60,000 (60,000 hours × ₹ 6)	2,40,000 (40,000 hours × ₹ 6)	6,00,000
Variable cost (Based on actual usage)	2,40,000 (60,000 hours × ₹ 4)	1,60,000 (40,000 hours × ₹ 4)	4,00,000
Total cost	6,00,000	4,00,000	10,00,000

(iv) Comments :

Under dual rate method, under (iii) and single rate method under (i), the allocation of fixed cost of practical capacity of plant over each department are based on single rate. The major advantage of this approach is that the user departments are allocated fixed capacity costs only for the capacity used. The unused capacity cost ₹ 3,00,00 (₹ 9,00,000 – ₹ 6,00,000) will not be allocated to the user departments. This highlights the cost of unused capacity.

Under (ii) fixed cost of capacity are allocated to operating departments on the basis of practical capacity, so all fixed costs are allocated and there is no unused capacity identified with the power plant.

Answer 25. (b)

Cash Budget for ABC Ltd.   ₹

	1ˢᵗ Qtr	2ⁿᵈ Qtr	3ʳᵈ Qtr	4ᵗʰ Qtr
Opening cash balance	10000	15000	15000	15325
Add : Collection from customers	125000	150000	160000	221000
Total cash available (A)	**135000**	**165000**	**175000**	**236325**
Payments :				
Purchase of materials	20000	35000	35000	54200
Other expenses	25000	20000	20000	17000
Salary and wages	90000	95000	95000	109200
Income tax	5000	–	–	–
Purchase of machinery	–	–	–	20000
Total cash payments (B)	**140000**	**150000**	**150000**	**200400**
Minimum cash balance required	15000	15000	15000	15000
Total cash required	**155000**	**165000**	**165000**	**215400**
Excess (deficit)	(20000)	–	10000	–
Financing :				
Borrowing	20000	–	–	–
Repayment	–	–	(9000)	(11000)
Interest payment	–	–	(675)*	(1100)
Total effect of financing (C)	2000	–	(9675)	(12100)
Cash balancing at the end of quarters (A-B+C)	**15000**	**15000**	**15325**	**23825**

* 9,000 × 0.10 × 9/12 = ₹ 675. Similarly interest has been calculated for one year @10% per annum on ₹ 11,000.

Q. 26. (a) ADB Ltd. has received an order from Customer 'X' to be executed for ₹ 1,800 (all inclusive). The order requires the following materials, labour etc. :

Materials	Requirements	In stock	Book value	Replacement cost per kg.	Realisable value per kg.
P	100 kg	50 kg	₹ 250	₹ 7	₹ 3
Q	300 kg	140 kg	₹ 280	₹ 3	Re. 1

Labour :

Department I   : 10 hrs. @ ₹ 15

Department II   : 8 hrs. @ ₹ 12

Variable overhead : ₹ 150

Material 'P' is one that is regularly used by the firm and if used on this order has to be replaced for the use of other orders - Material 'Q' has no use and is the result of excessive purchase made for an order executed two years ago.

Labour in department I is available for this order but labour in department II is fully engaged on another order which is earning a contribution of ₹ 20 per hour and if the order from 'X' is to be executed, labour in department II has to be diverted from current operations.

State whether the order received from customer "X" has to be accepted. Show workings.

(b) DEF has prepared the following budget for the coming year :

		₹ in lacs	₹ in lacs
Sales			20
Costs :	Direct materials	3.60	
	Direct Labour	6.40	
	Factory Overheads (Variable 2.20 + Fixed 2.60)	4.80	
	Administration Overhead	1.80	
	Sales Commission	1.00	
	Fixed Selling overhead	0.40	
Total Costs			18.00
Profit			2.00

The company fixes selling price by charging all overhead other than the Prime Costs on the basis of percentage of Direct Wages and to add a mark up of 1/9th of Total Costs to profit.

The company has received a special order which is in excess of budgeted sales. Material and labour costs of special order are ₹ 36000 and ₹ 64000 respectively. DEF submitted a quotation for special order for ₹ 200,000 while customer quoted a price of ₹ 150000. Advice the company whether the order should be accepted at ₹ 150000.

(c) Identify two common pitfalls in relevant costs analysis.

Answer 26. (a)

Relevant cost of order received from Customer 'X'

		₹	₹
Material A	(100 kgs. @ ₹ 7)	700	
Material B	(140 kgs. @ Re 1)	140	
	(160 kgs. @ ₹ 3)	480	1,320
Labour	(Dept. I 10 hrs. @ ₹ 15)	150	
	(Dept. II 8 hrs. @ ₹ 12)	96	
	Opportunity cost of contribution lost	160	406
Variable overheads			150
Total relevant cost of order			1,876

Analysis : The relevant cost of order amount to ₹ 1,876 whereas customer "x" has offered only ₹ 1,800 and it cannot be accepted.

Answer 26. (b)

Particulars	Nature and computation	₹
Direct materials	To be incurred specifically, hence relevant	36000
Direct labour	To be incurred specifically, hence relevant	64000
Variable Factory OH	To be incurred specifically, hence relevant 220000/640000 × 64000	22000
Fixed Factory OH	Apportioned Fixed OH not relevant	nil
Admn. OH	Apportioned Fixed OH not relevant	nil
Sales commission	Special order is direct order. Sales commission not payable	nil
Total relevant costs = Minimum price at which Co . may accept the offer		122000
Estimated sales revenue (if accepted)		150000
Estimated profit		28000
Percentage of Profit to revenue (Company policy is 1/9th, i.e 11.11%) only		18.66

Considering relevant cost and benefits the order may be accepted.

Answer 26. (c)

Two common pitfalls of relevant costs analysis are as follows :

 (i) All variable costs are relevant. Variable costs already incurred in past are historical and irrelevant. Even future variable costs which donot differ under different circumstances are irrelevant. For example, if company wishes to replace the manual operations with mechanizations, if same raw material is used, direct material cost is irrelevant.

 (ii) All fixed costs are irrelevant. There are fixed costs which are relevant as follows :

   (A) Fixed Costs are specifically incurred for any Contract;

   (B) When Fixed costs are incremental in nature;

   (C) When fixed portion of semi variable costs increases due to change in level of activity consequent to acceptance of a contract;

   (D) When Fixed Costs are avoidable or discretionary;

   (E) When Fixed cost are such that one cost is incurred in lieu of the another.

Q. 27. (a) A company is organized into two divisions namely A and B produces three products K, L and M. Data per unit are :

	K	L	M
Market price (₹)	120	115	100
Variable costs (₹)	84	60	70
Direct labour hours	4	5	3
Maximum sales potential (units)	1,600	1,000	600

Division B has demand for 600 units of product L for its use. If Division A cannot supply the requirement, Division B can buy a similar product from market at ₹ 112 per unit. What should be the transfer price of 600 units of L for Division B, if the total direct labour –hours available in Division A are restricted to 15,000?

(b) DAV Ltd. is engaged in the manufacture of Sunflower Oil. The three divisions are :

Harvesting – it produces Oilseeds and transports the same to Oil Mill,

Oil Mill- process Oilseeds and manufactures Edible Oil,

Marketing Division- packs Edible Oil in 2 Kg containers for sale T ₹ 150 per container.

The Oil Mill has a yield of 1000 kg of oil from 2000 kg of Oilseeds during a period. The Marketing Division has a yield of 500 cans of Edible Oil of 2 Kg of Oil.

The cost data for each division for the 3rd Quarter of 2011 are as under —

Harvesting Division:	Variable Cost per kg of Oil seed	₹ 2.50
	Fixed cost per Kg of Oilseed	₹ 5.00
Oil Mill Division:	Variable Cost of Processed Edible Oil	₹ 10 per Kg
	Fixed Cost of Processed Edible Oil	₹ 7.50 per Kg
Marketing Division:	Variable Cost per Can of 2 Kg of Oil	₹ 3.75
	Fixed Cost per Can of 2 Kg of Oil	₹ 8.75

Fixed Costs are calculated on the basis of estimated quantity of 2000 kg of Oilseeds harvested, 1000 kg of processed oil and 500 cans of Edible Oil packed by the aforesaid divisions respectively during the period under review.The other oil mills buy the oilseeds of same quantity at ₹ 12.50 per Kg in the market. The market price of Edible oil processed by the Oil Mill, if sold without being packed by Marketing Division is ₹ 62.50 per Kg.

 (i) Compute the Overall Profit of the Company of harvesting 2000 kg of Oilseeds, processing it into edible oil and selling the same in 2 cans as estimated for the period under review.

 (ii) Compute transfer prices using Shared Contribution Method in relation to Variable Costs and Market Pricing Method from (I) Harvesting Division to Oil Mill Division (II) Oil Mill Division to Marketing Division.

 (iii) Which method is preferable. Advice the divisional Manager.

Answer 27. (a)

Particulars	Product		
	K	L	M
Market price	120	115	100
Less : Variable cost	84	60	70
Contribution p.u. (i)	36	55	30
Direct labour hours p.u. (ii)	4	5	3
Contribution per D.L.H. (i)/(ii)	9	11	10
Rank	III	I	II

Product	Max sales	Hrs./unit	Production	Hours used	Balance Hrs.
L	1000	5	1000	5000	10000
M	600	3	600	1800	8200
K	1600	4	1600	6400	1800

Spare hours available in Division A	= 1,800 hrs.
Division A can produce product L in 1,800 spare hours	= 1,800 hrs./5 hrs. p.u.
	= 360 units of Product L
Balance units of product L required by Division B	= 600 units − 360 units
	= 240 units
Labour hours required for 240 units of product L	= 240 units x 5 hrs. p.u.
	= 1,200 hrs.
Opportunity contribution of K per hr.	= ₹ 9
Therefore, unit cost	= 9 hrs. × ₹ 5 = ₹ 45

Calculation of transfer price p.u.		(₹)
Variable cost	(600 units × ₹ 60)	36,000
Opportunity cost of contribution lost	(240 units × ₹ 45)	10,800
Total		46,800
Transfer price p.u.	(₹ 46,800/600 units)	78

Answer 27. (b)

(i) **Statement of Company's Profit**

	Harvesting	Oil Mill	Marketing	Total (₹)
(A) Sales (150 × 500)				
(B) Production (Qty)	2000 kg (oilseeds)	1000 kg (oil)	500 Cans	
(C) Variable Cost (VC) per unit	₹ 2.50	₹ 10.00	₹ 3.75	
(D) Total VC	₹ 5000	₹ 10000	₹ 1875	16875
(E) Contribution (A-D)				58125
(F) Total Fixed Cost	₹ 10000	₹ 7500	₹ 4375	21875
(G) Profit (E-F)				36250

(ii) **Computation of Transfer prices under different methods :**

	Harvesting	Oil Mill	Marketing
(A) Shared Contribution in relation to Variable Cost, i.e ₹ 58125 shared in ratio of 5000:10000:1875	₹ 17222	₹ 34444	₹ 6459
(B) Own Variable Costs	₹ 5000	₹ 10000	₹ 1875
(C) Transfer in Variable Costs	−	₹ 22222	₹ 66666
(D) Transfer Price under shared Contribution method (A+B+C)	₹ 22222	₹ 66666	₹ 75000 (market price)
(E) Transfer Price under Market Price Method	₹ 12.50 × 2000 = ₹ 25000	₹ 62.50 × 1000 = ₹ 62500	MP = ₹ 75000

(iii) Computation of Divisional Profits under different Transfer Pricing Methods:

	Harvesting	Oil Mill	Marketing	Total (₹)
(1) Shared Contribution Method (WN ii)	₹ 22222	₹ 66666	₹ 75000	
Less : Own Variable Costs	₹ 5000	₹ 10000	₹ 1875	
Less : Transfer in Costs	-	₹ 22222	₹ 66666	
Less : Fixed Costs	₹ 10000	₹ 7500	₹ 4375	
Profits	**₹ 7222**	**₹ 26944**	**₹ 2084**	**₹ 36250**
(2) Market Price Method				
Transfer Price (WN ii)	₹ 25000	₹ 62500	MP = ₹ 75000	
Less : Own Variable Costs	₹ 5000	₹ 10000	₹ 1875	
Less : Transfer in Costs	-	₹ 25000	₹ 62500	
Less : Fixed Costs	₹ 10000	₹ 7500	₹ 4375	
Profits	**₹ 10000**	**₹ 20000**	**₹ 6250**	**₹ 36250**
Preferences	Market Price	Shared Contribution	Market Price	

Q. 28. (a) KNT Limited has decided to analyse the profitability of its five new customers. It buys bottled water at ₹ 90 per case and sells to retail customers at a list price of ₹ 108 per case. The data pertaining to five customers are:

	Customers				
	P	Q	R	S	T
Cases sold	4,680	19,688	1,36,800	71,550	8,775
List Selling Price	₹ 108	₹ 108	₹ 108	₹ 108	₹ 108
Actual Selling Price	₹ 108	₹ 106.20	₹ 99	₹ 104.40	₹ 97.20
Number of Purchase orders	15	25	30	25	30
Number of Customer visits	2	3	6	2	3
Number of deliveries	10	30	60	40	20
Kilometers travelled per delivery	20	6	5	10	30
Number of expedited deliveries	0	0	0	0	1

Its five activities and their cost drivers are :

Activity	*Cost Driver Rate*
Order taking	₹ 750 per purchase order
Customer visits	₹ 600 per customer visit
Deliveries	₹ 5.75 per delivery Km traveled
Product handling	₹ 3.75 per case sold
Expedited deliveries	₹ 2,250 per expedited delivery

Required :

 (i) Compute the customer-level operating income of each of five retail customers now being examined (P, Q, R, S and T). Comment on the results.

      (ii) **What insights are gained by reporting both the list selling price and the actual selling price for each customer?**

      (iii) **What factors KNT Limited should consider in deciding whether to drop one or more of five customers?**

    (b) **How would you treat the following in Cost Accounts?**

     (i) **Employee welfare costs**

    (ii) **Research and development costs**

    (iii) **Depreciation**

Answer 28. (a)

Working note :

Computation of revenues (at listed price), discount, cost of goods sold and customer level operating activities costs :

	Customers				
	P	**Q**	**R**	**S**	**T**
Cases sold: (a)	4,680	19,688	1,36,800	71,550	8,775
Revenues (at listed price) (₹): (b){(a) × ₹ 108)}	5,05,440	21,26,304	1,47,74,400	77,27,400	9,47,700
Discount (₹) :	-	35,438	12,31,200	2,57,580	94,770
(c){(a)×Discount per case}		(19,688 cases × ₹ 1.80)	(1,36,800 cases × ₹ 9)	(71,550 cases × ₹ 3.60)	(8,775 cases × ₹ 10.80)
Cost of goods sold (₹) : (d) {(a) × ₹ 90}	4,21,200	17,71,920	1,23,12,000	64,39,500	7,89,750
Customer level operating activities costs					
Order taking costs (₹):(No. of purchase orders × ₹ 750)	11,250	18,750	22,500	18,750	22,500
Delivery vehicles travel costs (₹)(₹ 5.75 per km) (Kms traveled by delivery vehicles × ₹ 5.75 per km.)	1,150	1,035	1,725	2,300	3,450
Product handling costs (₹) {(a) × ₹ 3.75}	17,550	73,830	5,13,000	2,68,313	32,906
Cost of expediting deliveries (₹){No. of expedited deliveries × ₹ 2,250}	-	-	-	-	2,250
Total cost of customer level operating activities (₹)	31,150	95,415	5,40,825	2,90,563	62,906

(i) **Computation of Customer level operating income**

	Customers				
	P ₹	**Q** ₹	**R** ₹	**S** ₹	**T** ₹
Revenues (At list price) (Refer to working note)	5,05,440	21,26,304	1,47,74,400	77,27,400	9,47,700
Less : Discount (Refer to working note)	–	35,438	12,31,200	2,57,580	94,770
Revenue (At actual price)	5,05,440	20,90,866	1,35,43,200	74,69,820	8,52,930
Less : Cost of goods sold (Refer to working note)	4,21,200	17,71,920	1,23,12,000	64,39,500	7,89,750
Gross margin	84,240	3,18,946	12,31,200	10,30,320	63,180
Less : Customer level operating activities costs (Refer to working note)	31,150	95,415	5,40,825	2,90,563	62,906
Customer level operating income	53,090	2,23,531	6,90,375	7,39,757	274

Comment on the results :

Customer S is the most profitable customer, despite having only 52.30% of the unit volume of customer R. The main reason is that R receives a ₹ 9 per case discount while customer S receives only a ₹ 3.60 discount per case.

Customer T is less profitable, in comparison with the small customer P being profitable. Customer T received a discount of ₹ 10.80 per case, makes more frequent orders, requires more customer visits and requires more delivery kms. in comparison with customer P.

(ii) Insight gained by reporting both the list selling price and the actual selling price for each customer:

Separate reporting of both-the listed and actual selling prices enables KNT Ltd. to examine which customer has received what discount per case, whether the discount received has any relationship with the sales volume. The data given below provides us with the following information;

Sales volume	Discount per case (₹)
R (1,36,800 cases)	9.00
S (71,550 cases)	3.60
Q (19,688 cases)	1.80
T (8,775 cases)	10.80
P (4,680 cases)	0

The above data clearly shows that the discount given to customers per case has a direct relationship with sales volume, except in the case of customer T. The reasons for ₹ 10.80 discount per case for customer 'T' should be explored.

(iii) Factors to be considered for dropping one or more customers :

Dropping customers should be the last resort to be taken by KNT Ltd. Factors to be considered should include :

What is the expected future profitability of each customer? Are the currently least profitable (T) or low profitable (P) customers are likely to be highly profitable in the future?

What costs are avoidable if one or more customers are dropped?

Can the relationship with the "problem" customers be restructured so that there is at "win win" situation?

Answer 28. (b)

(i) **Employee Welfare Costs :** It includes those expenses, which are incurred by the employers on the welfare activities of their employees. The welfare activities on which these expenses are usually incurred may include canteen, hospital, play grounds, etc. These expenses should be separately recorded as Welfare Department Costs. These Costs may be apportioned to production cost centres on the basis of total wages or the number of men employed by them.

(ii) **Research and development costs :** It is the cost/expense incurred for searching new or improved products, production methods/techniques or plants/equipments. Re– search cost may be incurred- for carrying basic or applied research. Both basic and applied research relates to original investigations to gain from new scientific or technical knowledge and understanding, which is not directed towards any specific practical aim (under basic research) and is directed towards a specific practical aim or objective (under applied research).

Treatment in Cost Accounts: Cost of Basic Research (if it is a continuous activity) be charged to the revenues of the concern. It may be spread over a number of years if research is not a continuous activity and amount is large.

Cost of applied research, if relates-to all existing products and methods of production then it should be treated as a manufacturing overhead of the period during which it has been incurred and absorbed. Such costs are directly charged to the product, it is solely incurred for it.

If applied research is conducted for searching new products or methods of production etc. then the research costs treatment depends upon the outcome of such research. For example, if research findings are expected to produce future benefits or if it appears that such findings are going to result in failure then the costs incurred may be amortised by charging to the Costing Profit and Loss Account of one or more years depending upon the size of expenditure. If research proves successful, then such costs will be charged to the concerned product.

Development Costs begins with the implementation of the decision to produce a new or improved product or to employ a new or improved method. The treatment of development expenses is same as that of applied research.

(iii) **Depreciation :** It represents the fall in the asset value due to its use, wear and tear and passage of time. Depreciation is an indirect cost of production and operations. It is an important element of cost and without this true cost of production cannot be obtained. In costing; depreciation on plant and machinery is normally treated as part of the factory overheads.

Q. 29. (a) Enumerate the points on which uniformity is essential before introducing uniform costing system?

(b) What are the essential pre-requisites of integrated accounting system?

(c) Discuss the treatment in cost accounts of the cost of small tools of short effective life.

Answer 29. (a)

Points on which uniformity is essential before introducing uniform costing system are :

1. The firms in the industry should be willing to share / furnish relevant data/ information.

2. A spirit of cooperation and mutual trust should prevail among the participating firms.

3. Mutual exchange of ideas, methods used, special achievements made, research and know-how etc. should be frequent.

4. Bigger firms should take the lead towards sharing their experience and know-how with the smaller firms to enable the latter to improve their performance.

5. Uniformity must be established with regard to several points before the introduction of uniform costing in an industry. In fact, uniformity should be with regard to following points :

   • Size of the various units covered by uniform costing.

   • Production methods

   • Accounting methods, principles and procedures used.

Answer 29. (b)

Essential pre-requisites of Integrated Accounting System :

The essential pre-requisites of integrated accounting system include the following :

1. The management's decision about the extent of integration of the two sets of books. Some concerns find it useful to integrate upto the stage of primary cost or factory cost while other prefer full integration of the entire accounting records.

2. A suitable coding system must be made available so as to serve the accounting purposes of financial and cost accounts.

3. An agreed routine, with regard to the treatment of provision for accruals, prepaid expenses, other adjustment necessary for preparation of interim accounts.

4. Perfect coordination should exist between the staff responsible for the financial and cost aspects of the accounts and an efficient processing of accounting documents should be ensured.

   Under this system there is no need for a separate cost ledger. Of course, there will be a number of subsidiary ledgers; in addition to the useful Customers Ledger and the Bought Ledger, there will be : (a) Stores Ledger; (b) Stock Ledger and (c) Job Ledger.

Answer 29. (c)

Small tools are mechanical appliances used for various operations on a work place, specially in engineering industries. Such tools include drill bits, chisels, screw cutter, files etc.

Treatment of cost of small tools of short effective life :

(i) Small tools purchased may be capitalized and depreciated over life if their life is ascertainable. Revaluation method of depreciation may be used in respect of very small tools of short effective life. Depreciation of small tools may be charged to :

   – Factory overheads

   – Overheads of the department using the small tool.

(ii) Cost of small tools should be charged fully to the departments to which they have been issued, if their life is not ascertainable.

Q. 30. (a) LMN Ltd. has an installed capacity of 1,20,000 units per annum. The cost structure of the product manufactured is as under :

		₹
(i)	Variable cost per unit -	
	Materials	8
	Labour (Subject to a minimum of ₹ 56,010 per month)	8
	Overheads	3

(ii) Fixed overheads ₹ 1,68,750 per annum

(iii) Semi-variable overheads – ₹ 48,000 per annum at 60% capacity, which increase by ₹ 6,000 per annum for increase of every 10% of the capacity utilisation or any part thereof, for the year as a whole.

The capacity utilisation for the next year is estimated at 60% for two months, 75% for six months and 80% for the remaining part of the year. If the company is planning to have a profit of 25% on the selling price, calculate the selling price per unit. Assume that there are no opening and closing stocks.

(b) FBG Ltd of Surat purchased three Chemicals P, Q and R from Mumbai. The invoice gave the following information :

	₹
Chemical P :	12,600
Chemical Q :	19,000
Chemical R :	9,500
Sales Tax	2,055
Railway Freight	1,000
Total Cost	44,155

A shortage of 200 kg in Chemical A, of 280 kg. in Chemical B and of 100 kg. in Chemical C was noticed due to breakages. At Surat, the company paid Octroi duty @ Re 0.10 per kg. The Company also paid Cartage ₹ 22 for Chemical A, ₹ 63.12 for Chemical B and ₹ 31.80 for Chemical C. Calculate the stock rate that you would suggest for pricing issue of chemicals assuming a provision of 5% towards further deterioration.

(c) From the following information extracted fro the books of KBC Ltd, compute Profit under (i) Absorption Costing (ii) Profit under Marginal Costing (iii) Statement reconciling the difference in profit under two methods if any.

	March	*April*
Sales	5000 units	10000 units
Production	10000	5000
Selling price/unit	₹ 100	₹ 100
Variable production cost/unit	50	50
Fixed production overhead incurred	100000	100000
Fixed production overhead cost per unit, being the predetermined overhead absorption rate	10	10
Fixed administration, selling and distribution cost	₹ 50000	₹ 50000

Answer 30. (a)

Statement of Selling Price and Profit

	₹
Material	7,12,000
89,000 units × ₹ 8 p.u.	
(Refer to working note 1)	
Labour cost	7,28,000
(Refer to working note 2)	
Variable overheads	2,67,000
(89,000 units × ₹ 3)	
Semi-variable overheads	60,000
(Refer to working note 3)	
Fixed overheads	1,68,750
Total cost	19,35,750
Add : Profit @ 25% of selling price or	
33-1/3% on cost	6,45,250
Total sales value	25,81,000
Selling price per unit	29.00
(₹ 25,81,000/89,000 units)	

Working notes :

1. Capacity utilisation (for the next year)

60% of capacity for first two months	= 2 months × 6,000 units = 12,000 units
75% capacity for next six months	= 6 months × 7,500 units = 45,000 units
80% of capacity for the remaining four months	= 4 months × 8,000 units = 32,000 units
Total capacity utilisation	89,000 units

    Capacity utilisation = $\dfrac{89,000 \text{ units}}{1,20,000 \text{ units}} \times 100$ = $74\frac{1}{6}\%$

2. Calculation of labour cost (subject to a minimum of ₹ 56,000 p.m.)

	₹
Labour cost of first two months	
12,000 units × ₹ 8 = ₹ 96,000	
But minimum here is	1,12,000
Labour cost of next six months	
45,000 units × ₹ 8 = ₹ 3,60,000	3,60,000
Labour cost of last four months	
32,000 units × ₹ 8	2,56,000
Total labour cost	7,28,000

3. Calculation of semi-variable overheads (per annum) :

	₹
Semi-variable overheads at 60% capacity	48,000
Semi-variable overheads for additional 14-1/6% capacity are the same as that for 20% of the capacity utilisation for the whole year	12,000
	60,000

Answer 30. (b)

Statement showing the Issue Rate of Chemicals

	Chemicals		
	P ₹	**Q** ₹	**R** ₹
Purchase Price	12,600	19,000	9,500
Add: Sales Tax @ 5% of purchase price (Refer to Working Note 2)	630	950	475
Add: Railway Freight in the ratio of 3:5:2 (Refer to Working Note 3)	300	500	200
Add: Octroi @ Re. 1.10 p.per kg. On the quantity of material received (Refer to Working Note 1)	280	472	190
Add: Cartage	22	6312	31.80
Total Price	13,832	20,985.12	10,396.80
Rate of issue per Kg = $\dfrac{\text{Total price}}{\text{Qty. available for issue}}$ (Refer to Working Note 1)	$=\dfrac{₹\,13,832}{2,660\ \text{kg.}}$ $= ₹ 5.20$	$=\dfrac{₹20,985.12}{4,484\text{Kg.}}$ $= ₹ 4.68$	$=\dfrac{₹10,396.80}{1,805\text{kg.}}$ $= ₹ 5.76$

Working Notes :

1. **Statement showing the quantity of chemicals available for issue**

	Chemicals		
	P Kg.	**Q** Kg.	**R** Kg.
Quantity purchased	3,000	5,000	2,000
Less: Shortage (Assumed to be normal	200	280	100
Quantity received at the store	2,800	4,720	1,900
Less: Provision for further deterioration 5%	140	236	95
Quantity available for issue	2,660	4,484	1,805

2. **Rate of sales Tax** = $\dfrac{\text{Sales Tax}}{\text{Total Purchase price of Chemical}} \times 100 = \dfrac{₹2,055}{₹41,100} \times 100 = 5\%$

3. **Railway Freight :** It has been charged on the basis of quantity purchased i.e. P : 3000 kg; Q : 5000 kg; R : 2000 kg in the ratio of 3:5:2.

Answer 30. (c)

(i) **Profit & Loss statement using absorption costing**

₹ In '000

	March	April
(A) Sales: (5000*100)	500	
(10000*100)		1000
(B) Cost of Goods sold:		
Opening stock	-	300
Variable cost of production:		
March(10000*50)April(5000*50)	500	250
Fixed production overhead:	100	100
	600	650
Less Closing stock	300	-
Cost of Goods sold:	300	650
Gross profit(A-B)	200	350
Less: Administration ,Selling and distribution overhead	50	50
Profit	150	300

(ii) **Profit Statement under Marginal Costing**

₹ In '000

	March	April
(A) Sales:	500	1000
(B) Cost of Goods sold:		
Opening stock		250
Production cost March (10000*50) April (5000*50)	500	250
Less: Closing Stock (5000*₹ 50)	250	-
Cost of Goods sold:	250	500
Contribution (A-B)	250	500
Less : Fixed Cost:		
Production overhead	100	100
Administration, selling and distribution overhead	50	50
Net profit	100	350

(iii) **Statement showing reconciliation of profit**

₹ In '000

	March	April
Profit under marginal costing	100	350
Add: Fixed overheads included in closing stock in March: Less : Fixed overheads included in opening stock in April	100	(100)
Less: Under absorption of Admn, selling and distribution overhead in March Add: Over absorption of Admn, selling and distribution overhead in March	(50)	50
Profit under Absorption Costing	150	300

INTERMEDIATE EXAMINATION
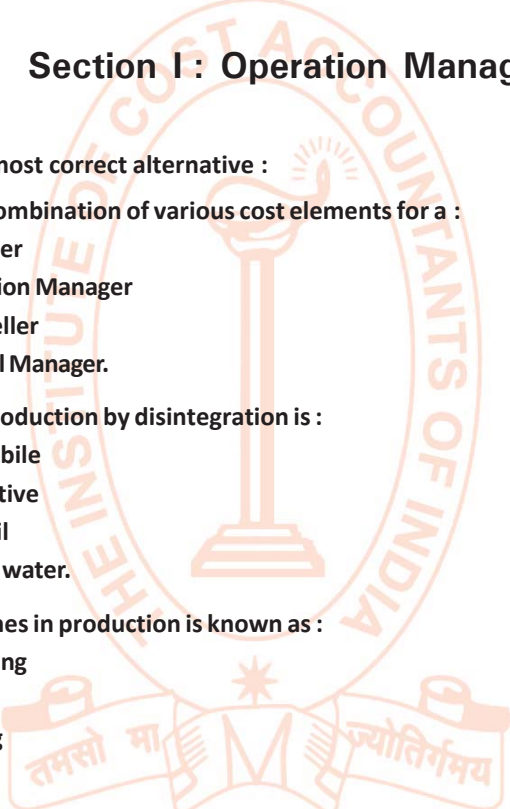
(REVISED SYLLABUS - 2008)

GROUP - II

Paper-9 : OPERATION MANAGEMENT AND INFORMATION SYSTEMS

Section I : Operation Management

Q. 1. (A) Choose the most correct alternative :

(i) Product is a combination of various cost elements for a :

    (a) Consumer

    (b) Production Manager

    (c) Retail seller

    (d) Financial Manager.

(ii) Example of production by disintegration is :

    (a) Automobile

    b) Locomotive

    (c) Crude oil

    (d) Mineral water.

(iii) Fixing Flow lines in production is known as :

    (a) Scheduling

    (b) Loading

    (c) Planning

    (d) Routing

(iv) The material handling cost per unit of product in Continuous production is :

    (a) Highest compared to other systems

    (b) Lower than other systems

    (c) Negligible

    (d) Cannot say.

(v) Important factor in forecasting production is :

    (a) Environmental changes

    (b) Available capacity of machines

    (c) Disposable income of the consumer

    (d) Changes in preference of the consumer.

(vi) **ABC analysis depends on the :**
  (a) **Quality of materials.**
  (b) **Cost of materials.**
  (c) **Annual consumption value of materials.**
  (d) **Quantity of materials used.**

(vii) **(Total station time/Cycle time × Number of work stations) × 100 is known as :**
  (a) **Line Efficiency**
  (b) **Line smoothness**
  (c) **Balance delay of line**
  (d) **Station efficiency**

(viii) **The class timetable is a good example of :**
  (a) **Route sheet**
  (b) **Follow up chart**
  (c) **Dispatcher's chart**
  (d) **Gantt chart.**

(ix) **Tempering is a process of :**
  (a) **Joining**
  (b) **Heat Treatment**
  (c) **Surface Treatment**
  (d) **Forming**

(x) **Buffer Stock is built to cater to :**
  (a) **Machine Breakdown**
  (b) **Import Substitution**
  (c) **Fluctuating load**
  (d) **Diversification**

Q. 1. (B) Fill in the blanks with appropriate word/words :
  (i) **Standard time is always more than _____ time.**
  (ii) **X chart is _____ chart.**
  (iii) **Plant layout is a _____ affair.**
  (iv) **Optimum Capacity is rate of output at which there is _____ to change the size of the plant.**
  (v) **Auxilury and support facilities required to operate main production unit are called _____ .**
  (vi) **_____ is a process that bakes on a white, brittle finish.**
  (vii) **Kaizen is essential part of _____ .**
  (viii) **Total output of all sectors is _____ total input of all sectors.**
  (ix) **A project implemented in the precincts of a working plant is known as _____ Project.**
  (x) **Production management is a _____ function.**

Answer 1. (A)

   (i) (d) **Financial Manager**

As Financial manager is responsible for profitability of the product.

  (ii) (c) **Crude oil**

By separating the contents of crude oil the desired fuel oils are produced.

 (iii) (d) **Routing**

Routing decision involves deciding the division of work into operations, the sequence in which each operation is to be done, division of each operation into elements.

 (iv) (b) **Lower than other systems**

Since machines are so located as to minimize distances between consecutive operations.

  (v) (b) **Available capacity of machines**

Capacity of machines is one of the limiting factor for deciding production volume, other factors given help in forecasting the demand.

 (vi) (c) **Annual consumption value of materials**

The ABC analysis suggests that inventories of an organization are not of equal value. 'A' items are very important for an organization. 'B' items are important, but of course less important, than 'A' items and more important than 'C' items. Therefore 'B' items are intergroup items. 'C' items are marginally important.

(vii) (a) **Line efficiency**

Line efficiency = Total minutes produced by the line/total minutes attended by all operators.

(viii) (d) **Grant chart**

This chart illustrate the start and finish dates of the terminal elements and summary elements of a project. Similar is the case with class time table which shows the routine for each day and start and finish time of each period.

 (ix) (b) **Heart Treatment**

Tempering is the process of reheating which will reduce the brittleness and soften the steel.

  (x) (c) **Fluctuating load**

Buffer stock is a supply of inputs held as a reserve to safeguard against unforeseen shortages or demands.

Answer 1. (B)

   (i) **normal**

Standard time = Normal time + Allowances.

  (ii) **mean**

By this chart, it is found whether the mean of the characteristic can be determined by the following formula:

Central Line = $\bar{\bar{X}} = \dfrac{\sum(\bar{X}_1....\bar{X}_k)}{k}$

$\quad\quad$ k is the number of subgroups

$\quad\bar{\bar{X}}$ = Mean of samples

$\sum\bar{\bar{X}}$ = Sum of sample means.

 (iii) **dynamic**

Good layout should have flexibility for change of layout, expansion due to changes in product design, process.

(iv) **no incentive**

It is the production capacity at which cost per unit is minimized.

(v) **utilities**

Utilities are significant inputs such as power, steam, water, compressed air which are used in manufacturing process but donot form part of final product.

(vi) **Enamelling**

It is a surface treatment process.

(vii) **TQM i.e. Total Quality Management**

Kaizen, Japanese for "improvement", or "change for the better" refers to philosophy or practices that focus upon continuous improvement of processes in manufacturing.

(viii) **equal to**

Output of one sector serves as input of another sector.

(ix) **Brown Field**

Brownfield sites are abandoned or underused industrial and commercial facilities available for re-use.

(x) **line**

Line function refers to decision making areas of an organization associated with its daily operations such as purchasing, production, selling.

Q. 2. (A) Match each item in Column A with appropriate item in Column B :

Column A	*Column B*
(i) **USP**	(a) **Job sequencing**
(ii) **ISO**	(b) **Scheduling**
(iii) **KANBAN**	(c) **Investment decision**
(iv) **VAM**	(d) **Standardisation**
(v) **EDD**	(e) **Job holding service**
(vi) **Tail Stock**	(f) **Prioritisation**
(vii) **Payback period**	(g) **Marketing strategy**
(viii) **FCFS**	(h) **Transportation application**
(ix) **Fractionalization**	(i) **Gilbreth**
(x) **Broaching**	(j) **Metal Cutting**

Q. 2. (B) Expand the following acronyms :

(i) **DMAIC**

(ii) **CPFR**

(iii) **GOLF**

(iv) **CRAFT**

(v) **MSE**

(vi) **VMI**

(vii) **WBS**

(viii) **UPC**

(ix) **QFD**

(x) **DFA**

Q. 2. (C) Indicate whether the following statements are *True/False*.

   (i) For a consumer the product is one which is available to him at cheap cost.

  (ii) Games theory deals with games which business executives play during lunch interval.

 (iii) Surface hardening is an example of production by service.

 (iv) Material handling is an integral part of sales process.

  (v) The time horizon selected for forecasting depends on time required for production cycle.

 (vi) Rucker plan is a group incentive plan.

 (vii) One of the aims of dispatching is to dispatch products to different places.

(viii) The card, which shows the number of rejected products from total quantity produced is quality control card.

 (ix) Assignment problem is solved by Johnson and Bellman method.

  (x) Preventive maintenance is useful in reducing inspection cost.

Answer 2. (A)

   (i) — (g)

  (ii) — (d)

 (iii) — (b)

 (iv) — (h)

  (v) — (a)

 (vi) — (e)

 (vii) — (c)

(viii) — (f)

 (ix) — (i)

  (x) — (j)

Answer 2. (B)

  (i) DMAIC — Define, Measure, Analyse, Improve and Control.

 (ii) CPFR — Collaborative Planning, Forecasting, and Replenishment.

(iii) GOLF — Government, Ordinary, Local and Foreign.

 (iv) CRAFT — Computarised Relative Allocation of Facilities Techniques .

  (v) MSE — Mean Squared Error.

 (vi) VMI — Vendor – managed Inventory.

(vii) WBS — Work Breakdown Structure.

(viii) UPC — Universal Product Code.

 (ix) QFD — Quality Function Deployment.

  (x) DFA — Design For Assembly.

Answer 2. (C)

  (i) **False.**

     For a consumer the product is one which is optima combination of potential utilities.

 (ii) **False.**

     Games theory is a mathematical method for analyzing calculated circumstances, such as in games, where a person's success is based upon the choices of others.

(iii) **True.**

     Under production by service the chemical and physical properties of materials are improved without any physical change.

(iv) **False.**

It is integral part of manufacturing process.

(v) **False.**

It depends on the purpose for which forecasts is made.

(vi) **True.**

Under this plan, added value is defined as the change in market value due to the alteration in the form, location & availability of product or service, excluding the cost of bought in materials or services. The ascertainment of the ratio of earnings & added value is done. Wage is proportionately increased due to any reduction in this ratio. For successful implementation, constant negotiation between employers & employees is required by the scheme. Rucker plan is known as share of production plan.

(vii) **False.**

Dispatching aims at the principle of completion of job by due date.

(viii) **False.**

It is Inspection card.

(ix) **True.**

It writes the value of a decision problem at a certain point in time in terms of the payoff from some initial choices and the value of the remaining decision problem that results from those initial choices. This breaks a dynamic optimization problem into simpler sub-problems, as Bellman's Principle of Optimality prescribes.

(x) **False.**

It helps in reducing shutdown cost.

Q. 3. (a) Contrast the capabilites and limitations of the following pairs of material handling equipment :

(i) EOT crane and Jib crane

(ii) Belt conveyor and Fork lift truck

(b) Distinguish between a job shop and a flow shop.

(c) C Ltd. manufactures three different items of tools. The time required to produce each tool on different operation is as follows :

Operation	Time in minutes		
	Drills	**Cutters**	**Reamers**
Turning	16	34	40
Grinding	10	8	17
Milling	4	5	8
Heat Treatment	3	3	3
Other data available :			
Sales per annum (units)	18000	20000	15000
Opening Stock (units)	5000	6000	–
Closing Stock (units)	2000	3000	4000

The workers are trained in each trade as such their services are interchangeable. They are paid at ₹ 27.50 per hour. The workers are paid for 2500 hours per annum which includes 200 hours for leave which time substitute operators are appointed and for 300 hours the machines are taken for overhaul. Using the above data, calculate :

(i) The production quantity.

(ii) No. of operators required per annum.

(iii) Annual direct labour cost on each type of tool, and

(iv) Indirect labour cost giving breakup of leave wages, overhaul time and idle time wages.

Answer 3. (a)

(i)

	EOT Crane	Jib crane
Capabilities	This is used for moving heavy work pieces in a rectangular area in large machine or assembly shops.	This is used to handle small work pieces.
Limitations	It can move load only in vertical direction.	It's movement is restricted to a semicircular area.

(ii)

	Belt conveyor	Fork lift truck
Capabilities	It provides continuous movement of material in chemical plants, power houses, etc.	It can move unit load on its fork anywhere and is capable of lifting and stacking material as well.
Limitations	It is only a fixed path material handling equipment.	It cannot move material continuously.

Answer 3. (b)

Job shop	Flow shop
(i) In a flow shop, continuous production/assembly line, each of the *n* jobs must be processed through *m* machines in exactly the same order and once in every machine.	(i) In a job shop, not all *n* jobs are assumed to pass through or require processing in *m* machines. Also some jobs may require more than one operation in the same machine. The sequencing of operations, may be different for different jobs.
(ii) Specialised machine results in low variable cost per unit and high volume absorbs the fixed cost easily; so unit cost is low.	(ii) Wide variety at reasonably low cost since general purpose machines are utilized.
(iii) Even unskilled or semi-skilled operator will be able to operate the machine thereby reducing dependencies on workers.	(iii) Through grouping of facility around standard operations, high capacity utilization could be effected.
(iv) Operation management is much simpler and meeting delivery commitments is relatively easier.	(iv) The workers are engaged in non-repetitive and challenging job. Their job gets enriched and morale high.
(v) Failure at any stage would result in breakdown of entire flow until repair is completed.	(v) Determination of optimum batch size creates a problem.
(vi) The pace of production is determined by the slowest machine.	(vi) Material flow is complicated and unsystematic.
(vii) The system is relatively inflexible.	(vii) Machines are diverse and operations are complex requiring highly skilled workers.
(viii) The system requires high investment due to specialized nature of machine.	(viii) Material Handling cost is usually higher since flow lines are irregular.

Answer 3. (c)

(i) Production quantity (units) :

Particulars	Drills	Cutters	Reamers
Sales	18000	20000	15000
Add : Closing Stock	2000	3000	4000
	20000	23000	19000
Less : Opening Stock	5000	6000	-
Production quantity	15000	17000	19000

(ii) No. of operators per annum :

Product	No. of units	Hours Required				
		Turning	Grinding	Milling	Heat Treatment	Total
Drills	15000	4000	2500	1000	750	8250
Cutters	17000	9633	2267	1417	850	14167
Reamers	19000	12667	5383	2533	950	21533
Total		26300	10150	4950	2550	43950
No. of operators required at (2500 – 300) hours = 2200 hours p.a rounded off to full operator		12	5	3	2	22

(iii) Annual direct labour cost (Rate per hour ₹ 27.50)

	Drills	Cutters	Reamers	Total
Direct labour hours	8250	14167	21533	43950
Direct labour cost. (₹)	226875	389592.50	592157.50	1208625

(iv) Indirect labour cost :

	Turning	Grinding	Milling	Heat Treatment	Total
No. of Hrs taken (no. of operators*2200)	26400	11000	6600	4400	
Total hours required as above	26300	10150	4950	2550	
Idle time hrs	100	850	1650	1850	
Leave hrs. (no. of operators*200)	2400	1000	600	400	
Overhaul hrs.	3600	1500	900	600	
Leave wages (leave hrs.*₹ 27.50)	66000	27500	16500	11000	121000
Overhaul time wages(overhaul hrs.*27.50)	99000	41250	24750	16500	181500
Idle time wages (idle time hrs*27.50)	2750	23375	45375	50875	122375
Indirect labour cost	167750	92125	86625	78375	424875

Q. 4. (a) A dairy plant management is to make a choice between Location A and Location B for locating a dairy plant for processing and distribution of milk . Location A could supply milk through road milk tankers (ROMT) where as Location B could have the facility of roads milk tankers (ROMT) as well as rail milk tankers (RLMT). Determine the following using the cost data given below :

  (i) The Breakeven point for location A and location B

  (ii) The production quantity at which either of the locations could be selected.

  (iii) State the conditions in which location A or location B would be preferred.

	Location A (Distribution by ROMT)	Location B (Distribution by ROMT & RLMT)
Selling Price (SP) of milk	₹ 10 /litre	₹ 10/litre
Variable cost (VC)	₹ 5.50/litre	₹ 3.00 per litre
Fixed cost per year (FC)	₹ 120,00,000	₹ 180,00,000

  (b) Dumpers are used to transport the Steel Ingots from Melting Shop to Ingot Yard, which is situated at a distance of 0.6 km from the melting shop. The capacity of the dumper is 8 tonnes. Due to speed restrictions, within factory the dumper cannot run beyond 12 Km/per hour. In order to avoid congestion in the Melting shop, a minimum transportation of 3200 Tonnes is necessary per shift (of 8 hrs. duration). Find the number of dumpers that would be required. Ignore the loading and unloading time.

Answer 4. (a)

At breakeven point :

Total revenue (TR) = Fixed cost (FC) + Variable cost (VC)

Quantity (Q) at breakeven point = FC/[SP-VC]

Q_{bep} for location A = 120,00,000/(10-5.5) = 120,00,000/4.5 = 26,66,666.6 litres

Q_{bep} for location B = 180,00,000/(10-3) = 180,00,000/7 = 25,71,428.5 litres.

(ii) Total cost of Location A and Location B at a given production volume can be calculated by the following formulae :

Total cost at Location A = 120,00,000 + 5.5Q

Total cost at Location B = 180,00,000 + 3.0 Q

Production volume for which Total Cost (TC) is same in both location A and B (Point of indifference)

    $TC_A = TC_B$

    120,00,000 + 5.5Q = 180,00,000 + 3.0 Q

Or   5.5Q-3Q = 60,00,000

Or   2.5Q = 60,00,000

Or   Q = 60,00,000/2.5

Or   Q = 2400,000 litres
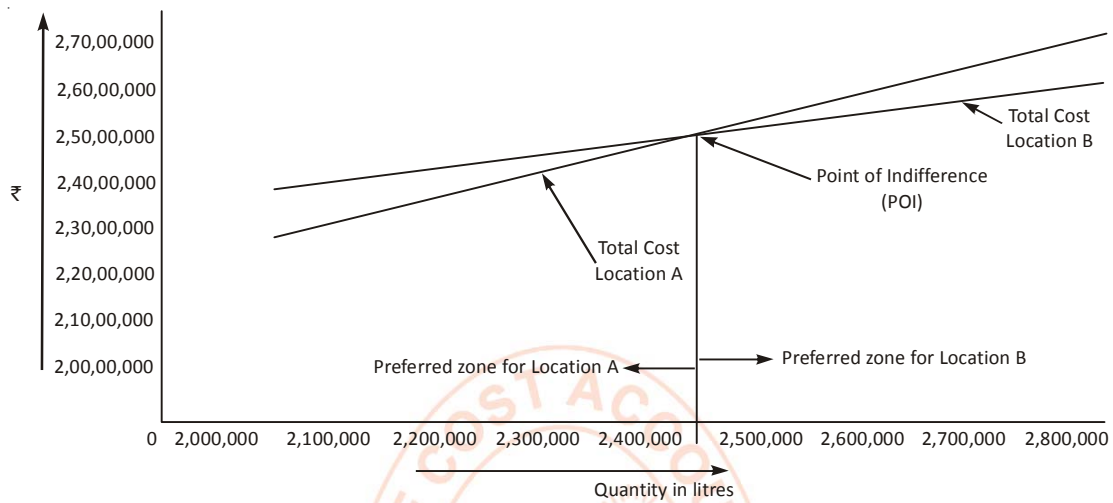
Total Costs and point of indifference between location A and location B

(iii) Comparison of total cost in respect of location A and location B

	Location A	**Location B**
Production Volume Q (litres)	TC = 120,00,000 + 5.5Q (₹)	TC = 180,00,000 + 3.0 Q (₹)
2,000,000.00	23000000	24000000
2,100,000.00	23550000	24300000
2,200,000.00	24100000	24600000
2,300,000.00	24650000	24900000
2,400,000.00	25200000	25200000
2,500,000.00	25750000	25500000
2,600,000.00	26300000	25800000
2,700,000.00	26850000	26100000
2,800,000.00	27400000	26400000

From the Figure and Table, It is observed that Location A would be suitable for production upto a level of 2400000 litres, where as Location B would be suitable for production level beyond 2400000 litres.

Answer 4. (b)

Distance travelled per trip = 0.6 + 0.6 = 1.2 Km.

No. of trips can be made per hour = 12/1.2 = 10 trips.

No. of trips per single shift = 10 × 8 = 80 trips.

Tonnage moved per shift = 80 × 8 = 640 tonnes.

No. of dumpers required = Required tonnage to move per shift/Tonnage moved per shift per dumper = 3200/640 = 5 Nos.

Q. 5. (a) There are five departments namely P, Q, R, S and T. The products manufactured by the factory needs the services of all the departments in different proportion. The volume of material for the products that move in between departments in terms of percentage of volume is given below. The distance between the departments also given. The layout engineer has prepared two layouts. Find which layout is better using load-distance matrix method.

Product Group	Sequence in which the departments used to department	Percentage of volume of material moves from department
I	PQRST	30
II	PRQTS	35
III	PRSQR	20
IV	PTSR	15

Distance between departments in meters in each layout is given below :

From	To	Layout I	Layout II	From	To	Layout I	Layout II
P	Q	20	25	C	Q	10	15
P	R	15	10	C	S	30	35
P	T	40	35	D	Q	25	30
Q	R	10	15	D	R	30	40
Q	T	25	25	E	S	15	10

(b) Should the following industries 'Simplify' or 'Diversify' and why?

(I) Automobile (II) Cosmetic

Answer 5. (a)

First let us write the load matrix and distance matrix from the data given.

Load Matrix or Volume Matrix

To

From		P	Q	R	S	T
	P	—	30	55	—	15
	Q	—	—	50	—	35
	R	—	35	—	50	—
	S	—	20	15	—	30
	T	—	—	—	50	—

Distance matrix for layout I

To (distance in meters)

From		P	Q	R	S	T
	P	—	20	15	—	40
	Q	—	—	10	—	25
	R	—	10	—	30	—
	S	—	25	30	—	15
	T	—	—	—	15	—

Next step is to multiply both volume matrix and distance matrix and workout volume-distance matrix. The row elements of this matrix are added and then these totals are added to get the grand total. The layout, which gives smaller total, will be the preferable layout.

The distance matrix of the second layout is :

To (distance in meters)

		P	Q	R	S	T
	P	—	25	10	—	35
	Q	—	—	15	—	25
From	R	—	15	—	35	—
	S	—	30	40	—	20
	T	—	—	—	10	—

Distance - Volume Matrix (L_1 for Layout I and L_2 for layout II)

From

		P	Q	R	S	T	Total for Layout I	Total for Layout II
P	L_1	—	600	825	—	600	2025	
	L_2	—	650	550	—	525		172
Q	L_1	—	—	500	—	875	1375	
	L_2	—	—	750	—	900		1650
R	L_1	—	350	—	1500	—	1850	
	L_2	—	540	—	1750	—		2290
S	L_1	—	500	450	—	450	1400	
	L_2	—	600	600	—	600		1800
T	L_1	—	—	—	750	—	750	
	L_2	—	—	—	500	—		500
Grand total for layout I =							7400	
Grand total for layout II =								6250

As layout II is having lesser grand total i.e. weighted distance for layout II is smaller, it is preferable. When number of layouts is prepared, weighted distance for all is calculated and the smaller is selected.

Answer 5. (b)

(I) Automobile manufacturer should follow simplification for the following reasons :

  (i) Since many parts and processes are involved , simplification reduces production control problems.

  (ii) Simplification would enable use of special purpose machines with permanently installed special purpose tooling ,since high precision jobs are involved.

 (iii) Semi skilled workforce can be employed in place of highly skilled , thus reducing labour costs;

 (iv) Since a variety of raw materials/ components inventory is needed , simplification would help in reducing inventory.

(II) Cosmetics manufacturer should follow diversification for the following reasons :

  (i) Seasonal fluctuations in demand for different types of cosmetics can be met.

  (ii) Risk of loss due to certain products is minimized.

 (iii) Provides better customer service by offering a wide choice of items in this high fashion industry

 (iv) Overhead Costs are spread over a larger sales volume, thus reducing overall costs.

Q. 6. (a) Sajo Beauty Salon (SBS)estimate that their customers on any day depend on the number of women visiting the Shopping Mall in which SBS is located. The relationship is expressed as :

A = (W/50) - 10

Where A = No. of customers

W = No. of women visiting the Mall

The total variation and the explained variation are 3200 and 2626, respectively.

Find :

(i) The co-efficient of correlation.

(ii) The co-efficient of determination.

(iii) On Women's Day, 3500 ladies visited the Mall. How many customers should have been expected at SBS?

(b) The targeted weekly output of a manufacturing unit employing 20 workers is 400 pieces. The group is entitled to earn an incentive @ 10% on aggregate of wages based on basic piece rate plus dearness allowance (which is ₹ 120 per week) upon achievement of a minimum of 80% of the output target. This incentive rate is increased by 2.5% flat for every 10% increase in achievement of targets upto a maximum of 10% at the level of 120% of the output target in the following manner :

Output Target	*Incentive Rate*
80%-90%	10%
90%-100%	12.5%
100%-110%	15%
110%-120%	17.5%
120% and above	20%

During the four weeks in February, the actual output achieved by the workers are 383 pieces, 442 pieces, 350 pieces and 318 pieces respectively. The average basic rate is ₹ 5. Compute the amount of incentive earned by the group during each of the four weeks.

Answer 6. (a)

(i) Co-efficient of co-relation $= \sqrt{\dfrac{\text{Explained variation}}{\text{Total variation}}} = \sqrt{\dfrac{2626}{3200}} = 0.905884$

(ii) Co-efficient of determination in case of simple regression is $R^2 = 0.820625$

(iii) A = (W/50) – (10)

where W = 3500

A = (3500/50) – (10) = 70 – 10 = 60

The number of customers expected on that day is 60.

Answer 6. (b)

Computation of incentives by group in February

Particulars	WEEKS			
	1st	**2nd**	**3rd**	**4th**
Actual output achieved (nos. of pieces)	383	442	350	318
Achievement (%) with respect to Standard (actual output/targeted output) × 100	95.75%	110.5%	87.5%	79.5%
Wages at piece rate (₹ 5 × quantity) [₹]	1915	2210	1750	1590
Dearness Allowance [₹]	120	120	120	120
Total [₹]	2035	2330	1870	1710
Incentive Rate (%)	12.5%	17.5%	10%	NIL
Incentive amount earned by group (₹)	254.38	407.75	187	NIL

Q. 7. (a) Explain the term 'cost of quality'.

(b) What are the objectives of using Control Charts for Variables?

(c) A company manufacturers a component on batches of 2000 each. Each component is tested before being sent to the agents for sales. Each component can be tested at the factory at a cost of ₹ 25. If any component is found to be defective, it can be rectified by spending ₹ 200. In view of the large demand for the components and the sophisticated system of manufacture, a proposal came up that the practice of pre-testing of the components be dispensed with to save costs. In that event, any defective component is received back from the customer under warranty, the cost of rectification and redespatch will be ₹ 400 per component.

State at what percentage of manufacture of components will the company find it cheaper to pre-test each component.

Answer 7. (a)

The maintenance of quality involves certain expenditure and costs. These are known as Costs of Quality and they comprise of the following :

   (i) Higher cost due to use of better quality of materials.
  (ii) Use of more expensive machines of advanced designs.
 (iii) Deployment of highly skilled workers , there by increasing total costs.
  (iv) Heavy rejections and attendant reworking.
   (v) Costs of disposal of scrap and wastes.

There are three categories of quality :

Cost of Appraisal : The costs associated with measuring, evaluating or auditing products or services to assure conformance to quality standards and performance requirements. For example, incoming and source inspection/test of purchased material, In-process and final inspection/test, product, process or service audits calibration of measuring and test equipment, associated supplies and materials.

Cost of prevention : The costs of all activities specifically designed to prevent poor quality in products or services. Examples are the costs of : New product review, quality planning , supplier capability surveys, process capability evaluations, quality improvement team meetings, quality improvement projects, quality education and training.

Cost of Failure : The costs resulting from products or services not conforming to requirements or customer/user needs. Failure costs are divided into internal and external failure categories.

Internal Failure Costs : Failure costs occurring prior to delivery or shipment of the product, or the furnishing of a service, to the customer. Examples are the costs of : Scrap, Rework, Re-inspection, Re-testing, Material review, Downgrading.

External Failure Costs : Failure costs occurring after delivery or shipment of the product — and during or after furnishing of a service — to the customer. Examples are the costs of: Processing customer complaints, Customer returns, Warranty claims, Product recalls.

Total Quality Costs : The sum of the above costs.

The costs mentioned above get added to the product cost and hence high quality becomes more expensive, generally. Thus cheaper products may not be able to afford the luxury of Costs of Quality.

Answer 7. (b)

The objectives of using Control Chart for Variables are as follows :

(i) To monitor a production process on a continuing basis.

(ii) To analyze the process with a view to establishing or changing specifications/production, procedures/inspection and/or procedures.

(iii) To provide a basis for continuous evaluation of production as to when to look for causes for external variations and to take action with a view to correct a process and when to leave a process alone.

(iv) To provide a basis for correct decisions on acceptance or rejection of manufactured or purchased product.

Answer 7. (c)

Let the total defectives be 'd'

(i) **If each component is tested before being sent to the agents for sales**

No. of components in a batch	= ₹ 2000
Cost of testing each component	= ₹ 20
Cost of rectification before despatch	= ₹ 200
Total Cost	= (2000 × 25) + 200d

(ii) **If components despatched without pre- testing and any defectives received back for rectification under warranty**

Total Cost	= ₹ 400d

In difference point of two alternatives

(2000 × 25) + 200d	= 400d
400d - 200d	= 2000 × 25
200d	= 50,000
d	= 50000/200
	= 250
Defective Components	= 250 components
Percentage of defectives to total components	= $\dfrac{250}{2000} \times 100 = 12.5\%$

Analysis : If defectives exceed 12.596 of the total number of components, pre-testing is recommended.

Q. 8. (a) **A factory has three departments X, Y, and Z to manufacture two products A and B. Department 'X' can produce parts for 7000 units of A or parts for 12000 units of B per week but cannot do both at the same time, though parts for some A and for some B can be produced. Similarly Department 'Y' can produce 9000 parts for A or 6000 parts for B or combinations in between.**

Final assembly is undertaken in department 'Z' with separate assembly lines for A and B with maximum capacities by 6000 and 4000 units respectively. Both lines can be operated at the same time. What is the optimal Product Mix?

(b) **A turning department wants to install enough semi automatic lathes to produce 2,50,000 good components per year. The turning operation takes 1.5 minutes per component. But it is observed that the output of lathes will have 3 percent defectives. How many lathes will be required, if each one is available for 2,000 hours of capacity per year?**

Answer 8. (a)

Let the optimal quantity of the product 'A' be M numbers and optimal quantity of product 'B' be N numbers.

So constraints of 'X' will be

$M/7000 + N/12000 \leq 1$

Ignoring inequality,

$M/7000 + N/12000 = 1$

Or, $12 M + 7 N = 84000$ ... (i)

From the constraints of 'Y' department,

$M/9000 + N/6000 \leq 1$

Ignoring inequality,

$M/9000 + N/6000 = 1$

Or, $6M + 9 N = 54000$ ... (ii)

From the constraints of Z department,

$M < 6000$ ... (iii)

$N < 4000$ ... (iv)

Solving equation (i) and (ii)

$12 M + 18 N = 108000$ ... (ii) × 2 ... (v)

$12 M + 7 N = 84000$

Substracting (i) from (v)

$11 N = 24000$

$N = 2181.8$.

Substituting the value of N in Eq. (ii)

$6M + 9 × 2182 = 54000$

Or, $6M = 54000 − 19638$

Or, $6M = 34362$

Or, $M = 5727$.

The values of M & N thus obtained satisfies the equations (iii) and (iv).

Therefore the optimal Product Mix is 5728 units of A & 2182 units of B.

Answer 8. (b)

Required system capacity $=$ $\dfrac{\text{Actual good components required}}{\text{System efficiency}}$

$= \dfrac{2,50,000}{0.97} = 2,57,732$ components per year.

$= \dfrac{2,57,000 \text{ components per year}}{2000 \text{ hours per year}} = 129$ units/hr.

Individual lathe capacity $=$ $\dfrac{60 \text{ minutes per hour}}{1.5 \text{ minutes per component}}$

$= 40$ components per machine hours.

Number of lathes required $=$ $\dfrac{129 \text{ units per hour}}{40 \text{ units per machine hour}}$

$= 3.2$ machines

Now the firm can go for 3 or 4 lathes. If it installs three machines, it may have to carefully manage the capacity by proper scheduling or using overtime or by over loading of lathes. If it installs 4 machines, the firm will have some excess capacity. This idle capacity may be utilized by accepting orders, which need the services of lathes, or it can lease the capacity to the firms, which needs the capacity.

Q. 9. (a) A Company adopts a counterseasonal product strategy to smooth production requirements. It manufactures its spring product line during the first four months of the year end would like to employ a strategy that minimises production costs while meeting the demand during these four months. The Company presently has on its rolls, 30 employees with an average wage or ₹ 1,000 per month. Each unit of the product requires 8 man-hours. The Company works on single shift basis (8 hrs. shift/day). Hiring an employee costs ₹ 400 per employee per occasion and discharging an employee costs ₹ 500 per person per occasion. Inventory carrying costs are ₹ 5/unit/month and shortage costs are ₹ 100/unit/month. The Company forecasts the demand for the next four months as below :

Month	(Demand units)	No. of working days in the month
January	500	22
February	600	19
March	800	21
April	400	21

The Company is thinking of adopting one of the following pure strategies:

Plan   1 : Vary work force levels to meet the demand.

Plan 11 : Maintain 30 employees and use inventory and stockouts to absorb demand fluctuations.

Which strategy would you recommend? You may assume nil inventory at the start.

(b) An item exhibiting a constant hazard rate has a reliability of 90 per cent for an operating time of 500 hours.

 (i) What is the average failure rate of the item?

 (ii) What is the MTBF?

     (iii) What is the reliability of the item for an operating time of 1000 hours? for 2000 hours?

     (iv) Corresponding to a reliability of 0.5, what is the operating time? (Reliability is given by $e^{-\lambda t}$ where λ is average failure rate)

   (c) Discuss the points to be considered while designing a Maintenance programme for an organization?

Answer 9. (a)

The overall costs of both the strategies are computed in the following tables.

Plan I : Varying the work force levels to suit the production needs :

		January	February	March	April	Total
1.	Workers required	$\frac{500}{22} = 23$	$\frac{600}{19} = 32$	$\frac{800}{21} = 38$	$\frac{400}{21} = 19$	
2.	Labour cost	23000	32000	38000	19000	112000
3.	Hiring costs		9×400 $= 3600$	6×400 $= 2400$		6000
4.	Lay off costs	7×500 $= 3500$			19×500 $= 9500$	131000
						Total 131000

Plan II : Maintain a steady work force and use of inventory plus stock on

		January	February	March	April	Total
1.	Workers used	30	30	30	30	
2.	Labour cost	30000	30000	30000	30000	1,20,000
3.	Units produced	660	570	630	630	
4.	Inventory costs	5×160 $= 800$	5×130 $= 650$		5×190 $= 950$	2400
5.	Shortage costs			100×40 $= 4000$		4000
						Total 1,26,400

On the basis of costs, Plan II would be the choice. Moreover this stategy would result in higher worker morale, smoother production, and generally, a higher quality product.

Answer 9. (b)

The item is exhibiting a constant hazard rate or age specific failure rate; which means, it is showing a negative exponential failure behaviour. In this case the reliability is given by $e^{-\lambda t}$ where λ is the average failure rate.

  (i) For our problem $t = 500$ hours and $e^{-\lambda t} = 0.90$

    Thus, $e^{-\lambda t} = e^{-\lambda\,(500)} = 0.90$

    Therefore, $\lambda = \dfrac{(0.105)}{500} = 0.00021$, which is the average failure rate per hour.

  (ii) Now, MTBF = $\dfrac{1}{\lambda} = \dfrac{1}{0.00021} = 4761.9$ hours.

(iii) Reliability for 1000 hours :

$$= e^{-\lambda t} \text{ where } t \text{ is 1000 hours.}$$

$$= e^{-(0.00021) \times (2000)} = e^{-0.21} = 0.8106$$

Reliability for 2000 hours :

$$= e^{-(0.00021) \times (2000)} = 0.6570$$

(iv) Corresponding to a reliability of 0.5, we have :

$$e^{-\lambda t} = 0.5000$$

i.e. $e^{-(0.00021) \times (t)} = 0.5000$

Therefore, $-(0.00021)(t) = 0.639$

i.e. $t = 3300$ hours

Thus, the item has a reliability of 0.50 for an operating time of 3300 hours.

Answer 9. (c)

While designing a maintenance programme the main objective of management should be to reduce the total cost of maintenance without sacrificing the efficiency and effectiveness of the plant. The following points are to be considered while designing a maintenance programme :

(i) The maintenance operation should increase the life of the asset at affordable cost.

(ii) The maintenance programme should not affect the normal working of the plant. This involves proper planning, having spare machines etc.

(iii) Manpower required for maintenance plan should determined and proper training should be imparted to them.

(iv) The equipments may be classified according to their criticality.

(v) Lubrication schedules should be prepared, spares and equipment replacement policy should be decided.

(vi) The maintenance plan should be communicated to all concerned.

(vii) Modern techniques like OR, PERT to be employed in carrying out maintenance.

(viii) Maintenance standard time may be fixed.

(ix) The programme itself may have to be modified in light of the experience gained.

Q. 10. (a) Explain, in brief the various reasons for holding inventory in context of operations management.

(b) A firm has to place orders for the supply of raw materials every three months. The raw materials are procured from a supplier at periodic intervals. The annual requirements of the raw materials amount to ₹ 12 lacs. The cost of ordering is estimated to be ₹ 5000/- per order and the cost of carrying inventory is estimated to be 25% of the value of inventory. Average lead time for procurement of the raw materials from the supplier is observed to be two months. The demand for the raw materials can be approximated to a normal distribution with a standard deviation of ₹ 1 lac per period. Design an inventory system for the raw materials for a service level of 97.5%.

(c) Discuss the managerial uses of Break-even Analysis.

Answer 10. (a)

Inventory may broadly be held for precautionery, speculative and transaction motives. These may be discussed as under :

(i) **Precautionery :** Business is characterised by uncertainties. Some industries are also seasonal in nature. In order to protect the production flow from stock outs, customers from being deprived of the product and consequently changing his loyality in favour of some other brands etc. the industries play safe by holding stock of raw materials, WIP and finished goods. For seasonal industries, to smoothen the demand throughout the period, some amount of stock piling may be necessary.

(ii) **Transaction :** Inventories are required for day to day work. If a JIT concept is being used, no inventory will be held. However since JIT is a terminal concept, so long such a system is finally achieved, some amount of stock is to be maintained. There may be a balancing problem requiring building up of in process inventory. Economic order quantity or batch quantity may also be required to trade off between the number of orders or set up costs to that of carrying of inventories.

There may also be instances of items calling for long lead time and delivery time. Items that are to be imported or have to be brought from a long distance, may result in inventories-in-transit. In the era of globalisation, sourcing of raw materials or process goods from different countries have become quite common. This ordinarily calls for an inventory blocking.

(iii) **Speculation :** Finally, holding up of stock may also be because of a speculative reason. The prices of raw material or finished goods may go up. The company may like to take this opportunity to reap benefits by holding inventories.

However, since the resources are limited, hoarding of stock could not be encouraged as it may lead to wide spread speculation resulting in economic gambling.

Answer 10. (b)

Let the cost of the item = ₹ C/unit

No. of units in one year = ₹ 1200000/C

Inventory Carrying Cost = 0.25C

EOQ in units = $\sqrt{[2\times(1200000/C)\times 5000]/0.25C}$ = 219089/C

So EOQ in rupee terms = EOQ in units × C = ₹ 219809/-

No. of orders per annum = 1200000/219089 = 5.48 i.e 5 to 6 orders.

Ordering policy is quarterly , i.e 4 orders per annum. Hence, it is not optimal.

Average lead time consumption = 1200000/12 = ₹ 200,000.

Inventory System Design :

Since company has to place orders every three months, the inventory system at a 97.5% service level may be computed as under :

S.D per period = ₹ 1 lac (period signifies present ordering period i.e 3 months)

Variance = ₹ 100000^2 for three months.

Variance for 5 months = ₹ 100000^2 × 5/3

Order is being placed every 3 months while lead time is 2 months. So average stock required to be maintained is for 5 months = ₹ 1200000/12 × 5 = ₹ 500000.

Safety stock at a service level of 97.5% is 2σ for this period i.e 2 × 100000 × √5/3

Where 100000 × √5/3 is S.D = ₹ 258200 (approx)

So Total Stock = ₹ (500000+258200) = ₹ 758200.

Safety Stock = ₹ 258200.

This will indicate the inventory system.

Answer 10. (c)

Managerial uses of Break-even Analysis are as follows :

  (i) **Capacity planning :** The BEA helps the management in understanding the impact of increase in output on fixed and variable costs of the organization.

 (ii) **Choice of technique of production :** Useful guide in selecting the most economical production process or equipment.

(iii) **Product mix decision :** Helps to find out the best combination of product that can maximize profit.

 (iv) **Plant shutdown decision :** During recession when demand for a product falls considerably, BEA facilitates such decision by differentiating between sunk and out of pocket costs.

  (v) **Add or drop a product :** BEA helps management in product planning by indicating the impact of such decision on costs and earning of the enterprise.

 (vi) **Make or buy decision :** BEA helps management to decide whether spare parts and components are to be manufactured in-house or purchased from market.

(vii) Volume required to achieve target profits.

Q. 11. (a) A company manufactures a specialised equipment. Direct labour required to make the first equipment is 2000 hours. Learning curve is 80%. Direct labour cost is ₹ 4 per hour. Direct material needed for one equipment is ₹ 7,200. Fixed overheads are ₹ 32,000.

Required :

  (i) Using the Learning Curve Concept calculate the expected average unit cost of making— (*a*) 4 equipments, (*b*) 8 equipments.

 (ii) After manufacturing 8 equipments, if a repeat order for manufacture of another 8 equipments is received, what lowest price can be quoted for the repeat order?

(b) A learning curve has strategic implications. Discuss.

 (c) It is not worthwhile to improve the productivity when the industry is facing recession leading to reduction in profits. Comment.

Answer 11. (a)

Working Notes :

Cumulative production	Labour hours required for manufacture of each equipment	
1	2000	
2	1600	(2000 × 80%)
4	1280	(1600 × 80%)
8	1024	(1280 × 80%)
16	819.20	(1024 × 80%)

(i) Calculation of cost per equipment

Particulars		4 machines ₹		8 machines ₹
Materials		7,200		7,200
Labour	(1280 × 4)	5,120	(1024 × 4)	4,096
Overheads	(32,000/4)	8,000	(32,000/8)	4,000
		20,320		15,296

(ii) Labour hours required for each machine after manufacturing 8 equipments (*Labour Hours*)

8 Machines	(1024 × 8)	8192
16 Machines	(819.2 × 16)	13107
Hours for 8 additional machines		4915
Each additional machine	(4915/8)	615

Quotation for repeat order after manufacturing 8 equipments (₹)

Materials		7,200
Labour	(615 L.H. × ₹ 4)	2,460
Overheads		—
Total		9,660

Answer 11. (b)

The learning curve is particularly important in productivity improvement results during the rapid development and mature phases of the product life cycle. Its uses in strategic planning is discussed below :

 (i) A firm which has the largest market share will produce the largest number of units and will have the lowest cost, even if all the firms are on the same percentage learning curve.

 (ii) If through process technology advantages ,a firm can establish itself on a lower percent learning curve than a competitor, it will have lower unit cost, even if both firms have the same cumulative output.

(iii) A firm with greater experience can use an aggressive price policy as a competitive weapon.

(iv) A firm can use aggressive process technology policy by allocating resources towards mechanization in earlier stages and automation in the later stages of growth to maintain its position.

Answer 11. (c)

This statement is not correct. Productivity improvement has to be constantly done in industry. While productivity improvements during periods of economic boom can lead to greater profits, productivity improvement during economic recession, is all the more necessary for cost reduction and lesser losses.

With improved productivity, the unit cost of production is reduced, thereby minimizing the losses in such a situation. Put in other words, a company would end up with longer losses, if it does not care to improve productivity during recessionary periods.

Q. 12. (a) As a cargo loader for North West Airlines, you are charged with the responsibility of setting a time standard (in minutes) for uploading refrigerated unitized loads. The following study was conducted over 300 hours with 900 uploadings performed.

Composite Worker Rating (in percent)	Activity	Number of Times Observed
80	Manually check and lift unitized load onto trailer	100
100	Tow loaded trailer with tractor to aircraft	300
120	Check electrical contracts holding pins and safety wires (called *wiring out*; this time will be reduced by 50 percent by an additional inspection during manufacture of the containers)	400
90	Correct any malfunctioning observed during wiring out	100
110	Load unitized load into plane bay with automatic lift	400
140	Return tractor and trailer to warehouse	300
	Personal or idle time	400

Official North West personal time allowance fraction is 0.10 for an eight-hour work day *unless otherwise stated*; it is not otherwise stated here.

(b) Define work sampling. Write down the formula indicating terms used for determining the sample size.

Answer 12. (a)

Average cycle time $= \dfrac{300 \, \text{hours}}{900 \, \text{uploadings}}$

$= \dfrac{1}{3}$ hour

$= 20$ minutes

Normal Minutes/Uploading

$$20 \times \dfrac{100}{2000} \times .80 = 8.0 \text{ minutes}$$

$$20 \times \dfrac{300}{2000} \times 1.00 = 3.0 \text{ minutes}$$

$$20 \times \dfrac{400}{2000} \times 1.20 \times 0.50 = 2.4 \text{ minutes}$$

$$20 \times \dfrac{100}{2000} \times .90 = .9 \text{ minutes}$$

$$20 \times \dfrac{400}{2000} \times 1.10 = 4.4 \text{ minutes}$$

$$20 \times \frac{300}{2000} \times 1.40 = 4.2 \text{ minutes}$$

Total normal time minutes/uploading = 22.9 minutes

Standard time = $\dfrac{15.7 \text{ minutes/uploading}}{1 - .10}$ = 25.4 minutes/uploading

= .42 hours/uploading.

Answer 12. (b)

Work sampling is a work measurement technique in which a sufficient large number of instantaneous observations of a worker or machine are taken over a period of time to obtain a reasonably accurate picture of the time spent on different activities. It is based on statistical theory of sampling. Work sampling is thus a method of finding out percentage occurrence of a certain activity or delay by statistical sampling.

The procedure of work sampling consists of following steps :

  (i) The purpose of study to be determined first.

 (ii) The worker or machine to be identified.

(iii) The operations to be observed to be decided.

 (iv) The number of observations to be made to be decided.

 (v) The activity performed at each visit to be recorded.

 (vi) Percentage of total time spent on each activity to be calculated.

(vii) Standard time is established by adding allowances.

The formula deciding the sample size is as follows :

   n = {4p(1-p)}/s^2 where,

   n = sample size

   p = extent of activity being observed.

   s = accuracy of sample results.
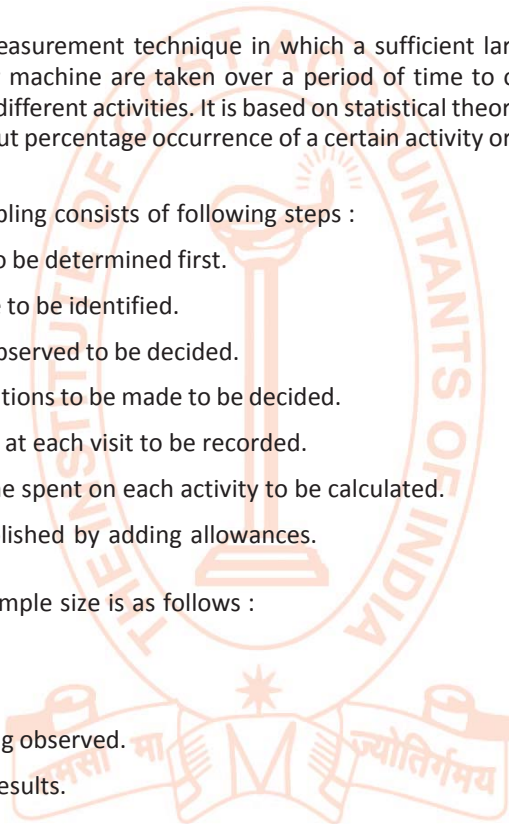
Q. 13. (a) Given below are the observations of a work sampling study of a rnaintena gang. Calculate (i) Individual utilization, (ii) Percent time lost for each cause by the gang, (iii) Overall utilization and its accuracy for 95% confidence limit.

Worker	Round Number									
Worker	1	2	3	4	5	6	7	8	9	10
Fitter No, 1	W	B	B	S	W	B	B	B	A	A
Fitter No. II	S	S	B	B	B	G	G	A	B	B
Welder	W	G	B	B	B	A	I	B	B	A
Electrician	W	W	S	B	B	B	I	B	B	W
Helper	I	B	B	I	B	B	A	B	B	I

B = Busy in worksite, working. W = Walking between Jobs. G = Getting materials or tools. S = Getting instructions. I = Idle. A = Away, not in work spot.

(b) Under what circumstances would work or activity sampling be preferable to time study for developing labour standards?

(c) Five architectural rendering jobs are waiting to be assigned at AST Ltd. Their work (processing) times and due dates are given in the following table. The company wants to determine the sequence of processing according to (1) FCFS, (2) SPT, (3) EDD, and (4) LPT rules. Jobs were assigned a letter in the order they arrived.

Job	Job Work (Processing) Time (Days)	Job Due Date (Days)
A	6	8
B	2	6
C	8	18
D	3	15
E	9	23

Answer 13. (a)

There are fifty observations out of which 26 observations shows busy, 6 readings shows walking between machines, 4 readings are getting instructions, 6 readings are away, 3 readings are getting materials and 5 are idle.

(a) Fitter I is busy 5 times out 10 readings, hence individual utilisation is 50%.

Fitter II is busy 5 times out of 10 readings, hence individual utilisations is 50%.

Welder and electrician are also 5 times busy out of 10 readings; hence individual utilisation is 50%.

Helper is 6 times busy hence his utilisation is 60%.

(b) Time lost in walking is $\frac{6}{50}$ = 12%

Time lost in getting material $\frac{3}{50}$ = 6%

Time lost in getting instructions = $\frac{4}{50}$ = 8%

Time lost in getting away from work spot = $\frac{6}{50}$ = 12%

Idle time = $\frac{5}{50}$ = 10%

(c) For 95% confidence limit and number of observations 50,

$$S \times p = 2 \times \sqrt{\left\{ \frac{p \times (1-p)}{n} \right\}}$$, Here $p = \frac{26}{50}$ as 26 times busy out of 50 readings. =0.52

$q = 1 - p = 1 - 0.52 = 0.48$ and n = 50.

$$S \times 0.52 = 2 \times \sqrt{\frac{(0.52 \times 0.48)}{50}} = 2 \times \sqrt{0.005} = 2 \times 0.071 = 0.141$$

$$S = \frac{0.141}{0.52} = 0.027$$ say approximately ± 3%.

Answer 13. (b)

Time study calls for qualified time study engineer or rate setter recording the time for an activity over time. For predetermined time setting , detailed process sequencing and corresponding time for each process has to be computed. The advantages of wok sampling over time study are as follows :

(i) Studies of several operators and machines can be done simultaneously.

(ii) No trained time study personnel are required.

(iii) No timing equipment required.

(iv) Long cycle work may be studied with fewer observer hours.

(v) The study may be interrupted at any time without any adverse consequences.

(vi) Operator can not influence results as he is not aware as to the precise timing at which he would be observed.

(vii) Also he tends to perform naturally as he does not get the feeling of someone breathing down his neck as in the case of time study where the operator is watched continuously.

Answer 13. (c)

1. The FCFS sequence shown in the next table is simply A-B-C-D-E. The "flow time' in the system for this sequence measures the time each job spends waiting plus time being processed. Job B, for example, waits 6 days while Job A is being processed, the takes 2 more days of operation time itself; so it will be completed in 8 days — which is 2 days later than its due date.

Job Sequence	Job Work (Processing) Time	Flow Time	Job Due Date	Job Lateness
A	6	6	8	0
B	2	8	6	2
C	8	16	18	0
D	3	19	15	4
E	9	28	23	5
	28	77		11

The first-come, first-served rule results in the following measures of effectiveness :

(i) Average completion time $= \dfrac{\text{Sum of total flow time}}{\text{Number of jobs}}$

$$= \dfrac{77 \text{ days}}{5} = 15.4 \text{ days}$$

(ii) Utilization $= \dfrac{\text{Total job work (processing) time}}{\text{Sum of total flow time}}$

$$= \dfrac{28}{77} = 36.4\%$$

(iii) Average number of jobs in the system $= \dfrac{\text{Sum of total flow time}}{\text{Total job work (processing) time}}$

$$= \dfrac{77 \text{ days}}{28 \text{ days}} = 2.75 \text{ jobs}$$

(iv) Average job lateness $= \dfrac{\text{Total late days}}{\text{Number of jobs}} = \dfrac{11}{5} = 2.2 \text{ days}$

2. The SPT rule shown in the next table results in the sequence B-D-A-C-E. Orders are sequenced according to processing time, with the highest priority given to the shortest job.

Job Sequence	Job Work (Processing) Time	Flow Time	Job Due Date	Job Lateness
B	2	2	6	0
D	3	5	15	0
A	6	11	8	3
C	8	19	18	1
E	9	28	23	5
	28	65		9

Measurements of effectiveness for SPT are :

(i) Average completion time $= \dfrac{65}{5} = 13 \text{ days}$

(ii) Utilization $= \dfrac{28}{65} = 43.1\%$

(iii) Average number of jobs in the system $= \dfrac{65}{28} = 2.32 \text{ jobs}$

(iv) Average job lateness $= \dfrac{9}{5} = 1.8 \text{ days}$

3. The EDD rule shown in the next table gives the sequence B-A-D-C-E. Note that jobs are ordered by earliest due date first.

Job Sequence	Job Work (Processing) Time	Flow Time	Job Due Date	Job Lateness
B	2	2	6	0
A	6	8	8	0
D	3	11	15	0
C	8	19	18	1
E	9	28	23	5
	28	68		6

Measurements of effectiveness for EDD are :

(i)   Average completion time = $\dfrac{68}{5}$ = 13.6 days

(ii) Utilization = $\dfrac{28}{68}$ = 41.2%

(iii) Average number of jobs in the system = $\dfrac{68}{28}$ = 2.43 jobs

(iv) Average job lateness = $\dfrac{6}{5}$ = 1.2 days

4. The LPT rule shown in the next table results in the order E-C-A-D-B.

Job Sequence	Job Work (Processing) Time	Flow Time	Job Due Date	Job Lateness
E	9	9	23	0
C	8	17	18	0
A	6	23	8	15
D	3	26	15	11
B	2	28	6	22
	28	103		48

Measurement of effectiveness for LPT are :

(i)   Average completion time = $\dfrac{103}{5}$ = 20.6 days

(ii) Utilization = $\dfrac{28}{103}$ = 27.2%

(iii) Average number of jobs in the system = $\dfrac{103}{28}$ = 3.68 jobs

(iv) Average job lateness = $\dfrac{48}{5}$ = 9.6 days

The results of these four rules are summarized in the following table :

Job Sequence	Job Work (Processing) Time	Flow Time	Job Due Date	Job Lateness
FCFS	15.4	36.4	2.75	2.2
SPT	13.0	43.1	2.32	1.8
EDD	13.6	41.2	2.43	1.2
LPT	20.6	27.2	3.68	9.6

LPT is least effective measure for sequencing for AST Ltd. SPT is superior in 3 measures, and EDD is superior in the forth (average lateness).

Q. 14. (a) **A project consists for four (4) major jobs, for which four (4) contractors have submitted tenders. The tender amounts, in thousands of rupees, are given below :**

Contractors	Jobs			
	A	*B*	*C*	*D*
1	120	100	80	90
2	80	90	110	70
3	110	140	120	100
4	90	90	80	90

Find the asignment, which minimizes the total cost of the project. Each contracts has to be assigned one job.

(b) Write short notes on :

  (I) Line of Balance

  (II) Sound incentive plan

  (III) Supply Chain Management

(c) What do you understand by the term 'utilities' in a factory? Briefly describe the different 'Utilities' required in a factory.

Answer 14. (a)

The given problem is a standard minimization problem. Subtracting the minimum element of each row from all its elements in turn, the given problem reduces to

Contractors	Jobs			
	A	B	C	D
1	40	20	0	10
2	10	20	40	0
3	10	40	20	0
4	10	10	0	10

Now subtract the minimum element of each column from all its elements in turn. Draw the minimum number of lines horizontal or vertical so as to cover all zeros.

Contractors	Jobs			
	A	B	C	D
1	30	10	0	10
2	0	10	40	0
3	0	30	20	0
4	0	0	0	10

Since the minimum number of lines to cover all zeros is equal to 4 (= order of the matrix), this matrix will give optimal solution. The optimal assignment is made in the matrix below :

Contractors	Jobs			
	A	**B**	**C**	**D**
1	30	10	☐0	10
2	☐0	10	40	✗
3	✗	30	20	☐0
4	✗	☐0	✗	10

The optimal assignment is

Contractors	Job	Cost (in thousands of rupees)
1	C	80
2	A	80
3	D	100
4	B	90

Hence, total minimum cost of project will be ₹ 3,50,000.

Answer 14. (b)

 (I) Line of Balance is a production planning system , which schedules key events necessary for completing an assembly with respect to delivery dates for completed system. Graphic displays are used to monitor progress achieved on a project and to indicate where an objective is not being met. Thus the LOB technique is based on the principle of 'Management by Exception' wherein, management attention is directed to existing or potential problems. The LOB technique is a useful complement to PERT and Gantt Charts.

 (II) Incentive is a management tool that is used to motivate the employees to work towards attainment of organizational goals. Well developed and properly operated incentive can yield significant productivity gains. Incentive plans may be financial or non-financial, individual or group. Characteristics of a sound incentive plan are as follows :

   (i) *Simple* : Simple enough for employees to understand easily and compute his own incentive pay.

  (ii) *Accurate* : Scheme should be based on accurate and scientific standards.

 (iii) *Secure* : A minimum basic wage should be guaranteed to all employees irrespective of the reward.

 (iv) *Effective* : The incentive plan should convince the workers that they are being accurately rewarded for good performance.

  (v) *Economy* : The incentive plan should result in reduction in unit cost of production. Administration cost of implementing the plan should be justifiable.

 (vi) *Equity* :The scheme should be beneficial to both management and employees.

 (vii) *Control systems* : The plan should be coordinated properly with control procedures like QC, Inventory control, production control etc.

(viii) *Flexible* : The plan should provide for revision of standards when changes in underlying conditions take place and modifications agreed with trade unions should be clearly specified.

 (ix) Basis whether individual or group should be clearly stated.

  (x) *Grievance machinery* : This will help in prompt redressal of complaints arising out of the plan. Adjustments should be made for failure beyond the control of workers.

(III) **Supply Chain Management :** The term 'supply chain' comes from a picture of how organizations are linked together. If we start with purchase department and work down on the supply side, we find a number of suppliers, each of whom in turn has its own supplier. This can indeed be a complex network or a series of chains.

The objectives of supply chain management are reduction of uncertainty and risk in the supply chain which will enable reduction in inventory levels, cycle time of processing and ultimately improve end-customer service levels. The focus is on system optimization. Some of the useful tools are forecasting, aggregate planning, inventory management, scheduling etc.

The forecast becomes an input to the aggregate plan, which sets the guidelines and constraints for development of an inventory system from which the detailed workforce and equipment schedules can be determined. The decisions made in one node of the supply-chain affect the other areas, e.g if an automobile industry factory plans to assemble 1000 vehicles in a given period, it is imperative that the supplier of tyres makes available 4000 tyres at the plant in time for use on the assembly line.

The overall plan needs to be optimized so that adequate number of men, materials and time available to meet the requirements.

Answer 14. (c)

Utilities comprise of the auxiliary and support facilities required to operate the main production facilities. These are very crucial, especially, in a process plant. Sometimes, in continuous chemical processing plants, utilities like de-mineralized water and steam become process inputs. In steel making, oxygen is an input. Compressed air plays a key role in instrumentation and conveying of materials.

Some common 'Utilities' are :

(i) **Water :** This is a very important utility and refers to water storage, water treatment, steam generation, other industrial uses including potable water, cooling water, water for fire fighting/irrigation of landscapes, etc., This is a scarce resource and recycling is important. Role of water is very crucial in some chemical, metallurgical and power plants and in such cases water alone determines the survival of the plant.

(ii) **Compressed Air :** A bunch of compressors is installed for producing compressed air used in instruments and for pneumatic conveying equipment.

(iii) **Steam :** Process Steam is generated through suitable boilers depending on pressure, temperature and quantity of steam required. Process steam is normally used for heating process vessels, etc.

(iv) **Captive Power :** is an important utility and its role is likely to increase in future, with the advent of power sector reforms in the country and with no improvements in sight in the existing power scenario. Conventional choices are thermal power, diesel gensets and gas turbines. Non-conventional sources growing in popularity in the recent times are solar energy systems, windmills, etc.

(v) **Effluent Treatment :** With stringent environmental regulations and increasing public awareness, air, water and sold waste pollutants have to be monitored, controlled and kept within the statutory limits.

(vi) **Others :** There are a number of other utilities required in a manufacturing organization like Heating, Ventilation, A.C. and Refrigeration Plants, Humidification Systems, Oxygen Plants, Chemical Recovery Systems Fire Protection, Communication Systems, etc.

Q. 15. (a) A company has 3 plants and 3 warehouses. The cost of sending a unit from different plants to the warehouses, production at different plants and demand at different warehouses are shown in the following cost matrix table :

Plants	Warehouses			Production
	P	Q	R	
A	8	16	16	152
B	32	48	32	164
C	16	32	48	154
Demand	144	204	82	

Determine a transportation schedule, so that the cost is minimized. Assume that the cost in the cost matrix is given in thousand of rupees.

(b) Competent Automobile is an authorised service centre of Maruti Cars. A new manager employed wants to analyse the efficiency of work and service personnel. To facilitate his analysis, he has classified the service procedure into the following seven activities :

Activity	Duration (Hrs.)	Precedence Activity
A	8	—
B	4	—
C	6	A
D	9	B
E	11	A
F	3	C
G	1	D, E, F

Help him by—

 (i) Drawing the network diagram.

 (ii) Finding the critical path.

(iii) Calculating the expected time for service of a car.

(iv) Amount of slack time for the technician in each activity.

 (v) Computing the Earliest Starting and Finishing Time.

(vi) Computing the Latest Finishing and Starting Time.

(c) What is Technology Life Cycle?

Answer 15. (a)

The given problem is an unbalanced transporation problem since the demand (= 430 units) is 40 units less than the production (= 470). It is converted into a balanced problem by a dummy warehouse as given below :

Plants	Warehouses				Production
	P	**Q**	**R**	**Dummy**	
A	8	16	16	0	152
B	32	48	32	0	164
C	16	32	48	0	154
Demand	144	204	82	40	

The objective of the company is to minimize the transporation cost. Let up apply vogel's approximation method for finding the initial feasible solution :

Plants	Warehouses				Production	Row Penalty
	P	*Q*	*R*	*Dummy*		
A	8	152 \ 16	16	0	152/0	88
B	32	42 \ 48	82 \ 32	40 \ 0	164/124/42/0	32 0 0 16
C	144 \ 16	10 \ 32	48	0	154/10/10	16 16 16 16
Column Penalty	144/0 8 8 16 -	204/52/42/0 16 16 16 16	82/0 16 16 16 16	40/0 0 - - -		

The solution obtained by VAM is given below :

Plants	Warehouse				Production
	P	*Q*	*R*	*Dummy*	
A	8	152 \ 16	16	0	152
B	32	42 \ 48	82 \ 32	40 \ 0	164
C	144 \ 16	10 \ 32	48	0	154
Demand	144	204	82	40	

The initial solution is tested for optimality. There are 6 (= m+n–1) independent allocations. Let us introduce u_i, v_j, i = (1, 2, 3), j = (1, 2, 3, 4) such that $\Delta_{ij} = c_{ij} - (u_i + v_j)$ for allocated cells.

We assume $u_2 = 0$ and remaining u_i's, v_j's and Δ_{ij}'s are calculated as below :

Plants	Warehouse							u_i
	P		Q		R		Dummy	
A	8		152		16		32	-32
		8		16		16	0	
B	0		42		82		40	0
		32		48		32	0	
C	144		10		32		16	-16
		16		32		48	0	
V_j		32		48		32	0	

On calculating Δ_{ij}'s for non-allocated cells, we found that their values are positive, hence the initial solution obtained above is optimal. The optimal allocations are given below :

Plant	Warehouse	Units	Cost per unit	Total cost
A	Q	152	16	2432
B	Q	42	48	2016
B	R	82	32	2624
B	Dummy	40	0	0
C	P	144	16	2304
C	Q	10	32	320
			Total	= ₹ 9696

Since one of the Δ_{ij}'s = 0, the solution is not unique. Alternate solution exists.

Answer 15. (b)
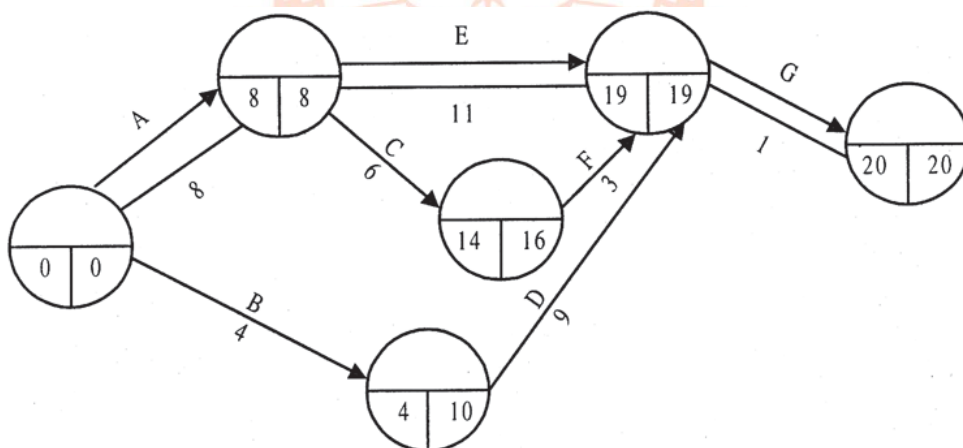
(i) Critical Path : A–E–G

(ii) Expected time for service of a car : 20 hrs.

(iii) Slack time for the technician in each of the 3 paths are :

ACFG : 2 hrs.

AEG : 0 hrs.

BDG : 6 hrs.

(iv) & (v)

Activity	Duration	ES	EF	LF	LS
A	8	0	8	8	0
B	4	0	4	10	6
C	6	8	14	16	10
D	9	4	13	19	10
E	11	8	19	19	8
F	3	14	17	19	16
G	1	19	20	20	19

(ES, EF, LF, LS)

ES - Early Start, EF - Early Finish, LS - Late Start, LF - Late Finish

Answer 15. (c)

Technology Life Cycle comprises of 4 stages, viz., Innovation, Syndication, Diffusion and Substitution.

(i) **Innovation :** This stage, in turn, comprises of three stages, namely Intelligence, Design and Choice. Intelligence stage involves creation of a product or technology through pure research, applied research, market research, brain storming etc., and selection through preliminary screening and feasibility analysis.

Design stage : involves development of the process or technology through which the concept could be given shape and Design and Testing are then done before final launching /adoption. Choice of the desired product/technology paves the way for finally launching the same in the market.

(ii) **Syndication :** During this stage, the technology/product is demonstrated and slowly commercialized.

(iii) **Diffusion :** In this stage, the new technology slowly penetrates and replaces the old one. (E.g. Pentium chips have replaced 486 and the colour TV have phased out the Black & White T.V)

(iv) **Substitution :** Substitution comes in when the cycle is complete and original technology is completely replaced by the advanced one (e.g the valve set radio no more exits.)

Section II : Information Systems

Q. 16. (a) Choose the most appropriate answer from the four alternatives in the set :

    (i) For information recording the magnetic tape is divided into vertical columns called :

        (A) Channels

        (B) Tracks

        (C) Grid

        (D) Frames

    (ii) Oracle is a software package for :

        (A) MRP

        (B) DBMS

        (C) MIS

        (D) TQM

    (iii) Tree topology is :

        (A) Combination of BUS topologies.

        (B) Combination of RING topologies.

        (C) Combination of STAR topologies.

        (D) None of the above.

    (iv) .org is an example of

        (A) IP address

        (B) Domain name

        (C) URL

        (D) None of the above.

    (v) 'Packet switching' on the Internet refers to :

        (A) Type of circuitry

        (B) Switching components

        (C) Method of data movement.

        (D) Packet of hard copy of documents.

    (vi) Military or Defence Service is :

        (A) Open System

        (B) Closed System

        (C) Cannot define

        (D) Not a system.

    (vii) First Calculating Machine

        (A) Punch Card machine

        (B) Analytical engine

        (C) Adding machine

        (D) Abacus.
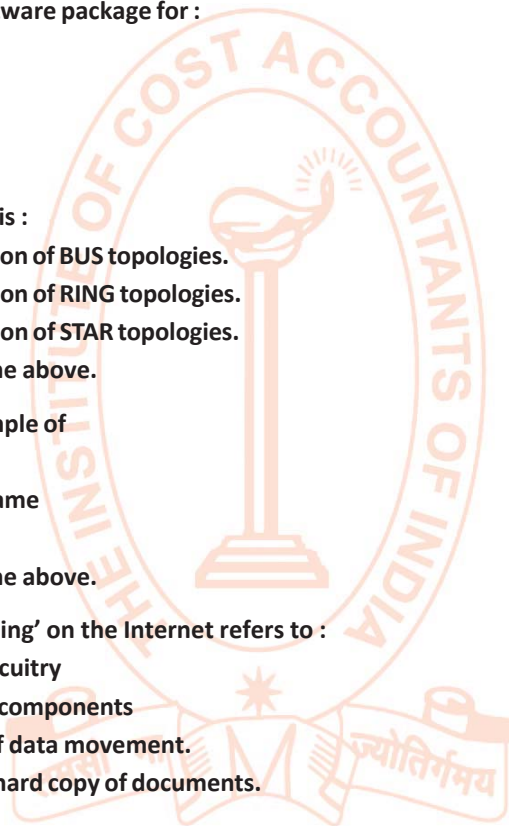
(viii) Personal Digital Assistant is

    (A) Notebook computer

    (B) Micro computer

    (C) Hand held computer

    (D) PC

(ix) Internet surfing is example of

    (A) Full duplex mode of transmission.

    (B) Half duplex mode of transmission.

    (C) Simplex mode of transmission.

    (D) Complex mode of transmission.

(x) One KB stands for :

    (A) 100 bytes

    (B) 10000 bytes

    (C) 999 bytes

    (D) 1024 bytes

Q. 16. (b) Complete the following sentences by putting an appropriate word in the blank position :

    (i) Data access in disk may be defined either in _____ or _____ way.

    (ii) _____ of a file arranges records within a file in some defined sequence.

    (iii) Bootstrapping means loading _____ in Computer after switching on the power.

    (iv) The total volume of work performed by the computer system over a given period of time is termed as _____ .

    (v) A symbol that marks to current position of the mouse on the screen or the point of entry of data is termed as _____ .

    (vi) Peoplesoft is a popular _____ package.

    (vii) Eliminating errors of a program is called _____ .

    (viii) _____ refers to an imitation of actual computer instruction.

    (ix) _____ contains information about the location of a document.

    (x) _____ is the art of secret or hidden message.

Q. 16. (c) Expand the following abbreviations :

    (i) VRML

    (ii) RISC

    (iii) HTTP

    (iv) OOPS

    (v) MFLOPS

    (vi) INGRES

    (vii) B2C

    (viii) A/D

    (ix) SQL

    (x) WYSIWYG

Q. 16. (d) Match Column I with relevant terms in Column II.

Column I	Column II
(i) Black box test	(A) Hierarchical data structure.
(ii) Trojan Horse	(B) Repetitive operation based on Parameters.
(iii) Handshaking	(C) Without internal logic.
(iv) Hang up	(D) Access method on net.
(v) Inverted tree	(E) Buffer storage to reduce processing delays.
(vi) Iteration	(F) Virus hidden inside data or program.
(vii) Bit map	(G) Connected sequence of characters or bits.
(viii) Spooling	(H) Transferring a file from a host computer to user's computer.
(ix) String	(I) Problem in hardware, software or media.
(x) Download	(J) Communication between two pieces of hardware

Answer 16. (a)

(i) (D) **Frames.**

The magnetic tape storage is divided into vertical columns, called frames and horizontal column called tracks or channels.

(ii) (B) **DBMS.**

The Oracle Database (commonly referred to as Oracle RDBMS or simply as Oracle) is an object-relational database management system (ORDBMS) produced and marketed by Oracle Corporation.

(iii) (A) **Combination of BUS topologies.**

Several bus LANs are joined to a main bus through repeaters and bridges to form a structure of a tree.

(iv) (B) **Domain name.**

A domain name is an identification string that defines a realm of administrative autonomy, authority, or control on the Internet. Last component for the category. ORG stands for organisation (nonprofit making)

(v) (C) **Method of data movement.**

Packet switching is a digital networking communications method that groups all transmitted data–regardless of content, type, or structure – into suitably sized blocks, called packets.

(vi) (B) **Closed System.**

Because of their rules, procedures are rigid for sake of strict code of discipline.

(vii) (D) **Abacus.**

Invented by a Chinese mathematician in 450 BC

(viii) (C) **Hand held computer.**

A personal digital assistant (PDA), also known as a palmtop computer, or personal data assistant, is a mobile device that functions as a personal information manager. PDAs are largely considered obsolete with the widespread adoption of smartphones.

(ix) (B) **Half duplex mode of transmission.**

Mode of transmission is both directional but sending or receiving at a time.

(x) (D) **1024 bytes.**

The kilobyte (symbol: kB) is a multiple of the unit byte for digital information. Although the prefix kilo-means 1000, the term kilobyte and symbol kB or KB have historically been used to refer to either 1024 (2^{10}) bytes or 1000 (10^3) bytes, dependent upon context, in the fields of computer science and information technology.

Answer 16. (b)

(i) direct, sequencial

(ii) Sorting

(iii) Operating System

(iv) throughput

(v) cursor

(vi) ERP

(vii) debugging

(viii) Pseudo code

(ix) URL or Universal Resource Locator

(x) Cryptography

Answer 16. (c)

(i) Virtual Reality Modeling Language.

(ii) Reduced Instruction Set Computing.

(iii) Hyper Text Transfer Protocol

(iv) Object Oriented Programming System.

(v) Million floating Point Operation Per Second.

(vi) Interactive Graphics Relational System.

(vii) Business to Customer.

(viii) Analog to Digital.

(ix) Structured Query Language.

(x) What You See Is What You Get

Answer 16. (d)

(i) — C

(ii) — F

(iii) — J

(iv) — I

(v) — A

(vi) — B

(vii) — D

(viii) — E

(ix) — G

(x) — H
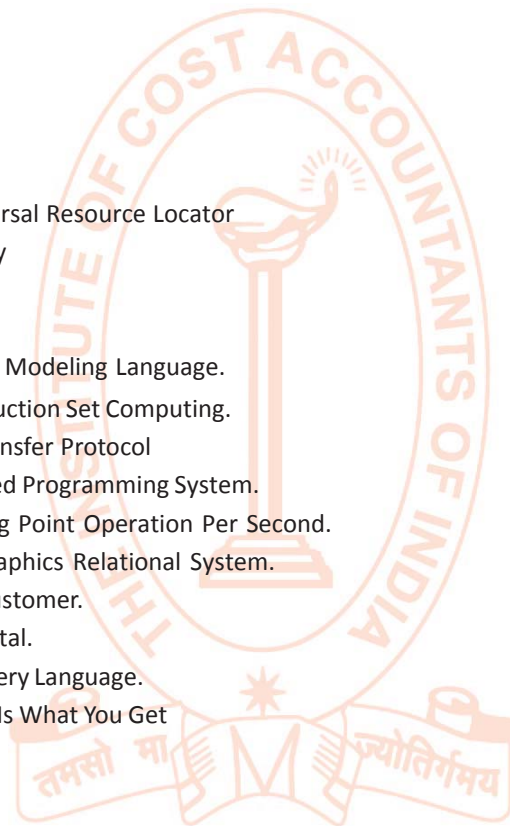
Q. 17. Discuss briefly the following term with reference to Information Technology :

    (a) Stored Program Concept

    (b) Reference files

    (c) System decomposition

    (d) Toggle

    (e) Virtual Memory

Answer 17.

  (a) Stored program concept : Computers can perform variety of mathematical calculations without error. They can sort data, merge lists, search files, make logical decisions and comparisons. However, computer is devoid of any original thinking. It is provided with a set of instructions. These instructions are stored in primary memory and executed under the command of the control unit of CPU. This is known as stored program concept.

  (b) Reference files : These files contain keys of records in other files. In order to retrieve a record from a file, the reference file is first searched to find out in which file a record can be located.

  (c) A computer system is difficult to comprehend when considered as a whole. Therefore, it is better that the system is decomposed or factored into sub systems. The boundaries and interfaces are defined, so that sum of the sub systems constitutes the entire system. This process of decomposition is continued with sub systems divided into smaller sub systems until the smallest sub systems are of manageable size. The sub systems resulting from this process generally form hierarchical structure.

  (d) Toggle : It is a switch or control code that turns an event on or off by repeated action or use. It also means to turn something on or off by repeating the same action.

  (e) Virtual memory is a provision of secondary storage which acts as primary memory. When the size of main memory is less than required size for a program to run, the operating system enables it with the help of hard disk (main storage media). The system followed is breaking the programs and accommodating the part according to the size of main memory available and rest is stored in hard disk. When a part of program stored in hard disk is required for running the program, a part of the program stored in the main memory is transferred to hard disk and the required part is brought to main memory. This process is called swapping.

Q. 18. (a) Differentiate between open and closed systems.

    (b) Define the term system stress and system change.

    (c) Explain why information system die.

Answer 18. (a)

Open system	Closed System
Open System actively interact with other systems and establish exchange relationship. They exchange information, material or energy with the environment including random and undefined inputs. Open systems tend to have form and structure to allow them to adapt to changes in their external environment for survival and growth. Organizations are considered to be relatively open systems.	A Closed System is self-contained and does not interact or make exchange across its boundaries with its environment. Closed systems do not get the feedback they need from the external environment and tend to deteriorate. A Closed System is one that has only controlled and well defined input and output. Participant in a closed system become closed to external feed back without fully being aware of it. Some of the examples of closed systems are manufacturing systems, computer programs etc.

Answer 18. (b)

Systems, whether they be living or artificial systems, organizational systems, information systems, or systems of controls, change because they undergo stress. A stress is a force transmitted by a system's supra-system that causes a system to change, so that the supra-system can better achieve its goals. In trying to accommodate the stress, the system may impose stress on its subsystems, and so on.

There are two basic forms of stress which can be imposed on a system, separately or concurrently :

1. A change in the goal set of the system. New goals may be created or old goals may be eliminated.

2. A change in the achievement levels desired for existing goals. The level of desired achievement may be increased or decreased. For example, the goal set for a computer system may change if a requirement is imposed by management (the supra-system) for system data to be shared among multiple users rather than be available only to a single user. When a supra-system exerts stress on a system, the system will change to accommodate the stress, or it will become pathological; that is, it will decay and terminate. Systems accommodate stress through a change in form; there can be structural changes or process changes. For example, a computer system under stress for more shareability of data may be changed by the installation of terminals in remote locations – a structural change. Demands for greater efficiency may be met by changing the way in which it stores data – a process change. It is very unlikely that system changes to accommodate stress will be global change to its structure and processes. Instead, those responsible for the change will attempt to localize it by confining the adjustment processes to only one or some of its subsystems.

Answer 18. (c)

Information Systems die due to changes in information requirement and information becoming outdated due to :

  (i) changes in business environment.

 (ii) changes in users' expectation.

(iii) changes in technology.

(iv) deterioration in software quality due to passage of time.

Q. 19. (a) Discuss the desired characteristics of a good coding system.

     (b) What is system manual? What information is included in it?

Answer 19. (a)

Characteristics of a Good Coding Scheme :

  (i) Individuality – The code must identify each object in a set uniquely and with absolute precision. To use one code number for several objects in a set would obviously cause a great deal of confusion. The code should be universally used over the entire organisation.

 (ii) Space - As far as possible code number must be much briefer than description.

(iii) Convenience - The format of code number should facilitate their use by people. This implies that code number should be short and simple and consist of digits and or upper case alphabets. It is better to avoid use of special symbols.

(iv) Expandability – As far as possible, growth in the number of objects in a set should be provided for. Therefore, whilst introducing the scheme, longer number of digits/number than necessary at present may be adopted as the code length. Related items must use similar number.

 (v) Suggestiveness - The logic of the coding scheme should be readily understandable. Also, the letter or number should be suggestive of the item characteristics. But this should not be carried too far in lengthening the code since it would defeat the purpose of brevity.

(vi) Permanence – Changing circumstances should not invalidate the scheme or invalidation in future should be kept to minimal.

Answer 19. (b)

A system manual or job specification manual is an output of the system design that describes the task to be performed by the system with complete layouts and flow charts. It contains :

(i) **General description of the existing system :** It describes the general structure of the existing system from top management to the bottom management.

(ii) **Flow of the existing system :** It describes the input, processing and output of the data to be flow at various levels of organisation's structure.

(iii) **Outputs of the existing system :** The documents produced by existing system are listed and briefly described, including distribution of copies.

(iv) **General description of the new system :** Its purpose and functions and also major differences from the existing system are stated together with a brief justification for the changes.

(v) **Flow of the new system :** This shows the flow of the system from and to the computer operation and within the computer department.

(vi) **Output Layouts :** It describes the user interface or layouts for the user that is used for better communication in near future.

(vii) **Output distribution :** The output distribution is summarized to show what each department will receive as a part of the proposed system.

(viii) **Input layouts :** The inputs to the new system are described as well as a complete layouts of the input documents, input disks or tapes are described.

(ix) **Input responsibility :** The source of each input document is indicated as also the user department responsible for each item on the input documents.

(x) **Macro Logic :** The overall logic of the internal flows will be briefly described by the systems analyst, wherever useful.

(xi) **Files to be maintained :** The specifications will contain a listing of the tape, disk or other permanent record files to be maintained, and the items of information to be included in each file.

(xii) **List of programs :** A list of programs to be written shall be a part of the systems specifications.

(xiii) **Timing estimates :** A summary of approximate computer timing is provided by the system analyst.

(xiv) **Controls :** This shall include type of controls, and the method in which it will be operated.

(xv) **Audit trail :** A separate section of the systems specifications shows the audit trail for all financial information. It indicates the methods with which errors and defalcation will be prevented or eliminated.

Q. 20. (a) Differentiate between :

(i) **Primary Storage and Secondary Storage.**

(ii) **Compiler and Interpreter**

(iii) **CD ROM Disks and WORM Disks.**

(b) XYZ Ltd. is considering three options to acquire software for computerizing one of its important functional area . The options are :

(I) **Buying the software package available in the market;**

(II) **Engaging software industries to design the software;**

(III) **Developing the software in-house with the help of their own IT people.**

Discuss the pros & cons of each option.

Answer 20. (a)

(i)

Primary Storage	Secondary Storage
1. Primary Storage is the internal or main memory and is basic to all computer systems. This memory stores the programs under operation and the data which is being processed. It has a definite size and cannot be expanded off and on.	Secondary Storage is called 'auxiliary storage' and is supplementary to the primary storage associated in CPU. Such memory is also called backup storage. It is used to hold programs not currently in use and data files. It has large capacity in relation to the primary storage.
2. The most popular form of Primary Storage is RAM.	The most popular secondary storage media are Magnetic Tape, Magnetic Drums etc.
3. The processing speed is very fast as compared to secondary storage.	It contributes to slower processing speed as compared to primary storage.

(ii)

Interpreter	Compiler
1. Translates line by line	Translates the whole program.
2. Translation takes place during execution.	Translation of whole program in one go.
3. Execution time is high.	Execution is fast.
4. Requires less memory.	Requires more memory.
5. Successful run for sometimes does not guarantee full correctness of the program.	Compilation is very time consuming process.
6. Cost of interpreter is less.	Cost of compiler is high.

(iii)

CD ROM Disks	WORM Disks
1. The data on Compact Disks (CD) is permanent and cannot be altered.	WORM Disk stands for 'Write Once, Read Many' which means data once written can only be read and cannot be changed or updated.
2. Its typical storage capacity is about 650 MB. Digital Video Disk (DVD) which looks like a CD is fast replacing CD's now. It can be used from both sides with each side capable of storing 4.7 GB of data.	The typical storage capacity of WORM Disk is about 200 MB.

Answer 20. (b)

The pros and cons of each of the options are enumerated below :

Type of software	Advantages	Disadvantages
(I) Buying ready made	(i) Can be seen and tested.	(i) May not meet requirements fully.
	(ii) Will have fewer bugs	(ii) Enhancement /modifications may be expensive and time consuming.
	(iii) May be less costly	(iii) Requires development, testing and implementation time.
	(iv) Documentation/support facilities.	
(II) Developed by outside firm	(i) Better control over schedule and cost.	(i) Difficult to negotiate on effort and time required.
	(ii) Does not affect day-to-day operations due to development work.	(ii) Difficult to implement without adequate technical knowledge of the software.
	(iii) Ready skills when hardware or software platforms.	iii) Difficult to maintain after implementation.
	(iv) Advantage of core competencies.	(iv) Unfamiliarity of the outside party about the business environment may hamper quality.
		(v) Maintenance support cost.
(III) Developed in-house	(i) Familiarity with business will lead to better quality.	(i) Difficult to adhere to time schedule.
	(ii) Will meet requirements fully.	(ii) Additional manpower cost.
	(iii) Development of in-house skills.	(iii) Particular skills may not be available.
	(iv) Source of income by selling software or consultancy services.	(iv) Turnover of skilled personnel
	(v) Improvisation according to systems followed by other software.	(v) Advantages of core competencies may not be there

Q. 21. (a) Discuss the three approaches of MIS development.

(b) Differentiate among Strategic, Tactical and Operational categories of Information required for different levels of Managerial decision-making.

Answer 21. (a)

For developing MIS, three approaches are used, viz., Top down approach, Bottom up approach and Integrative approach. Each of these is described below :

(i) **Top down approach :** The development of MIS under top down approach starts with the defining of the objectives of the organisation, the kind of business it is in, and the constraints under which it operates. The activities or functions for which information would be required are also identified. The crucial strategic and tactical decisions are also defined and the decisions necessary to operate the activities are specified. From the activities or functions and the decisions to be made, the major information requirements are ascertained.

This approach develops a model of information flow in the organization, which acts as a guide for designing the information system. By using the model of information flow, various information sub-systems may be defined. Each sub–system comprises of various modules. The selection of a module for developing system is made on the basis of the priority assigned to it.

The various sub–systems and their modules are coordinated to achieve the objective of integration. The information system so developed is viewed as a total system, which is fully integrated, rather than as a collection of loosely coordinated sub–systems.

It is also evident from the nomenclature that top management takes the initiative in formulating major objectives, policies and plans in a comprehensive manner and communicates them down the line to middle and supervisory management levels for translating them into performance results. Managers other than those at top levels have little role in planning, they have to only concentrate on implementation and day–to–day control.

(ii) **Bottom-up approach :** The development of information system under this approach starts from the identification of life stream systems. Life stream systems are those systems, which are essential for the day–to–day business activities. The examples of life stream systems include payroll, sales order, inventory control and purchasing etc. The development of information system for each life stream system starts after identifying its basic transactions, information file requirements and information processing programs.

After ascertaining the data/information requirements, files requirement and processing programs for each life stream system, the information system for each is developed. The next step is towards the integration of data kept in different data files of each information system. The data is integrated only after thoroughly examining various applications, files and records. The integrated data enhances the shareability and evolvability of the database. It also ensures that all programs are using uniform data. Integrated data also provides added capability for inquiry processing and ad–hoc requests for reports.

The next step under bottom up approach may be the addition of decision model and various planning models for supporting the planning activities involved in management control. Further, these models are integrated to evolve model base. The models in the model base facilitate and support higher management activities. They are useful for analysing different factors, to understand difficult situations and to formulate alternative strategies and options to deal them.

(iii) **Integrative approach :** This approach can overcome the limitations of the above two approaches when used objectively. Integrative approach permits managers at all levels to influence the design. Top management identifies the structure and design of MIS suitable to the concern. This design is further presented to lower level managers for their views and modifications. The managers at the lower level are permitted to suggest changes, additions, or deletions and return the design with their suggestions to the top level for approval. The revised design is drawn and evaluated by the top level and sent down again in a modified form for further consideration if required. This evaluation modification and approval process continues until a final design is achieved, that is suitable for all levels.

Answer 21. (b)

Strategic-level information systems help senior management to tackle and address strategic issues and long-term trends, both within the firm and external environment. Their principal concern is matching changes in the external environment with existing organisational capability - What will be the cost-trends, where will our firm fit in, what products should be made etc? In other words, these systems are designed to provide top-management with information that assists them in making long–range planning decisions for the organization.	Tactical-level information systems serve middle level managers and help in taking decisions for a period of 2-3 years. The managers are typically concerned with planning, controlling and use summaries of transactions to aid their decision- making. In other words, these systems provide middle-level managers with the information they need to monitor and control operations and to allocate resources more effec-tively. In tactical systems, tran-sactions data are summarized, aggregated, or analysed. Their purpose is not to support the execution of operational tasks but to help the manager control these operations.	Operational-level information systems are typically transaction processing systems and help in the operational level managers to keep track of elementary activities and transactions of the organisations such as sales, receipts, cash deposits, flow of materials etc. Their purpose is to answer routine questions and to track flow of transactions. Thus, the primary concern of these systems is to collect, validate, and record transactional data describing the acquisition or disbursement of corporate resources.

Thus, each type of information system serves the requirements of a particular level in the organisation, providing the needed basis for decision making.

Q. 22. (a) Successful executives take decisions relying more on intuition than on any quantitative analytical decision technique. Do you agree to this view? Justify your answer by stating the characteristics of information used by executives.

(b) Explain the role played by Financial Information System in making financial decisions.

(c) What is Expert Systems? Write short note on it.

Answer 22. (a)

It is true that to a large extent, executives rely much more on their own intuition, gut feelings and past experience rather than on sophisticated analytical skills. The type of decisions that the executives must make is broad. Often, executives make these decisions based on a vision they have regarding what it will take to make their companies successful. The intuitive character of executive decision-making is reflected strongly in the types of information found most useful to executives.

Here are some characteristics of the types of information used in executive decision-making are discussed below :

(i) **Lack of structure :** Many of the decisions made by executives are relatively unstructured. For instance, what general direction should the company take? Or what type of advertising campaign will best promote the new product line? These types of decisions are not so clear-cut as deciding how to debut a computer program or how to deal with an overdue account balance. Also, it is not always obvious which data are required or how to weigh available data when reaching at a decision.

(ii) **High degree of uncertainty :** Executives work in a decision space that is often characterized by lack of precedent. For example, when the Arab oil embargo hit in the mid-1970s, no such previous event could be referenced for advice. Executives also work in a decision space where results are not scientifically predictable from actions. If prices are lowered, for instance, product demand will not automatically increase.

(iii) **Future orientation :** Strategic-planning decisions are made in order to shape future events. As conditions change, organisations must also change. It is the executive's responsibility to make sure that the organisation keeps pointed toward the future. Some key questions about the future include: "How will future technologies affect what the company is currently doing? Where will the economy move next, and how might that affect consumer buying patterns? As one can see, the answers to all of these questions about the future external environment are vital.

(iv) **Informal source :** Executives rely heavily on informal source for key information. For example, lunch with a colleague in another firm might reveal some important competitor strategies. Some other important information sources of information are meetings, tours around the company's facilities to chat with employees, brainstorming with a trusted colleague or two, and social events. Informal sources such as television might also feature news of momentous concerns to the executives.

(v) **Low level of detail :** Most important executive decisions are made by observing broad trends. This requires the executive to be more aware of the large overviews than the tiny items. Even so, many executives insist that the answers to some questions can only be found by mucking through details.

Answer 22. (b)

Financial Information System plays an important role in making following financial decisions :

(i) **Estimation of requirements of funds:** This is the very important and starting point of making financial decisions. A very careful estimation of funds and the time at which these funds are

required is made in this stage. This can be done by forecasting all physical activities of the firm and translating them into monetary units.

(ii) **Capital structure decisions :** Decisions are to be taken to select an optimum mix of different sources of capital structure. There are many options available for procuring funds. Decision maker has to decide the ratio between debt and equity, long-term and short-term funds etc. He has to ensure that overall capital structure is such that the company is able to procure funds at optimum cost.

(iii) **Capital budgeting decisions :** Funds procured from various sources are required to be invested in different assets. With the help of capital budgeting, decision maker can determine feasibility of investment in long-term assets. This will help in attainment of financial objectives.

(iv) **Profit planning :** This part of profit planning is essential for the growth of the organization. The decision maker has to make decision regarding profits and dividends. He has to ensure adequate surplus in future for growth and distribution of dividends.

(v) **Tax management :** Tax planning is aimed at reducing of outflow of cash resources by way of taxes so that the same may be effectively utilized for the benefit of business. The purpose of tax planning is to take full advantage of exemptions, deductions, concessions, rebates, allowances and other relief.

(vi) **Working capital management :** Working capital management is concerned with the investment of long term funds into current assets. Decisions are to be taken for effective financing of current assets required for day-to-day running of the organization.

(vii) **Current assets management :** Policy decisions are taken regarding various items of current assets. Credit policy determines the amount of sundry debtors at any point of time. Inventory policy is to be determined jointly between finance and production department.

Answer 22. (c)

Expert Systems : They are designed to replace the need for a human expert. They are particularly important where expertise is scarce and therefore expensive. This is not 'number-crunching' software, but software that expresses knowledge in terms of facts and rules. This knowledge will be in a specific area, and therefore expert systems are not general, as are most decision support systems, which can be applied to most scenarios, an expert system for oil drilling is not of much use in solving company taxation problems.

While there may have been a progression from transaction-processing systems, through management information systems, to decision-support and executive information systems, expert systems have arisen largely from academic research into artificial intelligence. The expert system should be able to learn, i.e. change or add new rules. They are developed using very different programming languages such as PROLOG, which are referred to as fifth generation languages, or expert systems shells, which can make the process quicker and easier. It has been suggested that expert systems would be of greater use in the tactical and strategic level. This has been the case in banking, where expert systems scrutinize applications for loans, and lower level staff accepts the system's decision. This has replaced the somewhat subjective decision-making of more senior managers.

Q. 23. (a) PQR Ltd is planning to introduce a new range of products. The top management is advised to get developed a marketing information system which can enhance the decisional capacities in various marketing activities. You being in-charge of this project suggest what information sub-systems are required to be developed.

(b) How would you use system approach for solving problems?

Answer 23. (a)

Marketing Information System — is aimed at supporting the decision making, reporting and transaction processing requirements of marketing and sales management. It consists of following inter-related

information sub-systems to enhance the decision-making capacities in various marketing activities :

1. **Sales -** The objective of the sales manager is to coordinate the sales effort so that the long-term profitability of the company is maximized. Decisions are required in the area of adequate stocks, effective distribution channels, effective motivation of sales personnel, promotion of more profitable products or product lines and good customer relations. Information required for analysis and support of sales is as stated below :

   (a) Sales Support – Sales support information system provides information to sales personnel about the following :

   (i) Product descriptions and performance specifications

   (ii) Product prices;

   (iii) Quantity discounts,

   (iv) Sales incentives for salespersons

   (v) Sales promotions;

   (vi) Strengths and weaknesses of competitor's product;

   (vii) Products' inventory levels;

   (viii) The histories of customers' relations with the company;

   (ix) Sales policies and procedures established by the company;

   (x) Buying habits of customers.

   (b) **Sales analysis –** The sales analysis is a major activity in most companies involved in sales. Its purpose is to provide information for analysis of

   (i) Product sales trends;

   (ii) Product profitability on the product-by-product basis;

   (iii) The performance of each sales region and sales branch;

   (iv) The performance of respective sales persons.

   Information for sales analysis is derived primarily from the sales order entry system; the majority of information from actual sales transactions and is contained on sales invoice. It includes information on product type, product quality, price, customer identity and type, sales region and salesperson etc.

2. **Market Research and Intelligence –** The objective of marketing research is to investigate problems confronting the other managers in the marketing function. These problems may involve sales, product development, advertising and promotion, customer service, or general marketing management needs. To satisfy these decision-making and reporting requirements, the market research department must either periodically or upon demand gather information from a wide variety of sources. The investigations undertaken by market research helps in satisfaction of following informational needs of managers :

   (i) Information about the economy and economic trends and the probable impact of these trends on demand for the product.

   (ii) Information about the past sales; and sales trends for the entire industry;

   (iii) Information about potential new markets for product;

   (iv) Information about competitors, its product, strength, weaknesses, new product plans, strategies and so on.

   The decision-maker can use the information provided by marketing research in a number of ways for decision making process.

3. **Advertising and Promotions -** The promotion and advertising development devotes its attention to planning and executing advertising campaign and to carry out various product promotions. This includes :

   (i) Promotion through limited budget;

   (ii) Allocating resources in most effective manner;

   (iii) Analysing an array of information, sales people, locations, products, styles, sizes etc.;

   (iv) Storing information that can be combined with past experiences of managers;

   (v) Establishing a body of knowledge on the response of market for each of the several types of promotional activities such as coupons, contests, trade show;

   (vi) Continuously refreshing and modifying the information base in accordance with rapid changing environment.

4. **Product Development and Planning –** Product development involves analysing a possible opportunity for a new product and evaluating preferred specifications and probable market success. Often the market research activity initially perceives the opportunity and passes along information about it to the new product development group.Alternatively,

   • Sales persons may be aware of their need for a new product;

   • Customer call reports may help elicit information about new product needed which may encourage sales persons to think about new product possibilities;

   • Sales analysis system indicates the most desirable characteristics for the new product;

   • Market researchers gather information about the size and structure of the market place for the product.

   The product development department uses all these information to develop specifications for a new product. Product planning system provides marketing management with packaging, promotion, pricing and style recommendations throughout the life of product.

5. **Product Pricing System –** Product pricing is a complex managerial activity that is affected by product cost, customer demand, market psychology, competitors, prices and various actions taken by competitors. Prices may be determined on a full cost or marginal cost basis which is usually seen as the starting point in setting prices. Pricing information system almost always utilizes information about product cost. Past sales profitability information is useful to help in determining how much prices should be adjusted for changes in cost to ensure that margins are maintained.

6. **Customer Service –** The objective of marketing department is to satisfy customers with product and customer service. To achieve these objectives, management provides customers with technical assistance and product maintenance. Decisions are required in the area of training of service personnel, capabilities of equipment and location facilities to serve customers and assist in the dissemination of technical information to the customers. These decisions must be congruent with the marketing management strategy regarding customer satisfaction and service.

Answer 23. (b)

The system approach to management is in fact a way of thinking about management problems. To seek a solution for the problems by applying systems approach, we would make use of the following steps as shown in the figure given below :

```
┌─────────────────────────────┐
│ Defining of problem or      │◄──────────┐
│ opportunity                 │           │
└─────────────────────────────┘           │
              │                            │
              ▼                            │
┌─────────────────────────────┐           │
│ Gathering and analyzing data│           │
│ relating to problem or      │           │
│ opportunity                 │           │
└─────────────────────────────┘           │
              │                            │
              ▼                            │
┌─────────────────────────────┐           │
│ Identifying alternative     │           │
│ solutions                   │           │
└─────────────────────────────┘           │
              │                            │
              ▼                            │
┌─────────────────────────────┐           │
│ Evaluating various          │           │
│ alternatives                │           │
└─────────────────────────────┘           │
              │                            │
              ▼                            │
┌─────────────────────────────┐           │
│ Selecting the best          │           │
│ alternative                 │           │
└─────────────────────────────┘           │
              │                            │
              ▼                            │
┌─────────────────────────────┐           │
│ Implementing the solution   │           │
└─────────────────────────────┘           │
              │                            │
              ▼                            │
┌─────────────────────────────┐           │
│ Evaluating the success of   │───────────┘
│ solution                    │
└─────────────────────────────┘
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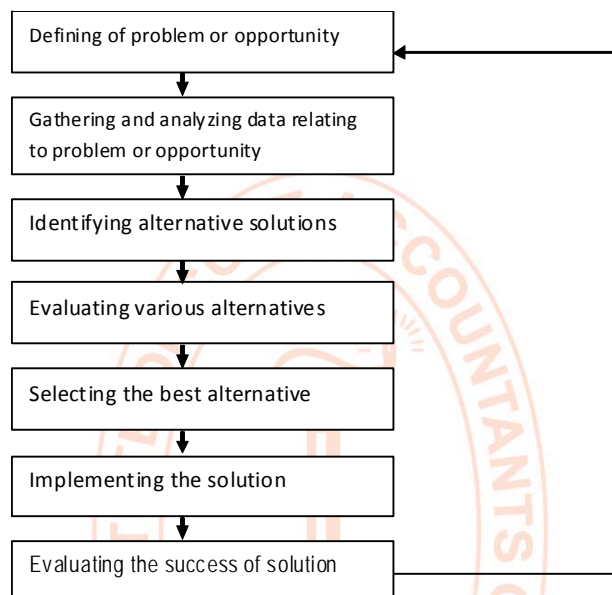
(i) **Defining of the problem :** The problem involved here is of inordinate delay between the receipt of orders and their delivery. This problem affects the vendor in various ways, e.g., a bad reputation, loss of customers, reduction in profits etc.

(ii) **Gathering and analyzing data :** The problem of delay may be because of following reasons :

(a) Excessive orders in the hand of vendors

(b) Shortage of power

(iii) **Identification of alternative solutions :** To overcome the stated problem by system approach, suppose the following two solutions exist :

(a) Refusals of orders, in case the total size of the orders exceeds the plant capacity of one shift.

(b) To run the plant in double shift to meet the commitment in time. Any shortfall in power supply may be met by installing a generator.

(iv) **Evaluation of alternative solutions :** Out of the two solutions as stated above, the second solution say accounts for an overall increase in the profitability of the concern after off-setting additional cost for the generator produced power. It also helps in retaining customers and growth of the concern.

(v) **Selection of the best alternative :** Under this step, the management closely examines the alternatives and chooses the best alternative.

(vi) **Implementation of the solution :** The implementation of the solution requires the necessary policy changes. Besides this, the resources required to run the plant in double shift and installation of the generator are also to be arranged. Finally, appropriate procedures are developed to exercise smooth production and timely supply to customers. The concerned officers are accordingly instructed.

Q. 24. (a) What are the stages through which the program has to pass during its development?

(b) Describe any three program design tools.

Answer 24. (a)

The system developer must instruct the computer how to do everything without error and in the required sequence. Hence, the development of program has to go through a life cycle having following stages :

(i) **Program Analysis :** In this stage, for a particular application, the programmer ascertains the inputs available, the output required and to achieve that, what kind of processing is needed. Depending upon the complexity, the programmer then determines whether the proposed application can be or should be programmed at all. It is not unlikely that the proposal is shelved for modification on technical grounds.

(ii) **Program Design :** Depending upon the main function to be performed, the programmer develops the general organisation of the program. The input, output, file layouts, flowcharts, and program specification etc are provided to the programmer by the analyst.

(iii) **Program Coding :** The logic of the program expressed in the flowchart is converted into program instructions. While coding, the syntax of the language used is to be kept in mind.

The coded instructions are then entered into the magnetic media through available sources such as key to diskette. The program is then compiled through compiler of the language. Several syntax errors may crop up at this stage. These errors are required to be removed after getting the printed listing etc.

(iv) **Debug the program :** The meaning of debugging is to remove the errors so that the program may compile without errors. Many a times, structured walk through is to be adopted to remove the errors.After debugging, the program is executed against test data. Several tests are performed and later the codes are reviewed to see whether these adhere to standards or not.

(v) **Program Documentation :** The writing of narrative procedures and instructions for people who will use software is carried out throughout the program life cycle. Managers and users should carefully review documentation to ensure that the software and system behave as the documentation indicates. If they do not, documentation should be revised. Following technical design specifications are generally included :

1. A brief narrative description of what the program should do.
2. A description of the output, inputs and processing to be performed by the program.
3. A deadline for finishing the program.
4. The identity of the programming languages to use along with coding standards to follow.
5. A description of the system environment into which the program should fit.
6. A description of the testing required to certify the program for use.
7. A description of documentation that must be generated for users, maintenance programmers and operational personnel.

The programmer writes the coding in the light of above documentation.

(vi) **Program Maintenance :** The requirements of business applications keep on changing and thus call for modification of various programs. The maintenance of the programs is generally done by people called maintenance programmers. The task of understanding the program written by some one and modifying the same is difficult. Therefore, the maintenance people should be involved from the beginning itself.

Answer 24. (b)

Three program design tools are briefly discussed below :

1. **Program flow chart :** Program flow chart is among the most common program design tools that managers and users encounter when reviewing the design work of the system development project. These flow charts depict the logical steps through which a computer program must proceed when solving a problem. At one time, program flow charts were considered the premier program design tool. Although they are still widely used, sometimes it is difficult for programmers to translate a program flow chart directly into a structured code.

   A program flow chart depicts the logical processing steps followed by a program quite well. However, unlike some of the other program design tools, they often do not provide a broad view of how the program is organised. However, they are useful for problems involving mathematical or scientific formulae.

2. **Pseudo code :** When reviewing the work done by a program designer, users may also need to review narrative descriptions of a program logic. Pseudo code, like program flow charts, also represents program logic. However, instead of using graphical symbols and flow lines, pseudo code presents program logic in English - like statements. Pseudo code is generally preferred by programmers over flowcharts because it represents program code more closely. Many users also find pseudo code more understandable than program flow charts.

   Pseudo code is used in a variety of ways. For example many fourth - generation languages use pseudocode - like statements. Besides using pseudo code to design program code in a 3GL, it can be embedded into a completed 3GL program as non-executable 'comment' statements that serve as a documentation to indicate what the program is doing. Pseudo code is particularly useful when designing transaction processing and information- retrieval programs.

3. **4GL Tools :** The tools described above were developed as manually applied methods for designing programs or systems. The main drawback of manually applied tools is that they take a lot of time to prepare. Also, when a program flow chart is prepared or a structure chart is drawn, the programmer is not sure if it is internally consistent. Fourth-generation languages provide a way out to remove these obstacles by automating many of these manual tasks by using 4GL tools. These tools ensure that the work done with them is consistent with the other work performed by the system team. The automation of manual task and internal consistency checks are two reasons due to which productivity gains result from using 4GL tools.

Q. 25. (a) Which areas of DBMS should be addressed while maintaining a database?

   (b) What are the integrity controls that DBMS package may offer?

Answer 25. (a)

Following five areas of DBMS managements are be considered when trying to maintain a well-tuned database :

   (i) Installation of database
   - Correct installation of the DBMS product.
   - Ensuring that adequate file space is available.
   - Proper allocation of disc space for database.
   - Allocation of data files in standard sizes for I/O balancing.

   (ii) Memory Usage – One should know about following memory management issues :
   - How the DBMS uses main memory?
   - What buffers are being used?

- What needs the programs in main memory have? Knowledge of above issues can help in efficient usage of memory.

(iii) Input / Output (I/O) contention

- Achieving maximum I/O performance is one of the most important aspects of tuning. Understanding how data are accessed by end-users is critical to I/O contention.
- Simultaneous or separate use of input and / or output devices.
- Clock speed of CPU requires more time management of I/O.
- Spooling/Buffering etc. can be used.
- Knowledge of how many and how frequently data are accessed, concurrently used database objects need to be striped across disks to reduce I/O contention.

(iv) CPU Usage

- Multi programming and multi processing improve performance in query processing
- Monitoring CPU load.
- Mixture of online/back ground processing need to be adjusted.
- Mark jobs that can be processed in run off period to unload the machine during peak working hours.

Answer 25. (b)

Data Integrity Controls (i.e. controls on the possible value a field can assume) can be built into the physical structure of the fields. In order to have the correct database, DBMS needs to have certain controls on the data fields. Some of the security controls that DBMS imposes on data fields are as follows :

- (i) **Data Type :** In the data field, the data type defines the type of data to be entered in the field. It may be numeric, character etc.
- (ii) **Length of data field :** The length of data field defines the maximum number of characters or digits (depending upon the data type) to be entered in the data field. It may be 256, 65536 etc.
- (iii) **Default value :** It is the value a field will assume unless a user enters an explicit value for an instance of that field. Assigning a default value to a field can reduce data entry time and entry of a value to that field can be skipped. Default value helps in reducing the probability of data entry errors for most common values.
- (iv) **Range Control :** This limits the set of permissible values a field can assume. The range may be numeric lower to upper bound or a set of specific values. Range control must be used with caution since the limits of range may change with time. A combination of range control and coding led to Y2K problem, in which a field for the year was represented by only the numbers 00 to 99.
- (v) **Null Value Control :** Null value is an empty value. Each primary key field must have an integrity control that prohibits a null value. Any other required field may also have a null value control placed on it depending upon the policy of the organization. For example, a university may prohibit adding a course to its database unless that course has a title as well as value to the primary key, course-ID. Many fields legitimately may have null values so this control is to be used only when truly required.
- (vi) **Referential Integrity :** This control on a field is a form of range control in which the value of that field must exist as the value in some field in another row of same or different table. That is the range of legitimate values comes from the dynamic contents of a field in a data base table, not from some pre-specified set of values. Referential integrity guarantees that only some existing cross-referencing value is used, not that it is the correct one.

Q. 26. (a) Give one or two reasons for each of the following :

     (i) Use of multiplexer in data communication.

     (ii) Need of Repeaters in the network.

     (iii) Need of Protocol Converters.

     (iv) Need of hub in a network.

    (b) What is 'Ring Network' as a network topology? What are its advantages and disadvantages?

    (c) State the various functions of communications software.

Answer 26. (a)

  (i) Multiplexer enables several devices to share one communication line. It scans each device to collect and transmit data on a single line to the CPU.

  (ii) Need of Repeaters in the network – Repeaters are devices that solve the snag of signal degradation which results as data is transmitted along the cables. It boosts the signal before passing it through to the next location.

  (iii) Need of Protocol Converters: Protocols are the standard set of rules which govern the flow of data on a communication network. To enable diverse system components to communicate with one another and to operate as functional unit, protocol conversion is needed. It can be accomplished via hardware, software, or a combination of hardware and software.

  (iv) Need of hub in a network: A hub is a hardware device that provides a common wiring point in a LAN. Each node is connected to the hub by means of simple twisted pair wires. The hub then provides a connection over a higher speed link to other LANs, the company's WAN or the Internet.

Answer 26. (b)

In Ring network, the network cable passes from one node to another until all nodes are connected in the form of a loop or ring. There is a direct point-to-point link between two neighbouring nodes. These links are unidirectional which ensures that transmission by a node traverses the whole ring and comes back to the node, which made the transmission.

Advantages :

  (1) Ring network offers high performance for a small number of workstations.

  (2) It can span longer distances compared to other types of networks.

  (3) These networks are easily extendable.

Disadvantages :

  (1) Ring network is relatively expensive and difficult to install.

  (2) Failure of one computer on the network can affect the whole network.

  (3) It is difficult to trouble shoot a ring network.

  (4) Adding or removing computers can disrupt the network.

Answer 26. (c)

Communications software manages the flow of data across a network. It performs the following functions :

  (A) Access control : Linking and disconnecting the different devices, automatically dialing and answering telephones; restricting access to authorized users; and establishing parameters such as speed, mode and direction of transmission.

  (B) Network management : Polling devices to see whether they are ready to send or receive data; queuing input and output; determining system priorities; routing messages, and logging network activity, use and errors etc.

(C) **Data and file transmission:** Controlling the transfer of data, files and messages *among* the various devices.

(D) **Error detection and control:** Ensuring that the data sent was indeed the data received.

(E) **Data security:** Protecting data during transmission from unauthorized access.

Q. 27. (a) How would you evaluate an ERP package?

(b) What are the benefits of implementing ERP package?

Answer 27. (a)

Evaluation of ERP packages is done based on the following criteria :

(i) **Flexibility :** It should enable organizations to respond quickly by leveraging changes to their advantage, letting them concentrate on strategically expanding to address new products and markets.

(ii) **Comprehensive :** It should be applicable across all sizes, functions and industries. It should have in depth features in accounting and controlling, production and materials management, quality management and plant maintenance, sales and distribution, human resources management and plant maintenance, human resources management and project management. It should also have information and early warning systems for each function and enterprise – wide business intelligence system for informed decision making at all levels.

It should be open and modular. It should embrace an architecture that supports components or modules, which can be used individually, expandable in stages to meet the specific requirements of the business including industry specific functionality. It should be technology independent and mesh smoothly with in house / third party applications, solutions and services including the web.

(iii) **Integrated :** It should overcome the limitations of traditional hierarchical and function oriented structures. Functions like sales and materials planning, production planning, ware house management, financial accounting, and human resources management should be integrated into a work flow of business events and processes across departments and functional areas, enabling knowledge workers to receive the right information and documents at the right time at their desktops across organizational and geographical boundaries.

(iv) **Beyond the Company :** It should support and enable inter-enterprise business processes with customers, suppliers, banks, government and business partners and create complete logistical chains covering the entire route from supply to delivery, across multiple geographic, currencies and country specific business rules.

(v) **Best Business Practices :** The software should enable integration of all business operation in an overall system for planning, controlling and monitoring. It should offer a choice of multiple ready-made business processes including best business practices that reflect the experience and requirements of leading companies across industries. It should intrinsically have a rich wealth of business and organizational knowledge base.

(vi) **New Technologies :** It should incorporate cutting edge and future proof technologies such as object orientation into product development and ensure inter- operability with the Internet and other emerging technologies.

(vii) **Other factors to be considered are :**

- Global presence of the package
- Local presence
- Market targeted by the package
- Price of the package
- Obsolescence of package

- Ease of implementation of package
- Cost of implementation
- Post –implementation support availability.

Answer 27. (b)

The following are some of the benefits that are achieved by implementing the ERP packages :

- Gives Accounts Payable personnel increased control of invoicing and payment processing and thereby boosting their productivity and eliminating their reliance on computer personnel for these operations.
- Reduces paper documents by providing on-line formats for quickly entering and retrieving information.
- Improves timeliness of information by permitting posting daily instead of monthly.
- Provides greater accuracy of information with detailed content, better presentation, satisfactory for the auditors.
- Improved cost control.
- Faster response and follow-up on customers.
- More efficient cash collection, say, material reduction in delay in payments by customers.
- Better monitoring and quicker resolution of queries.
- Enables quick response to change in business operations and market conditions.
- Helps to achieve competitive advantage by improving its business processes.
- Improves supply-demand linkage with remote locations and branches in different countries.
- Provides a unified customer database usable by all applications.
- Improves international operations by supporting a variety of tax structures, invoicing schemes, multiple currencies, multiple period accounting and languages.
- Improves information access and management throughout the enterprise.
- Provides solution for problems like Y2K and Single Monetary Unit (SMU) or Euro Currency.

Q. 28. (a) What is Electronic Data Interchange (EDI)? How it works?

(b) What is Teleconferencing? Explain different modes of teleconferencing.

Answer 28. (a)

EDI is the transmission of business information in standard format between computers of independent organizations. There is no need to change the database structure by the companies for implementation of EDI. However, EDI software is required to be developed for translating the format used by one organization to the format being used by another organizations. So EDI is computer-to-computer communication using a standard data format to exchange business information electronically between independent organizations.

Working Principle of EDI – EDI is the electronic exchange of business documents such as invoices, purchase orders, shipping notices etc. EDI is a three step process :

1. First of all, sender data is converted into standard format as defined by EDI translation software.

2. Data in standard format is transferred to the receiver using communication lines.

3. Finally, standard format data is converted according to the format of receiver data base files.

EDI consists of three components :

(i) Communication - To make EDI work, one needs communication software, translation software and access to standards. Communication software moves data from one point to another, flags the start and end of the document. Translation software helps the user to build a map and shows him how the data fields from his application corresponds to the elements of EDI standards. It also converts data back and forth between the application format and the EDI format.

(ii) Mapping - To build a map, the user first selects the EDI standard for the kind of data he wants to transmit. Usually the trading partner tells about the kind of standards to be used. Next, he edits out parts of the standards, which do not apply, to his application. Next, he imports a file that defines the fields in his application, and finally he makes the map to show where the data required by the EDI standards is located in his application. Once the map is built, the translator will refer to it during EDI processing every time a transaction of that type is sent or received.

(iii) Profile - The last step is to write a partner profile that tells the system where to send each transaction and how to handle errors or exceptions. Whereas the user needs a unique map for every kind of documents he exchanges with a partner, he should only have to define partner information once.

Answer 28. (b)

Teleconferencing refers to the electronic meeting between people who are geographically scattered. Telecommunication technology allows the people to interact with each other without traveling to the same location which saves a lot of money and valuable time.There are three modes of teleconferencing :

1. **Audio conferencing :** It is the use of audio communication equipments which allows the user to communicate with geographically dispersed persons. Audio conferencing does not require a computer but requires a two way audio communication facility.Guidelines to make Audio conferencing more efficient :

    (i) All the participants must have an opportunity to speak.

    (ii) Number of participants must be kept to manageable size.

    (iii) Copy of conferencing agenda must be sent to all the participants in advance through FAX.

    (iv) Participants must identify themselves.

    (v) Conferencing discussion must be recorded.

    (vi) Hard copy of the discussion must be prepared and should be sent to all the participants for approval.

2. **Video conferencing**: In this conferencing, participants can see and hear each other. It uses the television and does not require a computer. Participants gather in specially equipped rooms having audio and video facility.There are three types of Video Conferencing :

    (i) *One way Video and Audio* : In this case, audio and video is traveled only in one direction e.g. Television.

    (ii) *One way Video and Two way Audio* : In this case, audio is transferred in both the directions but video is transferred only in one direction e.g. discussion of news reader with field correspondent.

    (iii) *Two way video and Audio* : In this case, audio and video is transferred in both the directions between sender and receiver e.g. discussion of persons between different studios of a news channel.

3. **Computer Conferencing :** It is the use of networked computer that allows participants with some common characteristics to exchange information concerning a particular topic. It is more disciplined form of E-Mail. It can be used within single geographic site which is not practical in case of Audio and Video conferencing.

Q. 29. (a) Define the following computer Fraud and Abuse technique :

     (i) Piggy backing

     (ii) Logic time bomb

    (iii) Data diddling.

    (iv) Scavenging

  (b) What do understand by the term information security? What is its importance?

  (c) Your client has recently switched over from manual accounting to computerized accounting. When you receive computerized accounts for the first quarter, you find the following types of error :

     (i) Incomplete or unauthorized data input

     (ii) Errors in the files or database during updating

    (iii) Improper distribution or disclosure of output.

    You, as an information system auditor, suggest the suitable test of controls for audit of computer processing so that the above-mentioned errors can be prevented.

Answer 29. (a)

(i) Piggy Backing: It refers to tapping into a telecommunications line and latching on to a legitimate user before he logs into the system; legitimate user unknowingly carries perpetrator into the system.

(ii) **Logic time Bomb:** It refers to the program that lies idle until some specified circumstance or a particular time triggers it. Once triggered, the bomb sabotages the system by destroying programs, data or both.

(iii) **Data diddling:** Changing data before, during or after it is entered into the system in order to delete alter or add key system data is known as data diddling.

(iv) **Scavenging:** Gaining access to confidential information by searching corporate records is termed as scavenging. Scavenging methods range from searching for printouts or carbon copies of confidential information to scanning the contents of computer memory.

Answer 29. (b)

Security relates to the protection of valuable assets against loss, disclosure, or damage. Securing valuable assets from threats, sabotage, or natural disaster with physical safeguards such as locks, perimeter fences, and insurance is commonly understood and implemented by most organizations. However, security must be expanded to include logical and other technical safeguards such as user identifiers, passwords, firewalls, etc. which is not understood nearly as well by organizations as physical safeguards. In organizations where a security breach has been experienced, the effectiveness of security policies and procedures has to be reassessed.This concept of security applies to all information. In this context, the valuable assets are the data or information recorded, processed, stored, shared, transmitted, or retrieved from an electronic medium. The data or information is protected against harm from threats that will lead to its loss, inaccessibility, alteration, or wrongful disclosure. The protection is achieved through a layered series of technological and non-technological safeguards such as physical security measures, user identifiers, passwords, smart cards, biometrics, firewalls, etc.The objective of information security is "the protection of the interests of those relying on information, and the information systems and communications that deliver the information, from harm resulting from failures of availability, confidentiality, and integrity".

For any organization, the security objective is met when

- - information systems are available and usable when required (availability),
- - data and information are disclosed only to those who have a right to know it (confidentiality),
- - data and information are protected against unauthorized modification (integrity).

Importance of Information Security : In a global information society, where information travels through cyberspace on a routine basis, the significance of information is widely accepted. Organizations depend on timely, accurate, complete, valid, consistent, relevant and reliable information. Accordingly, executive management has a responsibility to ensure that the organization provides all users with a secure information systems environment. Today, there are many direct and indirect risks relating to the information systems. These risks have led to gap between the need to protect systems and the degree of protection applied.

This gap is caused by :

- • Widespread use of technology;
- • Interconnectivity of systems;
- • Elimination of distance, time and space as constraints;
- • Unevenness of technological changes;
- • Devolution of management and control;
- • Attractiveness of conducting unconventional electronic attacks over more conventional physical attacks against organizations; and
- • External factors such as legislative, legal, and regulatory requirements or technological developments;

Security failures may result in both financial losses and / or intangible losses such as unauthorized disclosure of competitive or sensitive information.Threats to information system may arise from intentional or unintentional acts and may come from internal or external sources. The threats may emanate from, among others, technical conditions (program bugs, disk crashes), natural disasters (fires, floods), environmental conditions (electrical surges), human factors (lack of training, errors, and omissions), unauthorized access (hacking), or viruses. In addition to these, other threats, such as business dependencies (reliance on third party communications carriers, outsourced operations, etc.) that can potentially result in a loss of management control and oversight are increasing in significance.Adequate measures for information security help to ensure the smooth functioning of information systems and protect the organization from loss or embarrassment caused by security failures.

Answer 29. (c)

During computer processing, the system might fail to detect erroneous input, improperly correct input errors, process erroneous input into files or databases during updating. Auditors must periodically re-evaluate processing controls to ensure their reliability.

The following test of controls may be used :

- • Evaluate adequacy of processing control standards and procedures.
- • Evaluate adequacy and completeness of data editing controls.
- • Verify adherence to processing control procedures by observing computer operations and the data control function.
- • Verify that selected application system output is properly distributed.
- • Reconcile a sample of batch totals and follow up on discrepancies.
- • Trace disposition of a sample of errors flagged by data edit routines to ensure proper handling.
- • Verify processing accuracy for a sample of sensitive transactions.

- Verify processing accuracy for a selected computer generated transactions.
- Search for erroneous or unauthorized code via analysis of program logic.
- Check accuracy and completeness of processing controls using test data.
- Monitor online processing using concurrent audit techniques.
- Recreate selected reports to test for accuracy and completeness.

The auditor must periodically re-evaluate processing controls to ensure their continued reliability. If processing controls are unsatisfactory, user and source data controls may be strong enough to compensate.

Q. 30. (a) Explain the duties of certifying authority in respect of digital signature.

   (b) What do you understand by the following terms with respect to Information Technology :
      (i) Cyber Café.
     (ii) Communication Device.
     (iii) Intermediary

Answer 30. (a)

Duties of Certifying Authority in respect of Digital Signature :

   (i) Every certifying authority shall follow certain procedures in respect of digital signatures as given below :
   - make use of hardware, software and procedures that are secure from intrusion and misuse,
   - provide a reasonable level of reliability in its services which are reasonably suited to the performance of intended functions,
   - adhere to security procedures to ensure that the secrecy and privacy of the digital signatures are assured and
   - observe such other standards as may be specified by regulations.

   (ii) Every certifying authority shall also ensure that every person employed by him complies with the provisions of the Act, or rules, regulations or orders made there under.

   (iii) A certifying authority must display its license at a conspicuous place of the premises in which it carries on its business and a certifying authority whose license is suspended or revoked shall immediately surrender the license to the controller.

   (iv) Every certifying authority shall disclose its digital signature certificate, which contains the public key corresponding to the private key used by that certifying authority and other relevant facts.

Answer 30. (b)

   (i) "Cyber Café" means any facility from where access to the internet is offered by any person in the ordinary course of business to the members of the public.

   (ii) "Communication Device" means Cell Phones, Personal Digital Assistance(Sic), or combination of both or any other device used to communicate, send or transmit any text, video, audio, or image.

   (iii) "Intermediary" with respect to any particular electronic records, means any person who on behalf of another person receives, stores or transmits that record or provides any service with respect to that record and includes telecom serviceproviders, network service providers, internet service providers, web hosting serviceproviders, search engines, online payment sites, online-auction sites, online marketplaces and cyber cafes.

Paper 10
Applied Indirect Taxation

Question No. 1: Answer the followings:

(i)   State the taxable event of Central Sales Tax, Value Added Tax, Service Tax, Excise Duty, Customs Duty

Answer: The taxable events are:

Tax/Duty	Vide Section	Act	Taxable Event
Central Sales Tax			Purchase or sale in the course of inter-state sale (i.e. from one state to another state)
Value Added Tax			Purchase or sale in the course of intra-state sale (i.e. within a state)
Service Tax	Sec.66 (Chapter V)	Finance Act,1994	destination based, service is taxable only if provided in India, except whole of Jammu & Kashmir
Excise Duty	Sec.3	Central Excise Act,1944	Production or manufacture of excisable goods in India (except goods manufactured or produced in Special Economic Zones in India)
Customs Duty		Customs Act,1962	Importation of goods into India or exportation of goods from India

(ii)   **What are excisable goods?**

Answer: Excisable goods are those goods, which are specified in the First and Second Schedule of the Central Excise Tariff Act, 1985, which are subject to duty of excise.

(iii)   **Indicate whether the following activities would fall under "Manufacture", "Deemed Manufacture" or "Production":**

Activity	Classification
1. Production in a sugar factory:	
(a) Sugar	Manufacture (main product)
(b) Molasses	Production (by-product)
(c) Bagasse	Production (by-product)
2. Mining of Coal	Production
3. Dyeing of Yarn	Deemed Manufacture [dyed and coloured yarn is a distinct commodity known to market]
4. Removing pulp from coffee seeds	Curing

5.	Activity on the CD pack and not on the CD	Not a Manufacture **[CCE v. Sony Music Entertainment (I) Pvt.Ltd.2010 (249) E.L.T.341 (Bom.)]**
6.	Labeling or relabeling without repacking from bulk to retail	Deemed Manufacture **[BOC (I) Ltd. 226 ELT 323(SC)]**
7.	Conversion of jumbo rolls into small rolls	Manufacture **[India Cine Agencies (2009) 233 ELT 8 (SC)]**
8.	Branding and Labeling of packed spices	Manufacture
9.	Branding/Labeling of Stainless Steel screws	Not Manufacture
10.	Melting of old brass tubes and converting into new brass tubes	Manufacture. [Identity of original product is completely lost in the process]
11.	Repairing, re-conditioning or re-making	Not a manufacture [No new product emerges because of this activity. **Shriram Refrigeration Industries 26 ELT 353 (Trib.)]**
12.	Affixing a brand name on a product manufactured by a sister unit	Not a manufacture. [Branding is a mere process of identifying the end product and is not a manufacturing activity. **Bush India Ltd. 6 ELT 258 (Bom.)]**
13.	Melting of old brass tubes and converting into new brass tubes	Manufacture. Identity of original product is completely lost in the process
14.	Making ice from water	Manufacture. [Ice is distinctly marketed]
15.	Conversion of rough marble slabs into regular marble slab/tiles	Deemed Manufacture as per Tariff Schedule
16.	Preparation of Mango Pulp from Raw Mango	Manufacture, as distinct product emerges which is marketable as different commodity
17.	Lamination of film	Not a manufacture, as no new and distinct product emerges [Meltex (I) Pvt. Ltd (165) ELT 129 (SC)]
18.	Up gradation of Computers	Not a Manufacture. Though up gradation involves in increasing its storage/processing capacity, however, no new goods with different name, character and use comes into existence.
19.	Crushing betel nuts into small pieces and sweetening the same with essential/non-essential oils, menthol, sweetening, agents, etc.	Not a manufacture, as there is no new product with a different character emerges [Crane Betel Nut Powder Works (2007) 210 ELT 171 (SC)]
20.	Cinders on burning coal	Not a manufacture. [After burning coal, the resultant cinders are not a new product, but only coal of an inferior quality. Also coal is not used as a raw material, but as a fuel. Hence, burning of coal is not manufacture and cinders arising there from are not dutiable. [Ahmedabad Electricity Co. Ltd. 158 ELT 3 (SC)]

(iv) **Discuss the components/structure of the following code numbers:**

Excise Control Code No	ABCPB3245K/XM/001	First 10 characters shows the PAN NUMBER ABCPB3245K	Next 2 characters shows whether the business is carried out as a MANUFACTURER/DEALER XM	Next 3 characters states the No. Assigned to the premise registered 001
Service Tax Registration Number	AABCC5588-ST-001	AABCC5588 First 10 characters shows the PAN NUMBER	ST Next 2 characters shows the Alpha code	001 Next 3 characters states the No. Assigned to the premise registered

Question No.2 (a): **What is meant by classification of goods?**

Answer: Classification of goods refers to determination of headings or sub-headings of the Central Excise Tariff Schedules under which the goods produced are covered. It is necessary for determining the eligibility to exemption, as generally exemptions in excise are given with reference to Tariff Headings and Sub-headings. Further, the actual amount of excise duty payable on goods depends on its Assessable Value and the Rate of Duty, which in turn depends upon its classification under Central Excise Tariff Schedule.

Question No. 2(b): **Discuss the structure of CETA (Central Excise Tariff Act).**

Answer: CETA contains two schedules on classification of goods, First Schedule gives the basic excise duties (CENVAT) and Second Schedule lists items attracting Special Excise Duty. CETA contains 98 Chapters grouped in 21 sections. For some chapters, no rates of duty have been specified, and some Chapters (5 in all) have been kept blank for future use.

Question No.2(c) **What is the system of classification in CETA?**

Answer: Excisable goods are identified/classified using 8-digits, as follows:
❖ First two digits- refers to Chapter number
❖ Next two digits- refers to Heading
❖ Next two digits- refers sub-heading
❖ Last two digits- product ID

Example: (1): Tariff No. 2710 19 30: High Speed Diesel (HSD)

First two digits	27	Chapter 27	Mineral Fuels, Mineral Oils and Products of their distillation; bituminous substances: Mineral waxes
Next two digits	10	Heading	Petroleum Oil and Naptha
Next two digits	19	Sub-heading	
Last two digits	30	Specific product ID	High speed diesel (HSD)

Example: (2): Tariff No. 4013 10 20: High Speed Diesel (HSD)

First two digits	40	Chapter 40	Rubber Articles
Next two digits	13	Heading	Inner tubes
Next two digits	10	Sub-heading	Used in motor cars/lorries
Last two digits	20	Specific product ID	For lorries and buses

Question No. 2(d):

Explain the meaning of Single Dash (-) and Double Dash (- -) used in Excise Tariff/Customs Tariff Schedule.

Answer: The dashes preceding a Tariff Heading or Tariff Item under the HSN (Harmonised System of Nomenclature) signify the following:

Type	**Denoted by**	**Significance/Meaning**
Single Dash	**(-)**	Indicates that the article or group or articles is covered by the Heading under which they are specified
Double Dash	**(- -)**	Indicates a sub-group or article which is part of a group with single dash. They are sub-classifications of immediately preceding article/group with single dash.
Triple dash or quadruple dash	**(- - -)/ (- - - -)**	Indicates a sub-sub-group or article which is part of a sub-group with single or double dash. They are taken to be sub-classification of the immediately preceding article/group with single or double dash

Question No. 2(e): The burden to prove appropriate classification always lies on the Department. Discuss.

Answer: It is the responsibility of the Department to establish the correct Tariff Heading under which the product falls. The onus is on the Department to establish the alternate classification, when the department turns down the classification claimed by the Assessee.

However, when certain goods are prima facie covered by the generic description, the burden to prove that they are so covered would be on the person claiming so.

Question No.2 (f): An assessee classifies "Hajmola" as a Candy. Is the classification correct?

Answer: Hajmola contains 25% sugar and 75% medicine. It has the necessary ingredients as per Ayurvedic experts, which helps in digestion and control acidity. Based on its essential character and use, it is an ayurvedic medicine and not a candy. Hence, classification is not correct. **[Dabur India (SC)]**

Question No.2 (g): After-shave lotion is classified as a medicine. Is the classification correct?

Answer: If an item is to be a treated as a medicinal preparation, it must be meant for curing a disease. Disease could arise out of ailments, physical condition or due to virus or bacterial effect. After-shave lotion is not a medicinal preparation. Hence, it is in the nature of cosmetic **[Coflax Laboratories (SC)]**.

Question No. 2(h): A controversy has arisen as to classification of Coconut oil. Is it (a) Hair oil (b) Edible Oil

(c) Pure Coconut Oil or Coconut Oil? Advice.

Answer: Classification of Coconut oil is based on End user test vide Circular No.890/10/2009 – CX dated 03.06.3009. It refers to coconut oil sold with the indications on the containers or the labels such as (a) Hair oil; (b) Edible Oil; (c) 'Pure Coconut Oil' or 'Coconut Oil'.

   (a) If the 'Coconut Oils' are sold with the label "Hair Oil" meant for retail sale, they are classified under the heading "hair oil" * Heading no.3305+;

   (b) If the coconut oil sold with the label "Edible Oil"/ "Pure Coconut or Coconut Oil" meant for retail sale:

   (i)   If such oil is sold in small packs i.e. 50ml/100 ml/200ml – classify as "Hair oil" only (Chapter 33), since majority of customers use as Hair oil

   (ii)   If such oil is sold in larger packs for e.g. 1 litre or 2 litres – classify as "Edible Oil" (Chapter 15), since majority of customers use as Edible oil.

Hence, the classification of coconut oil would depend upon the fact as to how the majority of the customers use the said product.

Question No. 3(a): What is specific duty?

Answer: Specific duty is the duty payable on the basis of units of measurement like weight, length, volume, thickness, etc. example:- Cigarettes (length basis); Matches (per 100 boxes/packs); cement clinkers (per tonne basis).

Question No. 3(b): Explain Assessable Value and the related principles in determining Assessable Value.

Answer: Assessable value is the value on which is excise duty payable on ad-valorem basis. Assessable value can be based on the followings:-

   (i)   Transaction value- value of a transaction. i.e. price charged by a seller or as determined under valuation rules

   (ii)   Tariff value – value fixed u/s 3(2) of the Central Excise Act

   (iii) Retail Sale Price – maximum retail price printed on packaged goods under Standards, Weights and Measures Act.

Question No.3(c): Explain Transaction Value with reference to Central Excise Act, 1944.

Answer: Transaction value as per Sec. 4 is the price actually paid or payable for the goods when sold. It includes the amount a buyer is liable to pay to the seller or on is behalf, by reason of such sale or in its connection, either at the time of sale or any other time. It also includes the following:

(i) Advertising or publicity;

(ii) Storage;

(iii) Servicing, warranty;

(iv) Marketing and selling organization expenses;

(v) Outward handling;

(vi) Commission or any other matter

But excludes, excise duty, sales tax and other taxes, actually paid or payable on such goods.

Question No. 3(d): What are the conditions for treating the transaction value as the assessable value of the excisable goods?

Answer: The following conditions must be fulfilled for considering Transaction Value as the Assessable Value for the levy of duty on ad-valorem basis:

(i) The excisable goods must be sold by the Assessee;

(ii) Such sale should be for delivery at the time and place of removal;

(iii) Price must be the sole consideration for sale; and

(iv) Assessee and the buyer of the goods must not be related persons.

Question No.4 (a): Discuss Place of Removal

Answer: U/s 4(3) (c) of the Central Excise Act,1944, Place of Removal refers :

(i) Place of Production- factory or any other place or premises of production or manufacture of the excisable goods;

(ii) Place of storage: warehouse or any other place where excisable goods have been permitted to be deposited without payment of duty;

(iii) Place of sale- depot, consignment agent premises or any other place from where excisable goods are to be sold after their clearance from the factory.

Question No. 4(b): Sale price ₹264. Excise duty @ 16% not shown separately. What is the transaction Value?

Answer: Transaction Value = ₹ (264 x 100) / (100 + ED @ 16%) = ₹227.59.

Excise Duty = ₹227.59 x 16% = ₹36.41

Question No. 4(c): If the sale price is ₹275, inclusive of VAT @ 13.5% and ED @ 16%. Calculate the transaction value and excise duty.

Answer: Transaction Value = ₹ (275 x 100 x 100)/ (100 + VAT@ 13.5%) (100 + ED @ 16%] = ₹ 208.87

Excise Duty: ₹208.87 x 16% = ₹33.41

VAT = ₹ (208.87 + 33.41) x 13.5% = ₹32.71

Question No. 4(d): The cum-duty price per piece was ₹150 and the assessee had paid duty @ 20% ad-valorem. Subsequently, it was found that the rate of duty was 30% ad-valorem and the assessee had not collected anything over and above ₹150 per piece. Determine the assessable value.

Answer: Assessable value = ₹ (150 x 100)/ 130 = ₹115.38

Question No.5 (a): "The value of price support incentives received from the raw materials supplier should be included in the assessable value of the final product". Is this an agreeable proposition?

Answer: The value of the price support incentives from the raw material supplier should not be included in the assessable value of the final product [Bisleri International Private Ltd (2005) 186 ELT 257(SC)] –

   (i)   There was no flow back of any additional consideration from the buyers;

   (ii) The price uniformity was maintained;

   (iii) There was no evidence of any of the buyers or existence of any favoured buyers.

If the aforesaid conditions are not satisfied, the value of the price support incentives would be includible in the assessable value of the final product.

Question No. 5(b): Calculate the assessable value for the purpose of levy of excise duty from the following particulars: Cum-duty selling price inclusive of sales tax @ 4.2% (before discount) ₹ 2,73,186. Excise duty @ 10% plus applicable cess. Trade discount allowed ₹3,000; Freight (to be charged extra) ₹ 5,400.

Answer: **Computation of Assessable Value**

Particulars	₹	Justification
Cum-duty selling price (inclusive of sales tax)	2,73,186	U/s 4(3)(d), Assessable Value excludes Duties and Taxes. As freight charges are not included in assessable value, it shall not be deducted.
Less: Sales Tax @ 4.2% (2,73,286 x 4.2/104.2)	11,011	
Less : Freight (to be charged extra)	Nil	
Less: Trade Discount	(3,000)	However, discount passed on to the buyer is excluded from the Assessable Value [Circular 354/81.2000 TRU]
	2,59,175	
Less: Excise Duty @ 10.3%	24,202	= 2,59,275 x 10.3 / 110.3
Assessable Value	**2,34,973**	

Question No. 6(a): What is the assessable value in the following case?

Dates	4.2.2012	8.2.2012	12.2.2012	16.2.2012	20.2.2012
X Computers (Y1 composition)	₹35,000	₹35,500	?	₹35,800	₹35,500
S Computers (Y2 composition)	₹28,000	₹29,000	₹32,000	₹31,800	₹30,900

Answer: The price of the excisable goods removed is not available at the time of removal. Value of excisable goods shall be based on the value of such goods sold by the Assessee for delivery at any other time nearest to the time of removal of goods under assessment. Price prevailing at the nearest time may be adjusted for differences in dates of delivery & nearest dates.

Such goods: In the above case, for valuing X Computers cleared on 12.2.2012, value of such goods, i.e. X Computers, sold during the nearest time only should be considered. S Computers are not such goods, as the composition of the computers are different, referred as Y1 composition and Y2 composition. Such goods refers to same goods or identical goods.

Value on nearest date: Nearest date in the instant case, i.e. 8th February, 2012 and 16th February, 2012. Interpolating the value between these two dates, value as on 12th February, 2012 is ₹ 35,650. (adjustment for difference in dates).

Question No. 6(b): B Ltd. is engaged in the manufacture of tablets that has an MRP of ₹100 per strip of 10 tablets. The company cleared 50,000 tables and distributed as physician's sample. The goods are not covered by MRP but MRP includes 10% excise duty and 4% CST. If the cost of production of the tablet is ₹2 per tablet, determine the total duty payable.

Answer: Where a product is not covered under MRP provisions, Sec.4A does not apply and valuation is required to be done as per the Central Excise Valuation Rules. CBEC has vide its circular, clarified that physicians samples or other samples distributed free of cost are to be valued under Rule 11 read with Rule 4 of the Valuation Rules,2000.

Under Rule 4, such samples are to be valued at the value of such goods nearest to the time of removal.

Computation of Duty Payable

Particulars	₹
Maximum Retail Price per strip	100.00
Less: CST @ 4% [₹100 x 4/104]	3.85
Cum-duty Price	96.15
Less: Excise Duty (including Cess) @ 10.3% [96.15 x 10.3/110.3]	8.98
Assessable Value	87.17
Excise Duty (including Cess) [₹ 87.17 x 10.3%]	8.98

Note: It is assumed that MRP is the cum-duty price collected by B Ltd on its normal sales. Excise duty rate is assumed to be inclusive of Education Cess and SHEC.

Question No.7 (a): Raj & Co. furnish the following expenditure incurred by them and want you to find the assessable value for the purpose of paying excise duty on captive consumption. Determine the cost of production in terms of rule 8 of the Central Excise Valuation (Determination of Price of Excisable Goods) Rules, 2000 and as per CAS-4 (cost accounting standard) (i) Direct material cost per unit inclusive of excise duty at 20% - ₹ 1,320 (ii) Direct wages - ₹ 250 (iii) Other direct expenses - ₹ 100 (iv) Indirect materials - ₹ 75 (v) Factory Overheads - ₹ 200 (vi) Administrative overhead (25% relating to production capacity) ₹ 100 (vii) Selling and distribution expenses - ₹ 150 (viii) Quality Control - ₹ 25 (ix) Sale of scrap realized - ₹ 20 (x) Actual profit margin - 15%.

Answer:

	Particulars	Amount (₹)
(1)	Direct Material (exclusive of Excise Duty) [1,320 x 100/120]	1,100.00
(2)	Direct Labour	250.00
(3)	Direct Expenses	100.00
(4)	Works Overhead [indirect material (₹75) (+) Factory OHs (₹ 200)]	275.00
(5)	Quality Control Cost	25.00
(6)	Research & Development Cost	Nil
(7)	Administration Overheads (to the extent relates to production activity)	25.00
	Less: Realizable Value of scrap	(20.00)
	Cost of Production	1,755.00
	Add 10% as per Rule 8	175.50
	Assessable Value	**1,930.50**

Question No. 7(b)

Determine the cost of production on manufacture of the under-mentioned product for purpose of captive consumption in terms of Rule 8 of the Central Excise Valuation (DPE) Rules, 2000 - Direct material - ₹ 11,600, Direct Wages & Salaries - ₹ 8,400, Works Overheads - ₹ 6,200, Quality Control Costs - ₹ 3,500, Research and Development Costs - ₹ 2,400, Administrative Overheads - ₹ 4,100, Selling and Distribution Costs ₹ 1,600, Realisable Value of Scrap - ₹ 1,200. Administrative overheads are in relation to production activities. Material cost includes Excise duty ₹ 1,054.

Answer: Cost of production is required to be computed as per CAS-4. Material cost is required to be exclusive of Cenvat credit available.

	Particulars	Total Cost (₹)
1	Material Consumed (Net of Excise duty) (11,600 – 1,054)	10,546
2	Direct Wages and Salaries	8,400
3	Direct Expenses	-
4	Works Overheads	6,200
5	Quality Control Cost	3,500
6	Research and Development Cost	2,400

Note - (1) Indirect labour and indirect expenses have been included in Works Overhead (2) In absence of any information, it is presumed that administrative overheads pertain to production activity. (3) Actual profit margin earned is not relevant for excise valuation.

Question No.8 (a)

Hero Electronics Ltd. is engaged in the manufacture of colour television sets having its factories at Kolkata and Gujarat. At Kolkata the company manufactures picture tubes which are stock transferred to Gujarat factory where it is consumed to produce television sets. Determine the Excise duty liability of captively consumed picture tubes from the following information: - Direct material cost (per unit) ₹ 800 Indirect Materials ₹ 50 Direct Labour ₹ 200; Indirect Labour ₹ 50; Direct Expenses ₹ 100; Indirect Expenses ₹ 50; Administrative Overheads ₹ 50; Selling and Distribution Overheads ₹ 100. Additional Information: - (1) Profit Margin as per the Annual Report of the company for 2011-2012 was 12% before Income Tax. (2) Material Cost includes Excise Duty paid ₹ 73 (3) Excise Duty Rate applicable is 10%, plus education cess of 2% and SHEC @ 1%.

Answer: Cost of production is required to be computed as per CAS-4. Material cost is required to be exclusive of CENVAT credit available.

	Particulars	Total Cost (₹)
1	Material Consumed (Net of Excise duty) (800 – 73)	727
2	Direct Wages and Salaries	200
3	Direct Expenses	100
4	Works Overheads	100
5	Quality Control Cost	-
6	Research and Development Cost	-
7	Administrative Overheads (Relating to production capacity)	50
8	Total (1 to 7)	1,177
9	Less - Credit for Recoveries/Scrap/By-Products/Misc Income	-
10	Cost of Production (8-9)	1,177
11	Add - 10% as per Rule 8	118
12	Assessable Value	1,295
13	Excise duty @ 10% of ₹ 1,295	129.50
14	Education Cess @ 2% of ₹ 129.5	2.59
15	SHEC @ 1% on ₹ 129.5	1.295

Total Duty Liability = ₹ (129.5 + 2.59 + 1.295) = ₹ 133.385

Note - (1) Indirect labour and indirect expenses have been included in Works Overhead (2) In absence of any information, it is presumed that administrative overheads pertain to production activity. (3) Actual profit margin earned is not relevant for excise valuation.

Question No. 8(b)

How would you arrive at the assessable value for the purpose of levy of excise duty from the following particulars :

- Cum-duty selling price exclusive of sales tax ₹ 20,000
- Rate of excise duty applicable to the product 10.30%
- Trade discount allowed ₹ 2,400
- Freight ₹ 1,500

Answer:

Trade discount of ₹ 2,400 and freight of ₹ 1,500 are allowed as deductions.

Hence, net price will be ₹ 16,100 [₹ 20,000 – 2,400 – 1,500].

Since the price is inclusive of excise duty of 10.30%, Excise Duty will be ₹ (16,100 × 10.30)/110.30 *i.e.* ₹ 1,503.45 and Assessable Value will be ₹ 14,596.55 [16,100 – 1,503.45]

Question No. 8(c)

Z Ltd. is a small-scale industrial unit manufacturing a product X. The Annual report for the year 2008-09 of the unit shows a gross sale turnover of ₹ 1,91,40,000. The product attracted an excise duty rate of 10% as BED and Sales Tax 10%. Determine the duty liability under Notification Nos. 8/2001 and 9/2001 meant for SSI units.

Answer:

(A) Duty payable under Notification No. 9/2001-CE (Now 9/2002-CE)

Under excise Notification No. 9/2001-CE, an SSI unit is required to pay 60% of normal duty (*i.e.* 6% duty) on first ₹ 100 lakhs and 10% on the balance. The assessee can avail Cenvat credit on all the inputs. Since the example gives gross sale turnover, it is first necessary to find net sales turnover.

In respect of first net turnover of ₹ 100 lakhs (₹ 1,00,00,000), excise duty will be ₹ 6,00,000. Sales tax @ 10% is payable on net turnover *plus* excise duty *i.e.* on ₹ 1,06,00,000, sales tax @ 10% will be 10,60,000.

Therefore, balance gross sale turnover will be ₹ 74,80,000 [₹ 1,91,400,00 − 1,16,60,000]. This includes excise duty at 10% and sales tax @ 10%.

Sales tax is payable on cum duty price. If Net turnover for excise purposes is 'Z', the gross sale turnover will be as follows:

Net Turnover	=	Z
Duty @ 10%	=	$0.10 \times Z$
Sub-Total	=	$1.10 \times Z$
Add : Sales Tax @ 10%	=	$0.11 \times Z$
Total price (*i.e.* inclusive of duty and sales tax)	=	$1.21 \times Z$

Now :

$1.21 \times Z$ = ₹ 74,80,000.00

Hence, Z = ₹ 61,81,818.18

This can be checked as follows:

Net turnover = ₹ 61,81,818.18

Excise duty @ 10% = ₹ 6,18,181.82

Sub-Total = ₹ 68,00,000.00

Add: Sales Tax @ 10% = ₹ 6,80,000.00

Gross Selling Price = ₹ 74,80,000.00

Therefore, —

Excise duty paid on first net turnover of ₹ 1,00,00,000	=	₹ 6,00,000
Excise duty on subsequent Turnover of ₹ 6,18,181.18	=	₹ 6,18,181.82
Total excise duty paid	=	₹ 12,18,181.82

This can be checked as follows :

Total Net turnover	=	₹ 1,61,81,818.18
Total Excise Duty	=	₹ 12,18,181.82
Sales tax @ 10% on Net turnover plus Excise duty		
i.e. on ₹ 1,74,00,000) [1,61,81,818.18 + 12,18,181.82]	=	₹ 17,40,000
Therefore, Gross sales turnover	=	₹ 1,91,40,000

(B) Duty payable under Notification No. 8/2001-CE (Now 8/2002-CE)

Under excise Notification No. 8/2001-CE, an SSI unit is exempt from duty on first ₹ 100 lakhs and duty payable on balance amount is 10%. The assessee can avail Cenvat credit on inputs after it crosses turnover of ₹ 100 lakhs. Since the example gives gross sale turnover, it is first necessary to find net sales turnover.

In respect of first net turnover of ₹ 100 lakhs (₹ 1,00,00,000), excise duty will be Nil. Sales tax @ 10% will be payable on net turnover on ₹ 1,10,00,000. Sales tax @ 10% will be 10,00,000.

Accordingly, gross sale turnover in respect of first net turnover of 100 lakhs (where excise duty is not paid) will be ₹ 1,10,00,000.

Therefore, balance gross sale turnover will be ₹ 81,40,000 [₹ 1,91,40,000 – 1,10,00,000]. This includes excise duty at 10% and sales tax @ 10%.

Sales tax is payable on cum duty price. If Net turnover for excise purposes is 'Z', the gross sale turnover will be as follows:

Net Turnover	= Z
Duty @ 10%	= 0.10 × Z
Sub-Total	= 1.10 × Z
Add: Sales Tax @10%	= 0.11 × Z
Total price (*i.e.* inclusive of duty and sales tax)	= 1.21 × Z

Now :

    1.21 × Z = ₹ 81,40,000.00

    Hence, Z = ₹ 67,27,272.73

This can be checked as follows:

    Net turnover = ₹ 67,27,272.73

    Excise duty @ 10% = ₹ 6,72,727.27

    Sub-Total = ₹ 74,00,000.00

    Add: Sales Tax @ 10% = ₹ 7,40,000.00

    Gross Selling Price = ₹ 81,40,000.00

Hence:

Excise duty paid on first net turnover of ₹ 1,00,00,000	=	Nil
Excise duty on subsequent of ₹ 67,27,272.73	=	₹ 6,72,727.27
Total excise duty paid	=	₹ 6,72,727.27

This can be checked as follows:

Total Net turnover	=	₹ 1,67,27,272.73
Total Excise Duty	=	₹ 6,72,727.27
Sales tax @ 10% on Net turnover *plus* Excise duty *i.e.* on ₹ 1,74,00,000 (1,67,27,272.73 + 6,72,727.27)	=	₹ 17,40,000.
Hence, Gross sales turnover ₹ [1,74,00,000 + 17,40,000]	=	₹ 1,91,40,000

Question No.9(a)

B Ltd. manufactures two products namely, Eye Ointment and Skin Ointment. Skin Ointment is a specified product under section 4A of Central Excise Act, 1944. The sales prices of both the products are at ₹ 43/unit and ₹ 33/unit respectively. The sales price of both products included 10% excise duty as BED and 8% excise duty as SED. It also includes CST of 2%. Additional information is as follows –

    Units cleared: Eye Ointment: 1,00,000 units

    Skin Ointment: 1,50,000 units

    Deduction permissible under section 4A: 40%

    Calculate the total excise duty liability of B Ltd., on both the products.—

Answer :

Duty on eye ointment and skin ointment is required to be calculated separately.

Duty on Eye Ointment :

Let us assume that Assessable Value of Eye Ointment is Z.

Assessable Value	= Z
Duty @ 18.54% [Basic 10% + Special 8% + Education Cess 3%]	= 0.1854 × Z
Sub-Total	= 1.1854 × Z
Add: Central Sales Tax @ 2%	= 0.0237 × Z
Total price (i.e., inclusive of duty and sales tax)	= 1.2091 × Z

Now:

1.2091 × Z = ₹ 43.00

Hence, Z = ₹ 35.56

This may be checked as follows:

Assessable Value per unit	= ₹	35.56
Excise duty @ 18.54%	= ₹	6.59
Sub-Total	= ₹	42.15
Add: Sales Tax @ 2%	= ₹	0.843
Total price	= ₹	43.00

Excise duty payable per unit of eye ointment is ₹ 6.59

Total quantity cleared is 1,00,000.

Hence, total excise duty on eye ointment will be ₹ 6,59,000.

Duty on skin ointment

Since the product is covered under section 4A, Assessable Value is required to be calculated after deducting abatement @ 40%.

The MRP is ₹ 33 and abatement is 40%.

Therefore, Assessable Value (after allowing deduction @40%) will be ₹ 19.80

Excise duty payable per unit @ 18.54% will be ₹ 3.67.

Total quantity cleared is 1,50,000 units.

Accordingly, total duty payable on skin ointment (basic plus special) will be ₹ 5,50,638

Question No. 9(b)

Determine the value on which Excise duty is payable in the following instances. Quote the relevant section/rules of Central Excise Law.

(a) A. Ltd. sold goods to B Ltd., at a value of ₹ 100 per unit, In turn, B Ltd. sold the same to C Ltd. at a value of ₹ 110 per unit. A Ltd. and B Ltd. are related, whereas B Ltd. and C Ltd. are unrelated.

(b) A Ltd. and B. Ltd. are inter-connected undertakings, under section 2(g) of MRTP Act. A Ltd. sells goods to B Ltd. at a value of ₹ 100 per unit and to C Ltd. at ₹ 110 per unit, who is an independent buyer.

(c) A Ltd. sells goods to B Ltd. at a value of ₹ 100 per unit. The said goods are captively consumed by B Ltd. in its factory. A Ltd. and B Ltd. are unrelated. The cost of production of the goods to A Ltd. is ₹ 120 per unit.

(d) A Ltd. sells motor spirit to B Ltd. at a value of ₹ 31 per litre. But motor spirit has administered price of ₹ 30 per litre, fixed by the Central Government.

(e) A Ltd. sells to B Ltd. at a value of ₹ 100 per unit. B Ltd. sells the goods in retail market at a value of ₹ 120 per unit. The sale price of ₹ 100 per unit is wholesale price of A Ltd. Also, A Ltd. and b Ltd. are related.

(f) Depot price of a company are –

Place of removal	Price at depot on 1-1-2012	Price at depot on 31-1-2012	Actual sale price at depot on 1-2-2012
Amritsar Depot	₹ 100 per unit	₹ 105 per unit	₹ 115 per unit
Bhopal Depot	₹ 120 per unit	₹ 115 per unit	₹ 125 per unit
Cuttack Depot	₹ 130 per unit	₹ 125 per unit	₹ 135 per unit

Additional information: (i) Quantity cleared to Amritsar Depot – 100 units (ii) Quantity cleared to Bhopal Depot – 200 units (iii) Quantity cleared to Cuttack Depot – 200 units (iv) The goods were cleared to respective depots on 1-1-2009 and actually sold at the depots on 1-2-2009.

Answer:

(a) Transaction value ₹ 110 per unit (Rule 9 of Transaction value Rules). [Sale to unrelated party].

(b) Transaction value ₹ 100 per unit for sale to B and ₹ 110 for sale to C – Rule 10 read with Rule 4 [Note that inter connected undertaking will be treated as 'related persons' for purpose of excise valuation only if they are 'holding and subsidiary' or are 'related person' as per any other part of the definition of 'related person'. Note that A is selling directly to C as per the question, and not through B Ltd+.

(c) Transaction value will be ₹ 100. – Section 4(1)—Incase of sale to unrelated person, question of cost of production does not arise.

(d) Transaction value ₹ 31. – section 4. – Since the goods are actually sold at this price, administered price is not considered.

(e) Transaction value ₹ 120 per unit – Rule 9 read with section 4 of Central Excise Act. Sale to an unrelated buyer. *Under new rules, there is no concept of 'wholesale price and retail price'+

(f) Under Rule 7, the price prevailing at the Depot on the date of clearance from the factory will be the relevant value to pay Excise duty.

Therefore:

(i) Clearance to Amritsar depot will attract duty based on the price as on 1-1-2012. Transaction value ₹ 110 × 100 units = ₹ 11,000

(ii) Clearance to Bhopal depot. Depot price on 1-1-2012. Transaction value ₹ 120 × 200 units = 24,000

(iii) Clearance to Cuttack Depot. Depot price on 1-1-2012. Transaction value ₹ 130 × 200 units = ₹ 26,000. Note The relevant date is 1-1-2012, since the goods were cleared to the depots on that date. No additional duty is payable even if goods are later sold from depot at higher price.

Question No. 10(a)

Determine the transaction value and the Excise duty payable from the following information : (i) Total Invoice Price ₹ 18,000; (ii) The Invoice Price includes the following :

(a)	Sales-tax	₹ 1000
(b)	Surcharge on ST	₹ 100
(c)	Octroi	₹ 100
(d)	Insurance from Factory to depot	₹ 100
(e)	Freight from factory to depot	₹ 700
(f)	Rate of Basic Excise duty	10% ad valorem
(g)	Rate of Special excise duty	24% ad valorem

Answer:

Let us assume that the Invoice Price of ₹ 18,000 is depot price. Thus, deduction of insurance and transport charges from factory to depot will not be available.

The deductions available will be :

- Sales Tax ₹ 1,000; Surcharge on Sales Tax ₹ 100; and Octroi ₹ 100

Thus, net price excluding taxes on final product (but inclusive of excise duty) will be ₹ 16,800.

The rate of excise duty is 35.02% [10% basic plus 24% special plus 3% Education Cess].

Hence, duty payable is as follows –

Assessable Value = 16,800 – 4,357 = ₹ 12,443

Check: Excise duty payable (basic plus special) is 35.02% of ₹ 12,443 i.e. ₹ 4,357.

Question No. 10(b)

Having regard to the provisions of section 4 of the Central Excise Act, 1944, compute/derive the assessable value of excisable goods, for levy of duty of excise, given the following information:

	₹
Cum-duty wholesale price including sales tax of ₹ 2,500	15,000
Normal secondary packing cost	1,000
Cost of special secondary packing	1,500
Cost of durable and returnable packing	1,500
Freight	1,250
Insurance on freight	200
Trade discount (normal practice)	1,500
Rate of C.E. duty as per C.E. Tariff	10% Ad-valorem

State in the footnote to your answer, reasons for the admissibility or otherwise of the deductions.

Answer :

The assessable value from cum-duty price can be worked out by the under-mentioned formula.

Assessable value =

Computation of Assessable value

	₹	₹
Cum-duty price		15,000
Less : Deductions (See Notes)		
Sales tax	2,500	
Durable & returnable-packing	1,500	
Freight	1,250	
Insurance	200	
Trade-Discount	1,500	6,950
		8,050
Less: Central Excise Duty thereon @ 10.30% Ad-valorem		
8,050 × 10.30/110.30		752
Assessable value		**7,298**

Notes:

1. The transaction value does not include Excise duty, Sales tax and other taxes.
2. The Excise duty is to be charged on the net price, hence trade discount is allowed as deduction.
3. With regards to packing, all kinds of packing except durable and returnable packing is included in the assessable value. The durable and returnable packing is not included as the such packing is not sold and is durable in nature.
4. Freight and insurance on freight will be allowed as deduction only if the amount charged is actual and it is shown separately in the invoice as per Rule 5 of the Central Excise Valuation Rules, 2000.

Question No. 11(a)

Thunder TV Ltd is engaged in the manufacture of colour television sets having its factories at Bangalore and Pune. At Bangalore the company manufactures picture tube; which are stock transferred to Pune factory where it is consumed to produce television sets. Determine the Excise duty liability of the captively consumed picture tubes from the following information:

Direct material cost (per unit)	₹ 600
Indirect material	₹ 50
Direct Labour	₹ 100
Indirect Labour	₹ 50
Direct Expenses	₹ 100
Indirect Expenses	₹ 50
Administrative overheads	₹ 50
Selling and Distribution overheads	₹ 100

Additional Information:

1. Profit margin as per the Annual Report for the company for 2008-2009 was 15% before income tax.
2. Material cost includes Excise duty paid ₹ 100.
3. Excise duty rate applicable is 10.30%.

Answer:

As per Rule 8 of The Central Excise Valuation (Determination of Price of Excisable Goods) Rules, 2000, the valuation of captively consumed goods is 110% of the cost of production. The cost of production of goods would include cost of material, labour cost and overheads including administration cost and depreciation etc. The cost of material would be net of excise duty if CENVAT credit is availed in respect of such inputs. Accordingly, the assessable value will be determined as follows :

Raw materials Cost (net of excise duty)	₹	500
Indirect material	₹	50
Direct Labour	₹	100
Indirect Labour	₹	50
Direct Expenses	₹	100
Indirect Expenses	₹	50
Administrative overheads	₹	50
Total cost of production	₹	**900**
Assessable value	₹	**990**
(i.e. 110% of the cost of production)		
Excise duty @ 10%	₹	99

Add: Education Cess @ 2%	₹	1.98
Add: SHEC @ 1%	Re.	0.99

Total Duty Liability = ₹ (99 + 1.98 + 0.99) = ₹ 101.97

The raw material cost has been taken at ₹ 500 after deducting the duty element assuming that the CENVAT credit has been availed.

Question No. 11(b)

From the following data, determine the CENVAT allowable if the goods are produced or manufactured in a FTZ or by a 100% EOU and used in any other place in India.

Assessable value : ₹ 770 per unit,

Quantity cleared 77,770 units,

BCD — 10%,

CVD – 10%

Answer:

As per Rule 3 of CENVAT Credit Rules, 2002 the following formula is to be used if a unit in DTA purchases goods from EOU –

CENVAT = 50% of Assessable value × {[1 + BCD/100] × CVD/100}

Hence, CENVAT Available per unit is as follows –

CENVAT = 0.50 × 770 x {[1 + 10/100] × 10/100}

= 385 {1.10 × .10}

= 385 × 0.11 = ₹ 42.35 per unit

Hence, CENVAT allowable on 77,770 units = 77,770 × 42.35 = ₹ 32,93,559.50

Question No. 12(a)

M/S RPL has three units situated in Bangalore, Delhi and Pune. The total clearances from all these three Small Scale units of excisable goods was ₹ 350 lakhs during the financial year, 2010-2011. However, the value of individual clearances of excisable goods from each of the said units was Bangalore Unit ₹ 150 lakhs; Delhi Unit ₹ 100 lakhs; and Pune Unit ₹ 1000 lakhs.

Discuss briefly with reference to the Notifications governing small scale industrial undertakings under the Central Excise Act, 1944 whether the benefit of exemption would be available to M/s RPL for the financial year, 2011-2012.

Answer :

Any SSI unit whose turnover was less than ₹ 3 crore in the previous year is entitled for exemption irrespective of their investment in plant & machinery or number of employees.

Where the manufacturer has more than one factory, the turnover of all factories will have to be clubbed together for the purpose of calculating the SSI exemption limit of ₹ 300 lakhs.

Since in the above case, the total value of clearances during the preceding financial year 2010-2011 is 350 lakhs, hence it will not be entitled for the SSI benefit.

Question No. 12(b)

An assessee has factory in Kolkata. As a sales policy, he has fixed uniform price of ₹ 2,000 per piece (excluding taxes) for sale anywhere in India. Freight is not shown separately in his invoice. During F.Y. 2011-12, he made following sales – (i) Sale at factory gate in Kolkata – 1,200 pieces – no transport charges (ii) Sale to buyers in Gujarat – 600 pieces –actual transport charges incurred – ₹ 28,000 (iii) Sale to buyers in Bihar – 400 pieces –

actual transport charges incurred – ₹ 18,000 (iv) Sale to buyers in Kerala – 1,000 pieces – Actual transport charges – ₹ 54,800. Find assessable value.

Answer :

The total pieces sold are 3,200 (1,200 + 600 + 400 + 1000). The actual total transport charges incurred are ₹ 1,00,800 (Nil + 28,000 + 18,000 + 54,800). Thus, equalized (averaged) transport charges per piece are ₹ 31.50. Hence assessable value will be ₹ 1968.50 (₹ 2,000 – ₹ 31.50). This will apply to all 3,200 pieces sold by the manufacturer.

Question No 13(a)

An assessee cleared various manufactured final products during June 2011. The duty payable for June 2011 on his final products was as follows – Basic – ₹ 2,00,000 Education Cesses – As applicable. During the month, he received various inputs on which total duty paid by suppliers of inputs was as follows – Basic duty – ₹ 50,000, Education Cess – ₹ 1,000, SAH education Cess ₹ 500. Excise duty paid on capital goods received during the month was as follows – Basic duty – ₹ 12,000. Education Cess - ₹ 240. SAH education cess - ₹ 120. Service tax paid on input services was as follows – Service Tax – ₹ 10,000. Education cess – ₹ 200 SAH Education Cess - ₹ 100. How much duty the assessee will be required to pay by GAR-7 challan for the month of June 2011, if assessee had no opening balance in his PLA account? What is last date for payment?

Answer:

Education Cess payable on final products is ₹ 4,000 (2% of ₹ 2,00,000). SAH education cess payable is ₹ 2,000.

The Cenvat credit available for June 2011 is as follows –

Description	Basic duty	Service Tax	Education Cess	SAH Education Cess
Inputs	50,000		1,000	500
Capital Goods (50% will be eligible and balance next year)	6,000		120	60
Input Service		10,000	200	100
Total	**56,000**	**10,000**	**1,320**	**660**

Credit of ₹ 66,000 (56,000 + 10,000) can be utilised for basic duty Credit of education cess and SAH education cess can be utilised only for payment of education cess and SAH education cess on final product only.

Hence, duty payable through GAR-7 challan for June 2009 is as follows –

	Basic Duty ₹	Education Cess ₹	SAH Education Cess ₹
(A) Duty payable	2,00,000	4,000	2,000
(b) Cenvat Credit	66,000	1,320	660
Net amount payable (A-B)	1,34,000	2,680	1,340

Last date for payment is 5th July, 2011.

Question No.13 (b)

In aforesaid example, calculate duty payable by GAR-7 challan if assessee had following balance in his PLA account on 6-6-2011 (after debiting utilised amount for payment of duty for May 2011) - Basic duty - ₹ 1,70,000, Service tax - ₹ 30,000. Education Cess - ₹ 4,000. SAH Education Cess - Nil.

Answer :

If credit was available on 1-6-2011, the total Cenvat credit available for June 2011 is as follows :

Description	Basic duty	Service Tax	Education Cess	SAH Education Cess
	₹	₹	₹	₹
Inputs	1,70,000	30,000	4,000	Nil
Capital Goods (50% will be eligible and balance next year)	6,000		120	60

Input Service	10,000	200	100	
Total	**2,26,000**	**40,000**	**5,320**	**660**

The duty payable will be as follows :-

Hence, duty payable through GAR-7 challan for June 2011 is as follows –

	Basic Duty ₹	Education Cess ₹	SAH Education Cess ₹
(A) Duty payable	2,00,000	4,000	2,000
(b) Cenvat Credit	2,66,000	5,320	660
Net amount payable (A-B)	(–66,000)	(–1,120)	1,340

The credit of education cess of ₹ 1,120 is to be carried forward since the credit cannot be utilised for payment of any other duty. Credit of basic duty can be utilised for payment of SAH education cess. Hence, the balance left in basic duty account will be ₹ 64,660.

Thus, no excise duty is required to be paid for the month of June 2011. Balance carried forward will be as follows - (a) Basic duty - ₹ 64,660 (b) Education Cess - ₹ 1,120.

Question No. 14(a)

An importer imports some goods @ 10,000 US $ on CIF basis. Following dollar rates are available on the date of presentation of bill of entry : (a) RBI Floor rate : ₹ 43.21 (b) Inter-bank closing rate : ₹ 43.23 (c) Rate notified by CBE&C under section 14 (3) (a) (i) of Customs Act : ₹ 44.66 (d) Rate at which bank has realised the payment from importer : ₹ 44.02. Find the assessable value for customs purposes.

Answer : The relevant exchange rate is ₹ 44.66. Thus, CIF Value of goods is ₹ 4,46,000. Landing charges [rule 9 (2) of Customs Valuation Rules] @1% of CIF Value are to be added - i.e. ₹ 4,460. Thus, Customs Value or Assessable Value is ₹ 4,50,460.

Question No.14 (b)

A consignment is imported by air. CIF price is 4,000 US Dolla₹ Freight is 2800 US $. Insurance cost was $ 140. Exchange rate is same as above. Find Value for customs purposes.

Answer :

CIF Price	$ 4,000
(–) Freight	$ 1,280
(–) Insurance	$ 140
FOB Price	$ 2,580
(+) Freight @ 20% on FOB	$ 516
(+) Insurance	$ 140
CIF Value for Customs	$ 3,236
Equivalent INR VSD 3,236 × 44.66 =	**₹ 1,44,519.76**
(+) Landing charges @ 1% =	**₹ 1,445.20**
	₹ 1,45,964.96

Question No. 15(a)

FOB Cost of a consignment is 6,000 UK Pounds. Insurance and transport costs are not available. What is Customs Value? On the date of filing of bill of entry, Reserve Bank of India reference rate of US $ was 43.37 and inter-bank closing rates were : ₹ 43.38 per US $ and ₹ 69.38 per UK Pound. Exchange rate announced by Board (CBE&C) by customs notification was ₹ 69.78 per British Pound. T T buying rate was 69.70 and T T selling rate was ₹ 69.61 per UK pound.

Answer:

FOB Price		$ 6,000
Add : Freight @ 20%		$ 1,200
Add : Insurance @ 1.125% on FOB		$ 67.50
CIF		$ 7,267.50
Exchange Rate		₹ 69.78 per $
CIF Value (in ₹) ($ 7,267.50×69.78)		₹ 5,07,126.15
Add : Landing charges @ 1% on CIF Value =		₹ 5,071.26
Assessable Value for Customs		₹ **5,12,197.41**

Question No.15 (b)

Customs value (Assessable Value) of imported goods is ₹ 4,00,000. Basic Customs duty payable is 10%. If the goods were produced in India, excise duty payable would have been 10%. Education cess is as applicable. Special CVD is payable at appropriate rates. Find the Customs duty payable. What are the duty refunds/benefits available if the importer is (a) manufacturer (b) service provider (c) Trader?

Answer:

		Duty %	Amount (₹)	Total Duty (₹)
(A)	Assessable Value		4,00,000.00	
(B)	Basic Customs Duty	10	40,000.00	40,000.00
(C)	Sub-Total for calculating CVD '(A+B)'		4,40,000.00	
(D)	CVD 'C' × excise duty rate	10	44,000.00	44,000.00
(E)	Education cess of excise – 2% of 'D'	2	880.00	880.00
(F)	SAH Education cess of excise – 1% of 'D'	1	440.00	440.00
(G)	Sub-total for Edu-cess on customs 'B+D+E+F'		85,320.00	
(H)	Edu Cess of Customs – 2% of 'G'	2	1,706.40	1,706.40
(I)	SAH Education Cess of Customs – 1% of 'G'	1	853.20	853.20
(J)	Sub-total for Spl CVD 'C+D+E+F+H+I'		4,87,879.60	
(K)	Special CVD u/s 3(5) – 4% of 'J'	4	19,515.18	19,515.18
(L)	Total Duty			1,07,394.78
(M)	Total duty rounded off			1,07,395.00

Notes: Buyer who is manufacturer, is eligible to avail Cenvat Credit of D, E, F and K above. A buyer, who is service provider, is eligible to avail Cenvat Credit of D, E and F above. A trader who sells imported goods in India after charging Vat/sales tax can get refund of Special CVD of 4% i.e. 'K' above.

Question No.16 (a)

An importer has imported a machine from UK at FOB cost of 10,000 UK Pounds. Other details are as follows:

(*a*) Freight from UK to Indian port was 700 pounds.

(*b*) Insurance was paid to insurer in India: ₹ 6,000

(*c*) Design and development charges of 2,000 UK pounds were paid to a consultancy firm in UK

(*d*) The importer also spent an amount of ₹ 50,000 in India for development work connected with the machinery.

(*e*) ₹ 10,000 were spent in transporting the machinery from Indian port to the factory of importer.

(*f*) Rate of exchange as announced by RBI was : ₹ 68.82 = one UK Pound

(*g*) Rate of exchange as announced by CBE&C (Board) by notification under section 14(3)(a)(i) : ₹ 68.70 = One UK pound

(*h*) Rate at which bank recovered the amount from importer: ₹ 68.35 = One UK Pound.

(*i*) Foreign exporters have an Agent in India. Commission is payable to the agent in Indian Rupees @ 5% of FOB price.

Customs duty payable was 10%. If similar goods were produced in India, excise duty payable as per tariff is 24%. There is an excise exemption notification which exempts the duty as is in excess of 10%. Education cess is as applicable Spl CVD is payable at applicable rates.

Find customs duty payable. What are the duty refunds/benefits available if the importer is (a) manufacturer (b) service provider (c) Trader?

Answer:

FOB Value	$ 10,000.00
Add : Design & Development Charges	$ 2,000.00
Add : Ocean freight	$ 700.00
Total C & F	$ 12,700.00
Equivalent C&F @ ₹ 68.70 per UK Pound =	₹ 8,72,490.00
Add : Insurance	₹ 6,000.00
Add : Local Agency commission 500 $	
@ ₹ 68.70 per pound =	₹ 34,350.00
Total CIF Price	**₹ 9,12,840.00**
Add : Landing Charges @ 1% of CIF	₹ 9,128.40
Assessable Value	**₹ 9,21,968.40**
Assessable Value (rounded to)	**₹ 9,21.968.00**

Calculation of duty payable is as follows:

		Duty %	Amount	Total Duty
(A)	Assessable Value		921,968.00	
(B)	Basic Customs Duty	10	92,196.80	92,196.80
(C)	Sub-Total for calculating CVD '(A+B)'		1,014,164.80	
(D)	CVD 'C' × excise duty rate	10	101,416.48	101,416.48
(E)	Education cess of excise – 2% of 'D'	2	2,028.33	2,028.33
(F)	SAH Education cess of excise – 1% of 'D'	1	1,044.16	1,044.16
(G)	Sub-total for edu cess on customs 'B+D+E+F'		196,655.77	
(H)	Edu Cess of Customs – 2% of 'G'	2	3,933.12	3,933.12
(I)	SAH Education Cess of Customs – 1% of 'G'	1	1,966.56	1,966.56
(J)	Sub-total for Spl CVD 'C+D+E+F+H+I'		1,124,523.45	
(K)	Special CVD u/s 3(5) – 4% of 'J'	4	44,980.94	44,980.94
(L)	Total Duty			247,536.39
(M)	Total duty rounded off			247,536.00

Notes – Buyer who is manufacturer, is eligible to avail Cenvat Credit of D, E, F and K above. A buyer, who is service provider, is eligible to avail Cenvat Credit of D, E and F above. A trader who sells imported goods in India after charging Vat/sales tax can get refund of Special CVD of 4% i.e. 'K' above.

Note: (1) Design and development work done in India and transport costs within India are not to be considered for purposes of 'Customs Value'. (2) Excise duty rate has to be considered after considering excise exemption notification. (3) Assessable Value and Final duty payable should be rounded off to nearest Rupee.

Duty payable is same whether the importer is manufacturer or a trader.

Question No.16 (b):

Zing Yong of China exports Lithium Cell to India, the FOB price of which is one Dollar for 30 cells; however the details of Fright & Insurance were not made available. Investigation reveals that the goods are imported into India at an increased quantity. Similar cells are manufactured in India, the cost of sales per cell of which indicates the following break-up :

Direct Material	₹ 2.00
Direct Labour	₹ 0.25
Direct Expenses	₹ 0.25
Indirect Expenses	₹ 0.50
Indirect Labour	₹ 0.25
Indirect Expenses	₹ 0.25
Administrative Overheads	₹ 0.50
Selling and distribution overheads	₹ 0.50
Profit Margin	₹ 0.50

The exchange rate 1 $ = ₹ 50. Is there any case to impose Safeguard Duty? If yes, what is the duty leviable?

Answer :

Amount		Total Duty
FOB US $ for 30 cells	1.00	
Freight @ 20% of FOB	0.20	
Insurance @ 1.125% of FOB	0.011	
CIF USD	1.21	
Total CIF in ₹ @ ₹ 50 per 1 USD	60.56	
ADD - Landing Charges @ 1%	0.61	
(A) Assessable Value	61.17	
(B) Basic Customs Duty @ 10%	6.12	6.12
(C) Sub Total for calculating CVD (A+B)	67.28	
(D) CVD "C" × Excise Duty rate (10%)	6.73	6.73
(E) Education cess of excise - 2% of D	0.13	0.13
(F) SAH Education cess of excise - 1% of 'D'	0.07	0.07
(G) Sub-total for education cess on customs 'B+D+E+F'	13.05	
(H) Education cess of customs - 2% of 'G'	0.26	0.26
(I) SAH Education cess of customs - 1% of 'G'	0.13	0.13
(J) Sub - total for Spl CVD 'C+D+E+F+H+I'	74.61	
(K) Special CVD - 4% of 'J'	2.98	2.98
(L) Total Duty		16.42

Hence, landed cost of 30 cells is ₹ 77.59 (₹ 61.17 + ₹ 16.42 as duty)

Accordingly, the landed cost will be ₹ 2.59 per cell

In case of Indian manufacturer, his total cost will be as follows –

Prime Cost (Direct Material + Direct Labour + Direct Expenses)	₹ 2.50
Cost of Production (Prime Cost + Indirect Material + Indirect Labour + Indirect Expenses)	₹ 3.50
Cost of Sales (Cost of production + Administration Overheads + Selling and Distribution Overheads).	₹ 4.50
Selling price (Cost of Sales plus profit).	₹ 5.00

Thus, landed cost of imported article will be ₹ 2.59 and selling price of Indian manufacturer will be ₹ 5,00 per cell.

Accordingly, there is a case for imposition of product Specific Safeguard Duty on imports from China u/s 8C of Customs Tariff Act.

Maximum safeguard duty that can be imposed is ₹ 2.41 per cell.

Question No 17(a)

Discuss briefly with reference to decided case laws as to how the 'value' shall be determined under section 14 of the Customs Act, 1962 read with Customs Valuation Rules, 1988 in the following cases :

  (i) Goods are offered at specially reduced price to buyer and the buyer is asked not to disclose the specially reduced price to any other party in India.
 (ii) There has been a price rise between the date of contract and the date of importation. The contract was over 6 months before the date of shipment.
(iii) The sale involves special discounts limited to exclusive agents.
(iv) The goods are purchased on High seas.

Answer :

 (i) Where sales are made to buyers at specially reduced prices, the prices so offered cannot be said to be the ordinary prices. In Padia Sales Corporation v Collector of Customs (1993) 66 ELT 35 (SC) the Supreme Court held that where the goods are offered to the buyers is asked not to disclose the specially reduced price to any other party, then the said price will not be acceptable.

 (ii) Where there is a price rise at the time when the goods are imported in comparison to the price when the contract was made then, the price at the time of importation will be taken to be the value of the goods. In Rajkumar Knitting Mills Pvt. Ltd. v Collector of Customs (1998) 98 ELT 292 (SC), the Supreme Court held that the contract price may have bearing while determining the value of the goods, but he value is to be determined at the time of importation of the goods.

(iii) In Eicher Tractors Ltd. v Commissioner of Customs, Mumbai (2000) 122 ELT 321 (SC) the Supreme Court held that the price paid by the importer to the vendor in the ordinary course of commerce shall be taken to be the value of imported goods. Since the buyer and the seller are not related and the price is the sole consideration for sale, the discounted price was taken as the assessable value. However this decision has been nullified by the Customs Valuation Price of Imported Goods Rules, 2002 and consequently, where the sale involves special discounts limited to exclusive agents, such discounted price shall not be accepted as the assessable value.

(iv) Where high sea sales are made, the price charged by the importer from the assessee will be taken to be the value of the goods. Similar view was expressed by the Tribunal in Godavari Fertilizers v C.C.Ex. (1996) 81 ELT 535 (Tri.).

Question No 17(b)

'A' imports by air from USA a Gear cutting machine complete with accessories and spares. Its HS classification is 84.610 and Value US $ f.o.b. 20,000. Other relevant data/information : (1) At the request of importer, US $ 1,000 have been incurred for improving the design, etc. of machine, but is not reflected in the invoice, but will be paid by the party, (2) Freight – US $ 6,000. (3) Goods are insured but premium is not shown/available in invoice. (4) Commission to be paid to local agent in India ₹ 4,500. (5) Freight and insurance from airport to factory is ₹ 4,500. (6) Exchange rate is US $ 1 = ₹ 45. (7) Duties of Customs: Basic – 10% CVD – 10% SAD – 4%. – Compute (i) Assessable value (ii) Customs duty.

Answer: (i)   Computation of Assessable Value –

FOB Value of Machine	= $ 20,000
Add : Expenditure for improving design	= $ 1,000
Add – Freight limited to 20% of FOB [Rule 9(2)]	= $ 4,000
Insurance @ 1.125% of FOB [Rule 9(2)c(iii)]	= $ 225
Sub-Total	= $ 25,225
Sub-Total In ₹ @ ₹ 45 per Rupee	= ₹ 11,35,125
Add – Agents Commission [Rule 9(1)(i)]	= ₹ 4,500
Total CIF Value	= ₹ 11,39,625
Add – Landing charges 1% of CIF	= ₹ 11,396
Assessable Value	**= ₹ 11,51,021**

Duty payable will be as follows –

(ii)   Gear cutting machine Complete with accessories and spares

	Amount	Total Duty
(A) Assessable Value	1,151,021.00	
(B) Basic Customs Duty @ 10%	115,102.10	115,102.10
(C) Sub Total for calculating CVD (A+B)	1,266,123.10	
(D) CVD "C" × Excise Duty rate (10%)	126,612.31	126,612.31
(E) Education cess of excise - 2% of 0	2,532.25	2,532.25
(F) SAH Education cess of excise - 1% of 'D'	1,266.12	1,266.12
(G) Sub-total for education cess on customs 'B+D+E+F'	245,512.78	
(H) Education cess of customs - 2% of 'G'	4,910.26	4,910.26
(I) SAH Education cess of customs - 1% of 'G'	2,455.13	2,455.13
(J) Sub - total for Spl CVD 'C+D+E+F+H+I'	1,403,899.16	
(K) Special CVD - 4% of 'J'	56,155.97	56,155.97
(L) Total Duty		309,034.13
(M) Total duty rounded off		309,034.00

Question No. 18(a)

Mr. B, an Indian resident, aged 52 years, returned to India after visiting England on 31.10.2009. He had been to England on 10.10.2009. On his way back to India he brought following goods with him –

- (a) His personal effect like clothes etc. valued at ₹ 40,000.
- (b) 1 litre of Wine worth ₹ 1,000.
- (c) A video cassette recorder worth ₹ 1,000
- (d) A microwave oven worth ₹ 20,000.

What is the customs duty payable?

Answer :

As per Rule 3 of the baggage Rules, 1998 passengers above 10 years of age and returning after stay abroad of more than 3 days are eligible for the following general free allowance :

- (i) Used personal effect of any amount;
- (ii) Articles other than those mentioned in Annex-I, upto a value of ₹ 25,000 if these are carried on the person or in the accompanied baggage of the passenger;

Therefore, in the instant case, the total customs duty payable by the passenger will be as follows :

Articles	Duty
1. Used personal effects	No Duty
2. Wine upto 1 Ltr. Can be accommodated in General Free Allowance	₹ 1,000
3. Video cassette recorder is dutiable	₹ 11,000
4. A microwave oven	₹ 20,000
Total Dutiable goods imported (that can be accommodated in General Free Allowance)	₹ 32,000
Total General Free allowance (As per rule 3 of the Baggage Rules)	₹ 25,000
Balance Goods on which duty is payable	₹ 7,000
Duty payable @ 36.05% [35% + 2% of 35% + 1 % of 35% = 36.05%]	₹ 2,523.50

Question No.18 (b)

'A' has exported under-mentioned goods under drawback claim –

S. No. of DBK Table	Description of goods & quantity exported	Value FOB ₹	Rate of Drawback
64.01	Leather footware Boots 200 nos. @ ₹ 1,000 per pair	2,00,000	11% of FOB subject to maximum of ₹ 85 per pair
64.11	Leather chappals 2000 no. @ ₹ 50 per pair	1,00,000	3% of FOB subject to maximum of ₹ 5 per pair.
71.01	Brass Jewellery 200 kgs. @ ₹ 200 per kg		₹ 22.50 per kg of Brass content
71.05	Plastic bangles with embellishment 200 kgs @ ₹ 100 per kg		₹ 5.00 per kg of plastic content.

On examination it is found that brass jewellery is 50% of weight and in plastic bangles the plastic content is 50% but the total weight comes to 190 kgs only. Compute drawback on each item and total drawback.

Answer:

Description	FOB Value ₹	Rate of Drawback	Drawback in ₹
Leather footwear Boots – 200 pairs @ ₹ 1,000 per pair	2,00,000	11% of FOB subject to max of ₹ 85 per pair	17,000
Leather chappals – 2,000 pairs @ ₹ 50 per pair	1,00,000	3% of FOB subject to Max ₹ 5 per pair	3,000
Brass jewellery 200 Kgs @ ₹ 200 per Kg – Brass content 50% of weight Plastic bangles with embellishment 200 Kgs – Plastic content 50%. Actual weight 190 Kgs only		22.50 per Kg of Brass content	2,250
		₹ 5 per Kg of Plastic content	475
		Total Duty Drawback	22,725

Question No. 19(a)

Ms Priya rendered taxable services to a client. A bill of ₹ 40,000 was raised on 29-4-2011. ₹ 15,000 was received from a client on 1-7-2011 and the balance on 23/10/2011. No service tax was separately charged in the bill. The questions are: (a) Is Ms Priya liable to pay service tax, even though the same has not been charged by her? (b) In case she is liable, what is the value of taxable services and the service tax payable, if service tax rate is 1096 plus education cess as applicable?

Answer : She is liable even if tax was not charged separately. ₹ 40,000 will be treated as inclusive of service tax. Hence, 'Value' for service tax is ₹ 36,264.73 [(₹ 40,000 × 100)/110.30]. Service tax @ 10% is 3,626.47, Education cess is ₹ 72.53 and SAHE cess is 36.27.

The tax is payable on 5th July, 2011 if paid by cheque/cash and 6th July, 2011 if paid electronically.

(Till 31-3-2011, the service tax was payable on receipt basis. Hence, in that case due date would have been 5th/6th October for ₹ 15,000 and 5th/6th January (next year) for balance ₹ 25,000).

Question No.19 (b)

M/s. ABC & Associates, a firm of Cost Accountants, raised an invoice for ₹ 38,605 (35,000 + service tax of ₹ 3,605 @ 10.3%) on 12th April, 2011. The client paid lump sum of ₹ 36,000 on 2nd June, 2011 in full and final settlement: (i) How much service tax M/s. ABC & Associates have to pay and what is the due date for payment of service tax? (ii) What will be the liability if the client refuses to pay service tax and pays only ₹ 35,000?

Answer: In first case, ₹ 36,000 is treated as inclusive of service tax @ 10.30%. Hence, making back calculations, service tax will be ₹ 3,361.74 on value of ₹ 32,638.26. In second case, ₹ 35,000 is treated as inclusive of service tax @ 10.30%. Hence, making back calculations, service tax will be ₹ 3,268.36 on value of ₹ 31,731.64. [Note that in case of Practising CA/CWA/CS, service tax is payable on receipt basis and not on accrual basis, even after 1-4-2011].

Question No.19(c)

Mr. Deshpande, Cost Accountant rendered taxable service to Vishwa Cement Ltd. In this regard the company sent 200 cement bags free of cost, for the house construction of Mr. Deshpande. Explain how the value of the taxable service will be determined in this case. Will your answer be different if the service had been rendered free of charge?

Answer : In first case, value of 200 cement bags will be treated as consideration for services received. It will be treated as gross value of service and service tax will be calculated by making back calculations. In second case, no service tax is payable since 10.30% of Nil is Nil.

Question No. 19(d)

Mr. Gombu, a proprietor of Intellect Security Agency received ₹ 100,000 by an account payee cheque, as advance while signing a contract from proceeding taxable services; he received ₹ 5,00,000 by credit card while providing the service and another ₹ 5,00,000 by a pay order after completion of service on January 31, 2012. All three transactions took place during financial year 2011-12. He seeks your advice about his liability towards value of taxable service and the service tax payable by him.

Answer : He is liable on entire ₹ 11 lakhs, presuming that he is not eligible for exemption as small service provider. The ₹ 11 lakhs are to be taken as inclusive of service tax and service tax is payable by back calculations. Assuming service tax rate as 10.30%, the 'value' would be ₹ 9,97,280.15 and service tax @ 10.30% would be ₹ 1,02,729.85.

Question No. 20(a)

Mr. X took an accommodation for 6 days in a Hotel at Delhi. Basic Room Rent ₹6,000 per day . Food Bills amounting to ₹ 8,000. Delhi VAT is @ 12.5%. Calculate Total Bill amount to be paid inclusive of Service Charge @ 10% and applicable Service taxes. [Abatement rate is 30%. Service tax on un-abated amount @ 10.3% and on abatement amount @ 3.71%, Delhi VAT @ 12.5%]

Answer: The bill amount shall be computed in the following manner:

Sl. No	Particulars	Amount (₹)
1	Room Rent @ ₹6,000 per day for 6 days	36,000
2	Add: Food Bill	8,000
3	Total of room rent including food bill	44,000
4	Add: Service Charges @ 10% on ₹44,000	4,400
5	Total including Service Charges	48,400
6	Add: Service Tax @ 10.3% on 70 % of ₹44,000 [considering abatement 30%]	3,172
7	Add: Service Tax @ 3.71% on 30% of ₹44,000 [service tax on the amount claimed as an abatement]	490
8	Add: VAT @ 12.5% on 30% of ₹44,000	1,650
	Total Bill Amount [5+6+7+8]	53,712

Question No. 20(b)

Determine the central sales tax liability from the following data when a sale is effected from Faridabad to Lucknow :

> (a)   Invoice no. : 00708374 ; (b)   Basic price : ₹ 3,00,000 ; (c)   Excise duty : 10% ad valorem
>
> (d)   CST : as applicable under 'C' forms ; (e) Trade discount : 8% ;(f)   Cash discount : 2%

(g) Quantity supplied : 10,000 kgs ; **(h)** Quantity rejected by buyer within 3 days of delivery : 1000 kgs ; **(i)** Quantity returned by buyer after 6 months of despatch : 1000 kgs.

Solution :

Computation of Central Sales Tax Payable

Particulars	Amount ₹
Basic Price @ ₹ 30/kg	3,00,000
Less : Goods rejected/returned by buyer within 6 months	30,000
Balance	2,70,000
Less : Trade Discount @ 8%	21,600
Balance	2,48,400
Less : Cash Discount @ 2%	5,400
Net Sales	2,43,000
Add : Excise Duty @ 10%	24,300
Total	**2,67,300**
CST @ 2% (under 'C' Form)	**5,346**

Question No. 21(a)

Vishal is a dealer. His sales during the first quarter of 2011-12 (April to June) are :

Date	Invoice No.	Amount (₹)
05.04.2009	101	10,000 plus tax @ 2%
12.04.2009	102	80,000 plus tax @ 2%
05.04.2009	102	62,400 (inclusive of tax)
05.04.2009	104	14,000 plus tax @ 2%
05.04.2009	105	18,000 plus tax @ 2%

(i) Goods worth ₹ 7,000 (excel of tax) against Invoice No. 104 were returned on 29.06.11.

(ii) Goods worth ₹ 13,000 (incl of tax) sold on 26.12.10 were returned on 30.06.11.

(iii) Goods worth ₹ 6,500 (incl of tax) sold on 27.12.10 were returned on 30.06.11.

All the above sales were made in the course of inter-State trade. Calculate the turnover and sales tax payable if the rate of tax is 2%.

Solution :

Computation of Turnover (Inclusive of Sales Tax)

Invoice No.	Computation	Amount ₹
101	(10000 + 2%)	10,200
102	(80000 + 2%)	81,600
103	—	62,400
104	(14000 + 2%)	14,280
105	(18000 + 2%)	18,360
		1,86,840
Less : Sales return within 6 months		**7,280**
Aggregate sale value		**1,79,560**

Turnover = = 1,76,039

Sales tax payable = [1,79,560 x 2/102] = ₹3,521

Note : Goods returned beyond 6 months are not deductible. Hence ₹ 13,000 and ₹ 6,500 are not deductible.

Question No. 21(b)

Adwell Co. of Indore (Madhya Pradesh) has supplied the following statement of sales :

(i) Sales of cloth ₹ 12,00,000 of which ₹ 7,50,000 sold in Madhya Pradesh and rst in Rajasthan.

(ii) Sales to a registered dealer of Gujarat for sale on Form C of such goods which are given in his registration certificate: ₹ 4,68,000.

(iii) Sale of declared goods to unregistered dealer of Maharashtra : ₹ 9,45,000 (The rate of sales-tax on such goods is 2% in the State and the customer returned goods worth ₹ 46,500 within 6 months.)

(iv) Sale to a registered dealer of Gujarat of such undeclared goods which have not been given in his registration certificate:₹ 3,63,000. (Sales tax on such goods in the State is 7%.)

(v) Sale of goods to Bangladesh: ₹ 6,00,000. (Rate of sales tax in the State is 4%.)

(vi) Subsequent sale during inter-State trade: ₹ 1,20,000. (Rate of tax in the State is 10%).

Compute the taxable turnover under the CST Act, 1956. Sales include the sales tax.

Solution: **Computation of Taxable Turnover**

	Particulars	Amount (₹)	Taxable Amount (₹)
(I)	Sales of cloth (Exempt from Tax)	—	—
(II)	Sales to a registered dealer of Gujarat for sale on form C	4,68,000	
	Less : Sales Tax @ 2% i.e. 4,68,000 × 2/102	9,147	4,58,853
(III)	Sale of declared goods to unregistered dealer of Maharastra	9,45,000	
	Less : Sales return within 6 months	46,500	
	Less : Sales Tax double the state rate @ 2% i.e. 8,98,500		
	(9,45,000 – 46,500) × 2/102	17,618	8,80,882
(IV)	Sale to a registered dealer of Gujarat of undeclared goods		
	which are ot given in the registration certificate	3,63,000	
	Less : Sales Tax at state rate or 6% whichever		
	is higher i.e. [3,63,000 × 6/106]	10,572	3,52,428
(V)	Sale of goods to Bangladesh. Exempt since it is export		
	from India	6,00,000	—
(VI)	Subsequent sale during Inter-state trade (assumed to a		
	registered dealer) is exempt under Sec 6(2)	—	—
	Taxable Turnover		**16,92,163**

Question No. 22(a)

Calculate the CST payable from the following data —

(a) Invoice No. 1011 dated 01.04.2011 for ₹ 1,78,967 inclusive of CST @ 2%.

(b) Invoice No. 1012 dated on 02.04.2011 for ₹ 1,87,697 exclusive of CST @ 2%.

(c) Invoice No. 1013 dated 03.04.2011 for ₹ 1,75,000 inclusive of local Sales Tax @ 10%.

(d) Invoice No. 1014 dated 04.04.2011 for ₹ 2,50,000 exclusive of local Sales Tax @ 8%.

(e) 50% of the goods sold on 01.04.2011 on inter-state trade was rejected and returned on 31.07.2011.

(f) 20% of the goods sold on 04.04.2011 on local sale was returned on 30.06.2011.

(g) 30% of the goods sold on 02.04.2011 on inter-state trade returned on 02.06.2011.

(h) 10% of goods sold on 03.04.2011 on local sale was rejected on 03.10.2011.

(i) Goods of ₹ 1,50,000 was stock transferred from Bangalore to Indore on 05.04.2011 excludes CST elements of 2%.

(j) Export of goods worth 10 million Yens to Japan on 06.04.2011 of which 50% were rejected and returned on 01.11.2009 (1 Yen = Re. 0.35).

(k) Export through Canalising Agency for value of 100 thousand Dollars (Export order with Canalising Agency) (1 dollar = ₹ 48).

(l) Purchased goods for ₹ 3,00,000 from the market on 09.01.2011 and exported to Singapore on 14.01.10 to the Agent for further sale (The goods attracted local sales tax of 10%).

Give reasons for inclusion/non-inclusion of the above.

Solution:

Calculation of Central Sales Tax

Invoice No. and date	Aggregate Sale Price (100+2%) Col. No. 1	Turnover (₹) Col. No. 1×100/102 Col. No. 2	CST (₹) Col. No. 1-2 Col. No. 3
1011 Dt. 01.04.2011	1,78,967	1,75,458	3,509
1012 Dt. 02.04.2011	1,95,205	1,91,377	3,828
Total	**3,74,172**	**3,66,835**	**7,337**
Less -			
(a) Rejected & returned goods sold on 01.04.2011	89,484	87,729	1,755
(b) Returned goods sold on 02.04.2011	58,561	57,413	1,148
Net Amount	**2,26,127**	**2,21,693**	**4,434**

Hence, total CST payable is ₹ 4,434.

Working Notes:

(1) Since CST payable is required to be calculated, local sale as given at Sr. No's 3, 4, 6 and 8 are not considered.

(2) Any rejections are excludable without restriction that these must be returned within six months.

(3) Direct exports and export through canalising agency are exempted from CST. Hence, sales given in Sr. No's. 10, 11 and 12 are ignored.

(4) No tax is payable on stock transfer and hence transfer as shown at Sr. No. 9 is not taxable.

Thus, we consider only Sr. No's 1, 2, 5 and 7 for calculation of CST.

Question No.22 (b)

Aloke, a registered dealer in the State of Orissa, furnishes the following details relating to its sales for the month of December, 2011.

		₹
1.	Sale of exempted goods (Schedule A goods)	75,000
2.	Sale of goods of zero rate (Schedule AA goods)	50,000
3.	Sale of goods taxable at 4% (Schedule C goods)	4,00,000
4.	Sale of goods taxable at 12.5% (Schedule CA goods)	1,20,000

On buyer of Schedule C goods (taxable at 4%) returned goods worth ₹ 20,000 on 20th January, 2012. Tax on maximum retail price has been paid at the time of purchase of Schedule CA goods, taxable at 12.5%. Determine turnover of sales and taxable turnover of the dealer.

Solution:

Computation of Turnover of Sales and Taxable Turnover of Mr. Alok for the Month of December, 2011.

		₹	₹
Aggregate Sale Price ₹ (75,000 + 50,000 + 4,00,000 + 1,20,000			6,45,000
Less: (i) Sales return of *Schedule C* goods within 6 months from the date of sale		20,000	
(ii) Sale price of goods, tax on which has been paid on the Maximum Retail Price (MRP) at the time of purchase		1,20,000	1,40,000
Turnover of Sales [Section 2(55)]			**5,05,000**
Less : (i) Sale of Exempted Goods (Schedule A goods)		75,000	
(ii) Sale of Zero-rated Goods (Schedule AA goods)		50,000	1,25,000
Taxable Turnover (on which tax is payable)			**3,80,000**

Question No. 23(a) : Two factories located in the same premises are to be considered as one factory for the purpose of arriving at the aggregate value of clearances in terms of the SSI notification. Explain.

Answer: Situs of a factory alone should not be considered as the sole criterion for clubbing its clearances with the other factory's clearances. The clubbing of clearances is dependent upon the facts and circumstances of each case. Two factories located in the same premises with common boundaries cannot be treated as one factory for the purpose of SSI exemption if they had separate staff, management passage, separate entrance with separate central excise registration and produced different end products.

Mere common boundary did not make them as one factory even though at the apex level both the factories are maintained by one company. [Rollantainers Ltd. 170 ELT 257(SC)]

Question No.23 (b) : Can SSI avail CENVAT Credit? Explain the transitional provision, when the SSI unt starts availing the exemption.

Answer: The assessee shall not avail input credit of excise duty paid on input services are used in relation to manufacture of clearances , till the aggregate clearances do not exceed ₹150 lakhs [notification no.8/2003]. CENVAT credit availed on inputs shall be reversed, if such input services are used in relation to manufacture of clearances, which are exempt based on the said notification. [Rule 6 of CENVAT Credit Rules,2004]

CENVAT credit can be availed on capital goods but has to be utilized only after the aggregate value of the clearances cross the limit of ₹150 lakhs[Rule 6(4) of the CENVAT Credit Rules,2004].

Transitional provisions- for availing exemption: an eligible person who has been paying excise duty but wishes to avail SSI exemption, should pay an amount equivalent to cenvat credit taken on inputs lying in stock or in process or contained in final product lying in stock on the date of exercising the SSI option.

Example:

In March, 2011, a company purchased goods worth ₹1,50,000 plus ₹30,000 as Excise Duty. It contained the whole duty paid as credit for that month. Half of the stock is still not consumed as on 31st March,2011. On 1st April,2011, the unit opts for SSI exemption. In this case, it has to pay Excise duty of ₹15,000 before claiming exemption.

Question No.23(c):

An SSI unit has effected clearances of goods of the value of ₹575 lakhs during the financial year 2011-12. The said clearances includes the following:

  (i) **Clearance of excisable goods without payment of duty to a 100% EOU ₹ 110 lakhs**

  (ii) **Job work in terms of Notification No.214/86 CE which is exempt from duty ₹ 75 lakhs**

  (iii) **Export to Nepal and Bhutan ₹50 lakhs**

  (iv) **Goods manufactured in rural area with the brand name of others ₹90 lakhs**

Examine whether SSI benefit of exemption would be available to the unit for the financial year 2011-12.

Answer:

Computation of Value of Clearances

Particulars	₹lakhs	₹lakhs
Value of clearance certified		**575.00**
Less:		
(i) **Clearance to 100% EOU – excluded from the limit**		**110.00**
(ii) **Clearance under notification 214/86- excluded from the limit**		**75.00**
Value of clearance as per notification		**390.00**

Clearance of excisable goods without payment of duty to a 100% EOU and job work amounting to manufacture done under specific notification 214/86 are not to be excluded in computation of turnover limit of ₹400 lakhs.

The total value of clearances for the financial year 2011-12 has not exceeded ₹400 lakhs. Therefore, the unit is SSI for the financial year 2011-12, i.e. it is eligible to avail the benefit of exemption.

Question No. 24(a): Basic Ltd. is a SSI which is producing 'Active' , a tonic for growing children. Under the Annual Report for the financial year 2011-12, the unit shows a gross sales turnover of ₹1,89,20,000. The product 'Active' attracts excise duty @ 10% and sales tax @ 5%. Calculate the duty liability under notification no.8/2003.

Answer: Computation of duty liability under Notification No.8/2003

Particulars	Amount (₹)
Gross Sales Turnover (including ED & Sales Tax)	1,89,20,000
Sales Tax on first ₹150 lakhs clearance = ₹150 lakhs x 10% [for first 150 lakh clearances, excise duty is NIL and sales tax is 5%]	7,50,000
Balance sales (including excise duty and sales tax) = [1,89,20,000 (1,50,00,000 + 7,50,000)]	31,70,000

Less: Sales Tax on the balance sales = 31,70,000 x 5/105 (since sales tax already included)	1,50,592
Cum-duty sales value	30,19,048
Excise duty (including 3% Cess) = 30,19,048 x 10/110.3	2,73,712
Add: Education Cess @ 2% [2% of ₹2,73,712]	5,474
Add: SHEC @1% [1% of ₹2,73,712]	2,737
Total Excise Duty payable	2,81,923

Question No. 24(b) : State the various types of bonds required for different circumstances in Excise Law.

Answer: The following are the bonds required for different circumstances under Excise law:

(i)   B1 Surety/Security (General Bond) – for export of goods without payment of duty under Rule 19

(ii)   B2 Bond Surety/Security (General Bond) – for provisional assessment

(iii)   B3 Bond Surety/Security – to obtain central excise stamp on credit (however, at present, this bond is of academic importance only)

(iv)   B11- Bond Surety/Security- for provisional release of seized goods

(v)   B17 Bond (General) Surety/Security – composite bond for EPZ/100% EOU's for assessment, export, accounting and disposal of excisable goods obtained free of duty.

Question No.24(c): What are the returns to be filed by the Assessee under the Excise Law?

Answer: Central Excise Rules (CER),2002; CENVAT Credit Rules,2004 (CCR)

Rule	Assessee Liable to comply	Frequency	Form No.	Due Date
Return for Removal of Goods				
17(3) CER	100% EOU for removals made in DTA	Monthly Return	ER-2	10th of the following month
12(1) CER	SSIs	Quarterly	ER-3	10th of the month following the immediately preceeding quarter ended [e.g. April-June quarter, to be submitted within 10th July]
12(1) CER	Assesses manufacturing processed yarn/unprocessed fabrics	Quarterly return	ER-3	20th of the month following the quarter
12(1) CER	Other Assessee's (not covered above)	Monthly return	ER-1	10th of the following month
9A(3)CCR	All Assessees (information on principal inputs)	Monthly return	ER-6	10th of the following month
12(1) CER	Assessees, availing exemption under notification no.1/2011 dated 1st	Quarterly return	ER-1	10th of the following month

	March,2011 (notification no.8/2011 dated 24th March,2011)			from the end of the previous quarter
Declaration				
Notification No.36/2001 dated 26.06.2001	Manufacturer of Nil rated or exempted goods	Declaration by persons exempt from registration	No specified form	Before the commencement of manufacture of such goods
	Persons availing SSI exemption- if value of clearances in preceding financial year is ₹90 lakhs or more			Not applicable
Annual Statement				
12(2) CER	Assessee's who have paid ED of ₹1 crore or more (through PLA and/or CENVAT credit)	Annual Financial Information Statement	ER-4	30th November of the succeeding financial year
94(1) CCR		Annual information on principal inputs	ER-5	30th April of each financial year
12(2A) CER	All Assessees	Annual Installed Capacity of Factory	ER-7	30th April of the succeeding financial year

Question No. 24(d): What does the return forms under central excise law signify?

Answer:

Form No.	Particulars	Returns under
ER 1/ER 3	Monthly returns	Central Excise Rules,2002
ER 2	Details regarding inputs and capital goods received without payment of duty by 100% EOU	Central Excise Rules,2002
ER 4	Annual Financial Information Statement	Central Excise Rules,2002
ER 5	Annual Information on Principal Inputs	CENVAT Credit Rules,2004
ER 6	Monthly Information on Principal Inputs	CENVAT Credit Rules,2004
ER 7	Annual Installed Capacity Statement	Central Excise Rules,2002

Question No. 25(a) : When can Provisional Assessment be made under Excise Law?

Answer: When the Assessee is unable to determine the (a) value of excisable goods or (b) rate of duty applicable, provisional assessment may be resorted.

Question No. 25(b) : State the effect of Final Assessment if there is already a provisional assessment made.

Answer: The following is the effect of final assessment provided there is a provisional assessment made:

Case	Final Duty > Provisional Duty	Final Duty < Provisional Duty
Effect	Further demand to be raised on Assessee	Refund due credited to Consumer Welfare Fund

Interest	@ 18% p.a.	@ 6% p.a.
Period	1st day of subsequent month to the date of payment	1st day of subsequent month to the date of refund

Question No.25(c): Given an overview of Special Audit u/s 14A and 14AA of Central Excise Act.

Answer: Situations which prompts for Special Audits may be represented as:

Audit u/s 14A If

Sales is sacrosanct, then Purchases has to be challenged
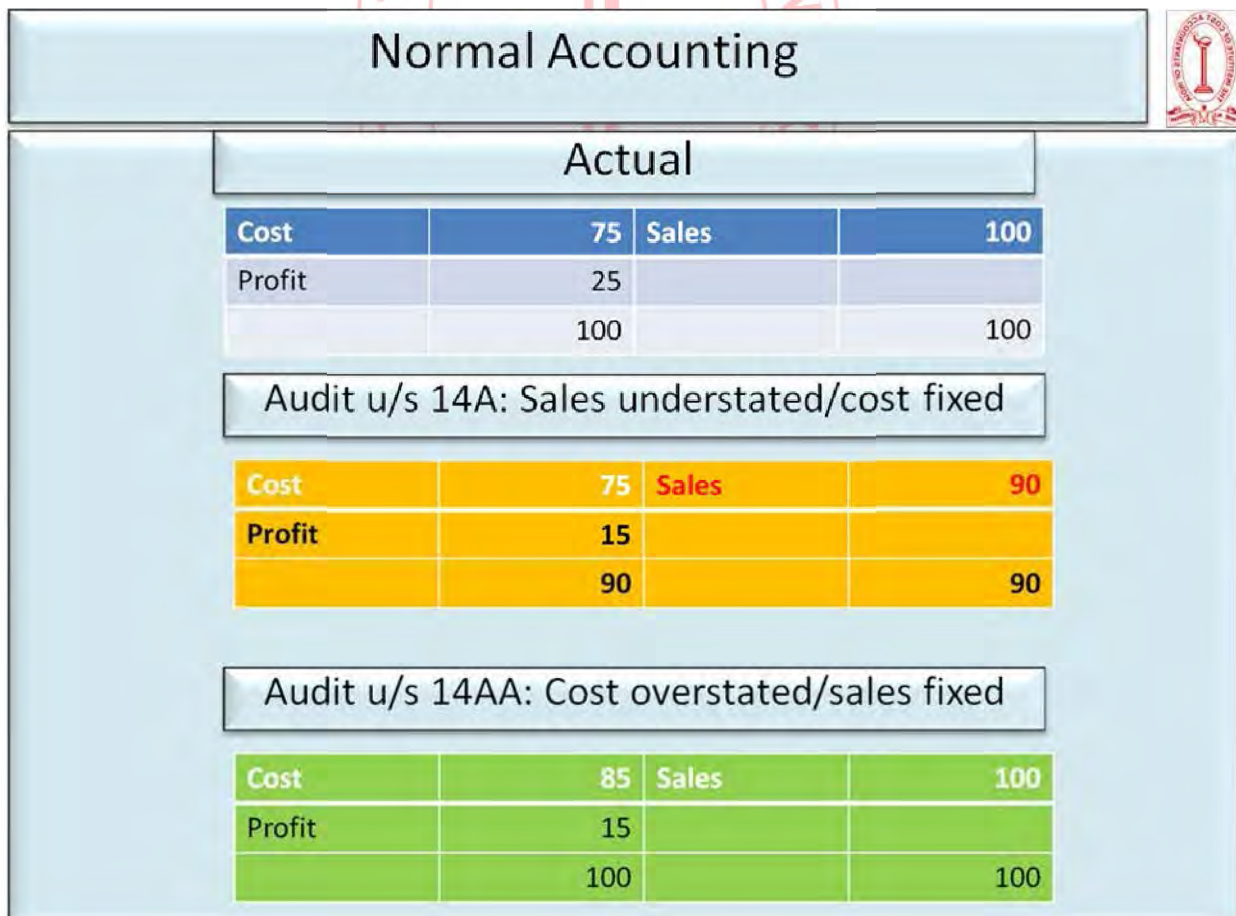
PURCHASES	SALES

Or

If Purchases is sacrosanct, then Sales has to be challenged

Audit u/s 14AA

PURCHASES	SALES

In the following diagram, Cost refers to Cost of Purchases

Normal Accounting

Actual

Cost	75	Sales	100
Profit	25		
	100		100

Audit u/s 14A: Sales understated/cost fixed

Cost	75	Sales	90
Profit	15		
	90		90

Audit u/s 14AA: Cost overstated/sales fixed

Cost	85	Sales	100
Profit	15		
	100		100

U/s 14A- Value has not been correctly declared or determined by a Manufacturer (Valuation)

U/s 14AA: - Credit of duty availed of or utilized by a manufacturer of any excisable goods is not within the normal limits (CENVAT Credit).

Case I: No Opening stock or closing stock

Stock Account (Shown)

Particulars	Quantity	Particulars	Quantity
		Sales	400 units
Purchases	1,000 Units	Wastage (60% appx)	600 units

ASSUMING PURCHASE of 1,000 units is SACROSANCT

Stock Account (Actual)

Particulars	Quantity	Particulars	Quantity
		Sales	950 units
Purchases	**1,000 Units**	Wastage (5% appx of 1,000 units) from ER-5 and ER-6 Return	50 units
	1,000 Units		

It is apparent that Sales quantity is deflated in the Stock Statement Return to the extent of (950 units – 400 units) = 550 units. [Subject of Sec.14A, based on Input-Output relation establishment]

ASSUMING SALES OF 400 units is SACROSANCT

Stock Account (Actual)

Particulars	Quantity	Particulars	Quantity
		Sales	400 units
Purchases (400 units x 1.05)	420 Units	Wastage (5% appx of 1,000 units) from ER-5 and ER-6 Return	50 units

Therefore, (1,000 units – 420 units) = 580 units.

Therefore, excess credit availed by the assessee on 580 units. [subject matter of Sec.14AA]

Case II: With Opening and Closing Stocks

Stock Account (shown)

Particulars	Quantity	Particulars	Quantity
Opening Stock	150 Units	Sales	400 units
Purchases	1,000 Units	Wastage (48% appx)	550 units
		Closing Stock	200 Units

Assuming Purchase is sacrosanct

Stock Account (Actual)

Particulars	Quantity	Particulars	Quantity
Opening Stock	150 Units	Sales	892 units
Purchases	1,000 Units	Wastage (5% appx of 1,150 units) from ER-5 and ER-6 Return	58 units
		Closing Stock	200 Units

It is apparent that Sales quantity is deflated in the Stock Statement Return to the extent of (892 units – 400 units) = 492 units.

Assuming Sales of 400 units is sacrosanct

Stock Account (Actual)

Particulars	Quantity	Particulars	Quantity
Opening Stock	150 Units	Sales	400 units
Purchases	482 Units	Wastage	32 units
		Closing Stock	200 Units
	632 units		632 units

It is apparent that purchase quantity is inflated in the Stock Statement Return to the extent of (1,000 units – 482 units) = 518 units.

Question No. 26(a): Who is a Large Tax Payer? What is an LTU?

Answer: Large Tax payer means a person who:-

   (i)   Has one or more registered premises under Central Excise Law/Service Tax Law;

   (ii) Is an assessee under Income Tax law, holding Permanent Account Number u/s 139A of the Income Tax Act,1961

Large Tax Payer Unit (LTU):

(i)   LTU is a self-contained tax office that provides single point interface with the tax administration to the large taxpayers who pay direct and indirect taxes above the threshold limit

(ii) It is headed by a Chief Commissioner (CCIT or CCCE) and supported by other Commissioners and office₹

(iii) Officers posted in LTU will have all India jurisdiction in respect of all registered premises of a Large Tax Payer registered in that particular LTU.

(iv) The existing Central Excise and Service Tax Commissionerate will have concurrent jurisdiction over the premises of the Large Tax Payers

Eligibility: An assessee should satisfy one of the following conditions to be eligible for higher benefits of Large Tax payer:

(i)   As a manufacturer, has paid duties of Central Excise of ₹ 5 crores or more;

(ii) As a provider of Taxable Service, has paid service tax of ₹5 crores or more;

(iii) As an Income Tax Assessee, has paid Advance Tax of ₹10 crores or more, during any financial year.

Question No. 26(b): State the provisions of reduced duty liability in respect of (i) pilfered goods; (ii) damaged or deteriorated goods; (iii) lost, destroyed or abandoned goods

Answer: A comparative analysis may be made on the following lines:

Basis of comparison	Pilfered goods(Sec.13)	Damaged or deteriorated goods (Sec.220	Lost, destroyed or abandoned goods (Sec.23)
Physical availability	Goods lost by theft, not physically available	Physically available but in damaged form	❖ Lost/destroyed goods are not physically available ❖ Abandoned goods are physically available
Quantity lost	Small quantities	Any quantity	Amu quantity
Duty liability	Duty is not leviable	Duty is leviable, but amount reduced proportionately, i.e. abatement	❖ Duty is leviable. But AC/DC may grant remission for lost/destroyed goods ❖ Owner not liable to pay duty for

			abandoned goods
Nature of benefit	Statutory benefit, cannot be denied by proper officer	Statutory benefit but damage is estimated by proper officer	Benefit is given by statute, but discretion is available to AC/DC
Burden of proof	Importer need not prove pilferage separately. It can be determined by examination	Importer should prove that accident is not due to his willful act/negligence/default	Loss/destruction due to natural causes, should be proved by importer
Restoration	If pilfered goods are restored to owner, duty is payable	There is no possibility of any restoration, since goods are not missing as such	Restoration is not possible, since gods are physically lost or damaged
Abandonment	There is no question of abandonment, since goods are not available at all	Where goods are sold by public auction, they are deemed abandoned	Sec.23 covers situations of abandonment/surrender also
Time point	After unloading, and before order for clearance (either for home consumption or warehousing)	Covers different situations: (i) All imported goods, and (ii) Warehoused goods	Lost/destroyed any time before clearance for home consumption (either directly or from warehouse)
Warehoused goods	Not applicable to warehoused goods	Applicable to warehoused goods	Applicable to warehoused goods

Question no. 27(a): Define Transaction Value u/s 14(1) of the Customs Law.

Answer: Transaction value u/s 14(1) refers to :

❖ Price actually paid or payable for the goods;

❖ When sold for export to / from India;

❖ For delivery at the time & place of importation/exportation;

❖ Where the buyer and seller of the goods are not related;

❖ Price is the only consideration for the sale;

❖ Subject to the other conditions as specified in the rules.

However, the Customs Valuation (Determination of Value of Imported Goods) Rules,2007 is relevant in this regard.

Question No.27 (b): what is the date for determination of rate of duty and tariff valuation?

Answer: For Imported goods [U/s 15]

Situation/type of goods	Relevant date for rate of duty & tariff valuation
1. Goods entered for home consumption u/s 46	Date on which Bill of entry is presented u/s 46
2. Goods cleared from a warehouse u/s 68	Date on which a Bill of Entry for Home consumption is presented u/s 68
3. In case of any other goods	Date of payment of duty

Note: If the Bill of Entry is presented before the date of entry inwards of the Vessel or arrival of the Aircraft by which the goods are imported, the Bill of entry shall be deemed to be presented on the date of such entry inwards or arrival, as the case may be.

In such case, relevant date = date of bill of entry or date of arrival of vessel/aircraft, whichever is later

Date of entry inwards for the purposes of Sec. 15(1)(a) and proviso therein, is the date recorded in the Customs Register, and not the date of actual entry of the vessel.

For Exported goods [U/s 16]

Situation/type of goods	Relevant date for rate of duty & tariff valuation
1. Goods entered for export u/s 50	Date on which proper officer makes an order permitting clearance and loading of the goods for exportation u/s 51
2. In case of any other goods	Date of payment of duty

Note: Sec.15 and Sec.16 is not applicable to (i) Baggage and (ii) Goods imported/ exported by post.

Question No.27 (c): Define Person-in-Charge u/s 2(31) of the Customs Act.

Answer: Person-in-charge in relation to:

Conveyance	Person-in-charge
Vessel	Master of the vessel
Aircraft	Commander or pilot in charge of the aircraft
Railway train	Conductor, guard or other person having the chief direction of the train
Any other conveyance	Driver or the other person in charge of the conveyance

Question No. 28(a): **State the different forms of Bill of Entry used under Customs law.**

Answer: The different forms of Bill of Entry used under Customs law are:

Form	Purpose	Colour	Reference
I	For Home Consumption	White	B/E (General)
II	For Warehousing	Yellow	Into Bond B/E
III	For Home Consumption from Warehouse	Green	Ex-Bond B/E

Question No.28 (b): **State the difference between Transit and Transshipment goods under Customs Law.**

Answer: The basis of difference between Transit and Transsshipment of goods are:

Purpose	Transit Goods (Sec.53)	Transshipment Goods (Sec.54)
Purpose	Goods intended for transit in the same conveyance (i) to any place outside India (ii) to any other customs station	Goods unloaded at a Customs station for transshipment, i.e. for loading into another vessel for carrying it to any place outside India or to any other Customs Station
Unloading/loading	Goods remain in same vessel. They are not unloaded in customs area	Goods are first unloaded into the Customs area, and reloaded into another vessel/conveyance
Document	Such goods are mentioned in import manifest/report, as for transit in same conveyance	Such goods are mentioned in Import Manifest/Report, as for transshipment
Bill of Transshipment	Not applicable	Such goods are also mentioned in a separate Bill of Transshipment
Permission	Transit of goods may be permitted without payment of duty, if the destination is – (a) Any place outside India, or (b) Any other customs station	It may be permitted without duty, if destination is- (a) Any place outside India, (b) Any major port, airport at Mumbai, Kolkata, Delhi or Chennai, other notified port/airport, other customs station, if goods are bonafide intended for transshipment
Duty liability	On arrival at the destination customs station, such goods shall be liable to duty and shall be entered in same manner as goods entered on first importation. Hence, the destination port/station is deemed as the actual port/station of importation	

Question No.29 (a): **After visiting USA, Mr. and M₹ B brought to India a laptop computer valued at ₹85,000, personal effects valued ₹1,00,000 and a personal computer for ₹55,000. What is the customs duty payable?**
Answer: Personal effects and one laptop are exempted from levy of duty. The General Free Allowance (GFA) for the passenger's of age of 10 years or more and returning after a stay abroad for more than 3 days is ₹25,000 [As per Rule 3 of Baggage Rules, 1998]. Rate of duty applicable for Baggage = 100% + EC @2% + SHEC @1% = 103%
Duty Payable = ₹ (55,000 – 25,000) = ₹30,000 x 103% = ₹30,900.

Question No. 29(b): What is Unaccompanied Baggage?
Answer: Unaccompanied baggage refers to baggage that is not accompanied with the passenger. Baggage rules, 1998 apply to Unaccompanied Baggage, except where it is specifically excluded.

Question No.29(c): Define Foreign-going Vessel or Aircraft.

Answer: Foreign-going Vessel or Aircraft u/s 2(21) of the Customs Act means, "any vessel or aircraft for the time being engaged in the carriage of goods or passengers between any port or airport in India, and any port or airport outside India, whether touching any intermediate port or airport in India or not"

It includes:

- ❖ Any naval vessel of a foreign government taking part in any naval exercises;
- ❖ Any vessel engaged in fishing or any other operations outside the territorial waters of India;
- ❖ Any vessel or aircraft proceeding to a place outside India for any purpose whatsoever.

Question No.30 (a): What is Input Tax for VAT?

Answer: Input tax means the:

- ❖ Tax paid or payable under this Act;
- ❖ By a registered dealer to another dealer on the purchase of goods;
- ❖ Including capital goods in the course of the business

Question No. 30(b) : Define Zero Rated Sale.

Answer: Zero rated sales is a sale on which no tax is levied but the tax paid on purchase of inputs used for such sales is refunded to the dealer. The zero rated sales are:

- ❖ Export sale u/s 5(1);
- ❖ Sale in the course of export u/s 5(3)
- ❖ Sale to international organizations;
- ❖ Sale to SEZ

Question No.30(c): Explain the composition scheme under VAT.

Answer: Every registered dealer who is liable to pay tax under the Respective State Acts and whose turnover does not exceed ₹50 lakhs in the last financial year is generally entitled to avail this scheme, excluding the followings:

- ❖ A manufacturer or dealer who sells goods in the course of inter-state trade or commerce
- ❖ A dealer who sells goods in the course of import into our export out of territory of India
- ❖ A dealer transferring goods outside the State otherwise than by way of sale of for execution of works contract

The following conditions must be fulfilled:

- ❖ A dealer who intends to avail the composition scheme shall exercise the option by intimating the Commissioner in writing for a year or part of the year in which he gets himself registered.
- ❖ The dealer should not have any stock of goods which are brought from outside the State on the day he exercises his option to pay tax by way of composition and shall not use any goods brought from outside the State after such date
- ❖ The dealer should also not claim input tax credit on the inventory available on the date on which he opts for composition scheme
- ❖ The dealers opting for composition scheme will not be entitled to input tax credit
- ❖ The dealer shall not be authorized to issue tax invoices

The composition tax can be levied on the taxable turnover instead of gross annual turnover at the rate decided by the State Governments. The Empowered Committee has permitted the States to reduce the rate of composition tax to 0.25%,