GROUP II

PAPER 10

WORK BOOK

COST & MANAGEMENT ACCOUNTING AND FINANCIAL MANAGEMENT

THE INSTITUTE OF COST ACCOUNTANTS OF INDIA
(Statutory body under an Act of Parliament)
www.icmai.in

SYLLABUS - 2016

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INTERMEDIATE

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Study Note – 1

COST AND MANAGEMENT ACCOUNTING

Section - I

1. Answer the following questions:

(a) Choose the correct answer from the given four alternatives. [1x 6 = 6]

(1) Management Accounting is an integral part of management concerned with_____ information.
- **(a) identifying, presenting and interpreting**
- **(b) identifying and presenting**
- **(c) identifying**
- **(d) None of the above**

(2) Management Accounting is related with _____.
- **(a) formulating strategy**
- **(b) planning and controlling activities**
- **(c) optimizing the use of resources**
- **(d) All of the above**

(3) Despite the development of Management Accounting as an effective discipline to improve the managerial performance, it has some limitations. Which of the following is a limitation of management accounting?
- **(a) Psychological Resistance**
- **(b) Physiological Resistance**
- **(c) Both of the above**
- **(d) None of the above**

(4) The primary objective of Management Accounting is to _____.
- **(a) maximize profits**
- **(b) minimize losses**
- **(c) maximize profits or minimize losses**
- **(d) All of the above**

(5) Management accounting is concerned with data collection from _____.
- **(a) internal sources**
- **(b) external sources**
- **(c) internal and external sources**
- **(d) internal or external sources**

(6) 'Management Accounting is concerned with accounting information, which is useful to the management.' — This definition is given by _____.

(a) Robert N. Anthony

(b) Brown and Howard

(c) CIMA

(d) The Institute of Chartered Accountants of England and Wales

Ans: 1-a; 2-d; 3-a; 4-d; 5-c; 6-a

(b) Match the statement in column I with the most appropriate statement in column II:

Column I	Column II
1. Management Accounting	a. suitable information to internal and external users
2. Fiduciary Accounting	b. suitable information to operation management
3. Financial Accounting	c. suitable information to internal users
4. Cost Accounting	d. suitable information to third party

Ans: 1-c; 2-d; 3-a; 4-b

(c) State whether the following statements are true or false:

(1) Management Accounting is a traditional approach to accounting

(2) The information in the management accounting system is used for three different purposes.

(3) Management accounting helps in decision making only, not in strategic decision making.

(4) The scope of Management Accounting is broader than the scope of Cost Accounting.

(5) As the reports generated by management accounting are not used by any external party, the business enterprises don't need to take care of GAAP.

(6) Management accounting records are kept for public.

1-F;2-T;3-F;4-T;5-T;6-F

Section - II

2. Short notes on

(a) Objectives of Management Accounting

Management accounting comprises the preparation of financial reports for management groups such as shareholders, creditors, regulatory agencies and tax authorities. The fundamental objective of management accounting is to enable management to maximize profits or minimize losses. Following are the important objectives or purposes of management accounting:

1. **Policy formulation**- Policy formulation and planning are the primary functions of management. The object of management accounting is to supply necessary data to the management for formulating plans. The figure supplied and opinion given by the management accountant helps management in policy formulation.
2. **Helpful in decision making**- The management is required to take various important decisions. Management accounting techniques help in collecting and analyzing data relating to cost, volume and profit which provide a base for taking sound decision.
3. **Helpful in controlling**- Management accounting is a useful device of managerial control. Various accounting techniques such as standard costing and budgetary control are helpful in controlling performance. The actual results are compared with pre-determined targets to know the deviations.
4. **Motivation**- Another important objective of management accounting is to help the management in selecting best alternatives of doing the things. Delegation of authority as well as responsibility increases the job satisfaction of employees and encourages them to look forward.
5. **Interpretation of financial information**- Financial information is of technical nature and must be presented in such a way that it can be easily understood. It is the duty of management accountant who uses statistical devices like charts, diagrams etc. so that the information can be easily understandable.

(b) Strategic management accounting

The term 'strategic management accounting' applies to the identification, measurement and communication of cost data in all these situations where the organisation is being judged against the performance of competitors.

The traditional approach to management accounting has been to regard internal decision makers as inward looking. This has led to developing techniques for identifying, measuring and communicating costs where only internal comparisons have been thought relevant. Those techniques remain useful in some cases and are sufficiently widely used to justify studying them in an introductory course.

However, the later years of the twentieth century brought an increasing awareness that company managers must be outward looking. They must form a strategy for their business that has regard to what competitors are achieving. This requires management accounting to identify measure and communicate data on the company relative to data for other similar companies. Managers must consider competitive forces such as the threat of new entrants, substitute products or services, rivalry within the industry and the relative bargaining strength of suppliers and customers. Managers must also consider how their organisation adds value in creating its product. There is a flow of business activity from research and development through production, marketing, distribution and after-sales support. This chain of activities creates costs which must be compared with the value added by the organisation.

Strategic management accounting uses different approaches/techniques to achieve strategy execution, to develop integrated approaches to performance measurement. Some of the strategic tools for performance measurement are Target Costing, Kaizen Costing, Life Cycle Costing, Theory of constraints (TOC), Bench Marking etc.

(c) Cost accounting vs. Management Accounting

Cost accounting	Management Accounting
An object of cost accounting to find out a cost of a product or a service.	An object of management accounting is to make available various information to the management for planning and other activities.
In cost accounting both past and present data are used.	In the normally data are used for future policies and planning.
Cost accounting having a narrow scope because mainly it determines the cost.	Its scope is very wide, it includes financial account, cost account report to management etc
Cost accounting is an old method.	Management accounting is a modern concept.
In case of cost accounting, some principles and methods are adopted and from time to time same principles are used.	In case of management accounting, for reporting to management no specific rule or principle is adopted.

Study Note – 2

DECISION MAKING TOOLS

1. **Choose the correct alternative:**

   (i) Marginal costs is taken as equal to
   - **a) Prime Cost plus all variable overheads**
   - **b) Prime Cost minus all variable overheads**
   - **c) Variable overheads**
   - **d) None of the above**

   (ii) Marginal costing is also known as
   - **a) Direct costing**
   - **b) Variable costing**
   - **c) Both a and b**
   - **d) None of the above**

   (iii) Which of the following costs is relevant in decision-making?
   - **a) committed costs**
   - **b) accounting costs**
   - **c) historical costs**
   - **d) cash costs**

   (iv) An opportunity cost is the cost of
   - **a) lost business**
   - **b) unplanned new business**
   - **c) obtaining new business opportunities**
   - **d) the next best alternative course of action**

   (v) In a product mix decision, which is the most important factor to consider in order to try to maximise profit?
   - **a) contribution per unit of a scarce resource used to make the product**
   - **b) contribution per unit of the product**
   - **c) variable cost per unit of the product**
   - **d) product unit selling price**

   (vi) Which of the following costs incurred by a commercial airline can be classified as variable?
   - **a) Interest costs on leasing of aircraft**
   - **b) Pilots' salaries**
   - **c) Depreciation of aircraft**
   - **d) None of these three costs can be classified as variable**

(vii)The basic decision rule on acceptance of special contracts is:

a) **Accept the special contract if additional fixed costs can be covered by contribution from other products**
b) **Accept the special contract if the additional revenue from the contract exceeds the fixed costs of manufacture**
c) **Accept the special contract if it produces a positive contribution to fixed costs**
d) **Accept the special contract if it produces a positive contribution to variable costs**

Solution: i. (a); ii.(c); iii. (a); iv. (a); v. (a); vi. (d); vii. (c)

2. **State true or False.**

(i) In marginal costing, managerial decisions are guided by profit.
(ii) In Absorption Costing, closing stock is valued at full cost.
(iii) In marginal costing, fixed costs are treated as period cost.
(iv) Marginal costing is a technique of cost control.
(v) When quantity (kg) of material is the limiting factor, products are ranked based on contribution per unit.
(vi) When sales value (₹) is the limiting factor, products are ranked based on Profit Volume ratio.
(vii)Fixed costs are always unavoidable.

Solution: i. False; ii. True; iii. True; iv. False; v. False; vi. True; vii. False.

3. **Match the following.**

I	**General Administrative Overhead**	**A**	**Contribution**
II	**Marginal Costing**	**B**	**Relevant cost**
III	**Make or buy decision**	**C**	**Excess over Break-even sales**
IV	**Margin of safety**	**D**	**Unavoidable fixed cost**

Solution: I. D; II. A; III. B; IV. C.

4. **A Sen manufactures a single product with a sale price of ₹16 p.u. and a variable cost of ₹10 per unit. Fixed costs are ₹48,000 p.a. Calculate -**

a) **P/V ratio;**
b) **No. of units to be sold to break even, and**
c) **Number of units to be sold to achieve a profit of ₹ 30,000 p.a.**

Solution:

Contribution per unit = Selling Price per unit - Variable Cost per unit = ₹16 – ₹10 = ₹6

a) P/V ratio = Contribution/ Sales = 6/16 =0.375 = 37.5%.
b) No. of units to be sold to break-even: BEP (units) = Fixed Cost/ Contribution p.u. = 48000/6 = 8000 units.
c) Number of units to be sold to achieve a profit of ₹ 30,000 p.a.
   = (Target Profit +Fixed Cost)/ Contribution p.u. = (30000+48000)/6 = 13000 units.

5. R Ltd. Sold goods for ₹3000000 in a year. In that year the variable costs were ₹600000 and Fixed Cost is ₹800000. Find out:

a) P/V ratio

b) Break even sales

c) Break even sales if selling price was reduced by 10% and fixed costs are increased by ₹100000.

Solution:

Total contribution = Total sales – Total variable cost = ₹ 3000000 – ₹ 600000 = ₹ 2400000.

a) P/V ratio = Contribution/Sales = 2400000/3000000 = 80%

b) BEP (Value) = Fixed Cost/ P.V ratio = 800000/80% = ₹1000000

c) Revised sales = ₹ 3000000 – 10% of ₹ 3000000 = ₹ 2700000

Revised contribution = ₹ 2700000 – ₹ 600000 = ₹ 2100000

Revised P/V ratio = 2100000/2700000 = 77.78%

Revised Fixed Cost = ₹ 800000 + ₹ 100000 = ₹ 900000

Revised BEP (value) = ₹ 900000/77.78% = ₹ 1157110

6. The following figures for profit and sales obtained from the accounts of Y Co. Ltd.

Period	Sales(₹)	Profit (₹)
2016	**2,70,000**	**6,000**
2017	**3,00,000**	**15,000**

Assuming the cost structure and selling price remains the same in both the years, calculate:

a) P/V Ratio

b) Fixed Cost

c) Break-even Point

d) Margin of safety at a profit of ₹24000.

Solution:

a) P/V ratio = (Change in profit / Change in sales) x 100 = (9000/30000) x 100 = 30%

b) Fixed cost = (Sales x P/V ratio) – Profit = (270,000 x 0.3) – 6,000 = ₹75000

c) Break-even point = Fixed cost / PV ratio = 75,000 / 30% = ₹2,50,000

d) Margin of safety at a profit of ₹24000 = Profit/ P.V ratio = 24000/30% = ₹80000

7. DB Ltd. furnished the following information:

Period	Sales @ ₹10 p.u (₹)	Profit (₹)
20014-15	**200000**	**30000**
20015-16	**250000**	**50000**

You are required to compute:

a) P/V Ratio.

b) Break-Even Point

c) Total Variable Cost of 20014-15 and 2015-16

d) Sales required to earn a profit of ₹60,000.

e) Profit/Loss when sales are ₹1,00,000

f) Margin of Safety when Profit is ₹80,000

g) During 2006-07, due to increase in cost, Variable Cost is expected to rise to ₹7 per unit and Fixed Cost to ₹55.000. If selling Price cannot be increased, what will be the amount of sales to maintain the Profit of 2005-06?

Solution:

a) P.V ratio = Change in profit/ Change in sales = 20000/50000 = 40%

b) BEP Sales = Fixed Cost/P.V ratio = 50000/40% = ₹125000
Where Fixed Cost = Contribution - Profit = [(2,00,000 * 40%) – 30,000] = ₹50,000

c) Total Variable Cost = Sales - Contribution
For 2004-05 = [2.00,000 - (2,00,000 x 40%)] = ₹120 000
For 2005-06 = [2,50,000 - (2,50,000 x 40%)] = ₹1,50,000

d) Sales required to earn desired Profit = (Total Fixed Cost + Desired Profit)/P.V Ratio
= (50.000 + 60.000)/40% = ₹275000.

e) Profit/ (Loss) = (Sales x P.V Ratio) - Total Fixed Cost = (1,00,000 x 40%) - 50,000 = ₹(10,000)

f) Margin of Safety (MOS) =Profit/ P V ratio= 80000/40% = ₹200000

g) Revised Contribution/unit = ₹(10 -7) = ₹3

Revised P/V Ratio =3/10= 30%

Sales required to earn desired Profit = (Total Fixed Cost + Desired Profit)/P V Ratio = (55000+50000)/30% = ₹ 350000.

8. From the following details find out Break Even Sales and Fixed Cost and required sales to earn a profit of ₹ 3,00,000.
Sales ₹ 9,00,000
Margin of Safety = 40%
PV Ratio = 2/3

Solution:

BEP Sales = (Sales - Margin of Safety) = [9,00,000 - (9,00,000 x 40%)] = ₹ 540000
Fixed Cost = BEP Sates x P/V Ratio = ₹ 5,40,000 × 2/3 = ₹ 3,60,000

Required Sales to earn a profit of ₹ 3,00,000 = (Fixed Cost + Desired Profit)/ PV Ratio
= (360000 + 300000)÷ 2/3 = ₹ 9,90,000

9. Fill in the blanks for each of the following independent situation:

Situation	P	Q	R	S	T
Selling Price per unit	?(a)	₹50	₹20	?(g)	₹30
Variable Cost as % of selling price	60	?(c)	75	75	?(i)
No. of units sold	10,000	4,000	?(e)	6,000	5,000
Contribution	₹20,000	₹80,000	?(f)	₹25,000	₹50,000
Fixed Cost	₹12,000	?(d)	₹1,20,000	₹10,000	?(j)
Profit/Loss	?(b)	₹20,000	₹30,000	?(h)	₹15,000

Solution:

For P: sales = Contribution/ PV ratio = 20000/(100-60)% = ₹50000
Selling price per unit = Sales/ No. of units sold = 50000/10000 = ₹5 (a)
Profit = Contribution – Fixed Cost = 20000 -12000 = ₹8000 (b)

For Q: P V ratio = Contribution/Sales = 80000/(50*4000) = 40%
Variable cost ratio = (100-40)% = 60% (c)
Fixed cost = Contribution – Profit = ₹80000 – ₹20000 = ₹60000 (d)

For R: P V ratio = 100% - Variable cost ratio = 100% -75% = 25%
Contribution = Fixed Cost +Profit = 120000 + 30000 = ₹150000 (f)
Sales = Contribution/ P V ratio = 150000/25% = ₹600000
No. of units sold = Sales/Selling price per unit = 600000/20 = 30000 units (e)

For S: P V ratio = 100% - Variable cost ratio = 100% -75% = 25%
Sales = Contribution/ P V ratio = 25000/25% = ₹100000
Selling price per unit = Sales/ No. of units sold = 100000/6000 = ₹16.67(g)
Profit = Contribution – Fixed Cost = 25000 -10000 = ₹15000
Contribution = Fixed Cost +Profit = 120000 + 30000 = ₹150000 (h)

For T: Sales = 30 × 5000 = ₹150000
P V ratio = contribution/Sales = 50000/150000 = 33.33%
Variable cost ratio = (100-33.33)% = 66.67% (i)
Fixed cost = Contribution – Profit = ₹50000 – ₹15000 = ₹35000 (j)

10. A business produces 200 units of product by making following expenditure-

(i) Materials — ₹30,000.
(ii) Labour — ₹20,000.
(iii) Factory Overhead — ₹4,000.
(iv) Administrative Overhead — ₹ 5,754, and
(v) Selling and Distribution Overhead ₹1,500
The products are sold at a price of ₹400 per unit.

The above expenditures are classified into fixed and variable as follows:

Expenditure	Fixed	Variable
Materials	**Nil**	**100%**
Labour	**50%**	**50%**
Factory Overhead	**25%**	**75%**
Administrative Overhead	**100%**	**Nil**
Selling & Distribution overhead	**60%**	**40%**

From the above information determine (a) Total Variable Costs and Fixed Costs, (b) Contribution(c) P/V Ratio, (d) Break-Even-Point in units and Sales Value.

Solution:

(a) Total Variable Costs and Total Fixed Costs

Expenditure	Fixed(₹)	Variable(₹)
Materials	Nil	100% of 30000 = 30000
Labour	50% of 20000 = 10000	50% of 20000 = 10000
Factory Overhead	25% of 4000 = 1000	75% of 4000 = 3000
Administrative Overhead	100% of 5754 = 5754	Nil
Selling & Distribution overhead	60% of 1500 = 900	40% of 1500 = 600
	17654	43600

(b) Total Contribution = Sales – Variable Cost = 400 × 200 – 43600 = ₹36400
Contribution per unit =Total Contribution/ No. of units sold = 36400/200 = ₹182

(c) P V ratio = Contribution per unit/ Selling price per unit = 182/400 = 45.5%

(d) Break-even point (value) = Fixed Cost/ P V ratio = 17654/45.5% = ₹38800
Break-even point (units) = Fixed Cost/ Contribution per unit = 17654/182 = 97 units.

11. X Ltd. manufactures automobile accessories and parts. The following are the total costs of processing 200000 units:

	₹
Direct material cost	**1000000**
Direct labour cost	**1600000**
Variable factory overhead	**1200000**
Fixed factory overhead	**1000000**

The purchase price of the component is ₹22. The fixed overhead would continue to be incurred even when the component is bought from outside, although there would have been reduction to the extent of ₹400000. Required:

(a) Should the part be made or bought considering that the present facility when released following a buying decision would remain idle?

(b) In case the released capacity can be rented out to another manufacturer for ₹300000 having good demand, what should be the decision?

Solution:

Analysis of Cost for Different Alternatives

		If manufactured in-house	If purchased from outside, present facility remaining idle	If purchased from outside but released capacity is rented out
		(₹ in Lakhs)	(₹ in Lakhs)	(₹ in Lakhs)
1.	variable cost of production	19	—	—
2.	Cost of buying from outside	—	22	22
3.	Savings in fixed cost when buying	—	(2)	(2)
4.	Income from renting released capacity		—	(1.5)
	Net Outflow	19	20	18.5

Decision:

(a) If the present facility is remaining idle, then it is economical to *make in-house.*

(b) If the present facility can be rented out, it is economical to buy from outside.

12. Company XYZ produces two components (M and N) and is planning the allocation of its available resources for the next period.

75 units of component M and 60 units of component N are required to be produced but machine hour capacity is restricted to a total of 300 hours. Any deficit of components produced in-house can be made up by the purchase of any quantity of either component from an outside supplier. The objective of company XYZ is to satisfy the requirement for components at minimum total cost.

The following information is available concerning each component:

Costs (₹ per unit)	M	N
Direct materials	**6.20**	**8.70**
Direct labour	**5.10**	**7.50**
Variable production overheads	**1.20**	**1.30**
Fixed production overheads	**4.80**	**6.40**
Total	**17.30**	**23.90**
Machine hours (per unit)	**2.00**	**3.00**
Price from outside supplier (₹ per unit)	**18.50**	**25.90**

Required:

For the next period:

(a) Calculate the variable costs of producing each component in-house.

(b) Calculate the extra costs of buying-in each component.

(c) Determine which component should have production priority. Show workings clearly and justify your conclusion.

(d) Calculate the number of units of each component that should be manufactured by company XYZ.

Solution:

(a) Calculation for variable cost of producing in-house

Products	M (₹)	N (₹)
Variable Cost:	6.20	8.70
Direct material	5.10	7.50
Direct labour	1.20	1.30
Variable production overhead		
Total		
	12.50	17.50

(b) Calculation of Extra Cost of Buying-in Each Component

Products	M	N
Price to be charged by outside Supplier	18.50	25.90
Variable cost of producing In-house [as per (a)]	12.50	1750
Extra cost of buying - in	6.00	8.40

(c) Machine hour per unit

Particulars	M	N
Machine hour per unit	2 Hours	3 Hours
Extra cost of buying-in per unit	6.00	8.40
Extra cost of buying (per machine hour) (₹)	3.00	2.80

Priority should be given to the production of component M in order to minimize the extra cost of buying-in.

(d) Components to be manufactured by XYZ

M = 75 units (75 units x 2 hours) = 150 machine hours

N = 50 units [(300 - 150 machine hours

13. A company producing products PIE and SIGMA using a single production process has the following cost data:

Particulars	PIE	SIGMA
Selling price per unit (₹)	**20**	**30**
Variable cost per unit (₹)	**11**	**16**
Machine hours required per unit production (Hours)	**1**	**2**
Market limitation (units)	**100000**	**250000**

Total machine hours available: 4 lakhs.

Fixed cost per annum: ₹26 lakhs.

Considering the limiting factors of machine hours and market limitations, you are required to:

(a) Indicate the best combination of products to give optimum contribution;

(b) Show the additional machinery requirement to be augmented on rental basis at an annual rent of ₹1.5 lakhs per machine to provide additional capacity of 30,000 hours per machine;

(c) Change in number of machines to be rented if the annual rental charges reduce to ₹125000 per machine.

Solution:

Statement Showing the Contribution per Machine Hour

Particulars	PIE (₹)	SIGMA (₹)
Selling price per unit	20	30
Less: Variable cost per unit	11	16
Contribution per unit	9	14
Machine hour required per unit	1	2
Contribution per machine hour	9	7
Production priority	I	II

Determination of Product Mix

Products	Number of Units (Maximum)	Machine Hours per unit	Total Machine Hours
PIE	100000	1	100000
SIGMA	150000	2	300000 (Balancing figure)
			400000

Working Note:

(1) Total machine hours available=4,00,000 hours. After producing PIE to the extent of maximum demand the balance (4,00,000 -1,00,000) = 3,00,000 hours can be used for producing product SIGMA. Number of units of SIGMA can be produced: 3,00,000 hours / 2 hours = 1,50,000 units.

Computation of Requirement of Additional Machine on Rental basis

Total demand of SIGMA	250000 units
Demand can be satisfied from available machine hours	150000 units
Number of units to be produced with rented machine	100000 units

Total machine hours required = 1,00,000 x 2 hours = 2,00,000 hours
Number of machines required = 2,00,000 / 30,000=6.67 machines.

It is clear that 7 machines (6 + 1) will be required for satisfying for entire demand of SIGMA. It is to be noted that 6 machines will be used at full capacity but the 7th machine will remain idle for 10000 hours (210000 – 200000).

Contribution per machine hour = ₹7.00.
Total contribution from 7th machine (20,000 x 7) = ₹140000
Less: Rental of 7th machine = 150000
Contribution (10000)

As the contribution is negative, the 7th machine should not be taken on rent.
Hiring of 7th machine will be justified if the rental is less than ₹1,40,000 (i.e., the contribution from 20000 machine hours). If the machine rental is ₹1,25,000, then it is economical to take it on rent. Additional contribution will be: ₹1,40,000 – ₹ 1,25,000 = ₹15,000.

Alternatively,
Contribution from 7th machine (20,000 x 7) ₹140000
Less: Rent of machines 125000
Additional contribution 15000

14. Sum Toys (P) Ltd. manufactures and sells children's toys of high quality over an extensive market, utilizing the services of skilled artisans who are paid at an average rate of ₹15 per hour. The total number of skilled labour hours available in a year is only 14,000. The details of planned production for 2009-10, estimated cost and unit selling prices are given below:

Toy	Production Planned (Units)	Cost of Production per Unit			Selling Price per unit (₹)
		Direct Materials (₹)	Direct Labour (₹)	Fixed Overheads (₹)	
A	3,000	20	10	15	70
B	4,000	24	12	18	92
C	4,000	32	12	18	95
D	3,000	40	16	24	110
E	2,400	60	20	30	180

Variable overhead costs amount to 50% of the direct labour cost.

The company has estimated the following maximum demand for each product. The company has minimum commitment for each product for its permanent customers.

Demand	A	B	C	D	E
Maximum (units)	5,000	6,000	6,000	4,000	4,000
Minimum (units)	1,000	1,000	1,000	500	500

(a) What is the estimated profit for 2009-10 as per the company's production plan?
(b) Do you agree with the said plan? If not, what would be the plan for maximum profit?
(c) What is the estimated profit as per the plan suggested by you in (b)?

Solution:

Statement showing ranking of the products

Products	SPPU ₹	Variable Cost (₹)				Contribution p.u	Labour hours p.u = Labour cost/hourly rate	Contribution p. hour	Rank
		DM ₹	DL ₹	VOH ₹	Total ₹				
A	70	20	10	5	35	35	0.6667	52.50	4
B	92	24	12	6	42	50	0.8000	62.50	2
C	95	32	12	6	50	45	0.8000	56.25	3
D	110	40	16	8	64	46	1.0667	43.13	5
E	180	60	20	10	90	90	1.3333	67.50	1

Estimated profit to be earned as per company's production plan.

Products	A	B	C	D	E	Total Contribution (₹)
Production Planned (units)	3,000	4,000	4,000	3,000	2,400	
Contribution (Per Unit) (₹)	35	50	45	46	90	
Fixed Cost (per Unit) (₹)	15	18	18	24	30	
Total Contribution	105000	200000	180000	138000	216000	839000
Less. Fixed Cost (₹)	45000	72000	72000	72000	72000	333000
Estimated profit						506000

Production plan for maximum profit

Products as per ranking	Min. Produ-ction	Labour hours p.u	Total hours for min. production	Additional Max. Production	Actual addl. Production	Total hours for addl. production	Actual addl. Production	Total hours	Total Produc-tion
E	500	1.3333	667	3500	3500	4667	3500	5334	4000
B	1000	0.8000	800	5000	5000	4000	5000	4800	6000
C	1000	0.8000	800	5000	2331	1865(b.f)	5000	2665	3331
A	1000	0.6667	667	4000	Nil	Nil	Nil	667	1000
D	500	1.0666	534	3500	Nil	Nil	Nil	534	500
			3468			10532		14000	

Estimated Profit

Particulars	A	B	C	D	E	Total Contribution (₹)
Production	1000	6000	3331	500	4000	
CPU (₹)	35	50	45	46	90	
Total Contribution (₹)	35000	300000	149895	23000	360000	867895
Less. Fixed Cost						333000
Profit						534895

15. Present the following information to show to the management:

(i) The marginal product cost and the contribution per unit.

(ii) The total contribution and profits resulting from each of the following sales mixtures.

(iii) The proposed sales mixes to earn a profit of ₹ 250 and ₹ 300 with total sales of A and B being 300 units.

	Product A	**Product B**
	₹	₹
Direct materials (per unit)	**10**	**9**
Direct wages (per unit)	**3**	**2**
Sales price (per unit)	**20**	**15**
Fixed expenses ₹ 800		
Variable expenses are allocated to products as 100% of direct wages		

Sales mixtures:

(a) 100 units of Product A and 200 of B

(b) 150 units of product A and 150 of B

(c) 200 units of product A and 100 of B

Recommend which of the sales mixtures should be adopted.

Solution:

(i) STATEMENT OF MARGINAL COST AND UNIT CONTRIBUTION

	Product A		Product B	
	Per unit ₹	Per unit ₹	Per in it ₹	Per unit ₹
Sale Price		20		15
Less. Variable Cost :				
Direct Materials	10		9	
Direct Wages	3		2	
Variable Overheads	3		2	
Contribution		16		13
		4		2

(ii) Total contribution and profit under alternative sales mix:

	Mix (a)			Mix (b)			Mix (c)		
	A	B	Total	A	B	Total	A	B	Total
Sales (units)	100	200	300	150	150	300	200	100	300
Contribution p.u	4	2		4	2		4	2	
Total Contribution	400	400	800	600	300	900	800	200	1000
Less Fixed Cost			800			800			800
Profit			Nil			100			200

Sales mix (c) with highest profit is the best.

(iii) Let x units of product A and (300-x) units of product B are to be sold.

Earning profits of ₹250	Earning profits of ₹300
Then, [x*4+ (300-x)*2] -800 = 250	Then, [x*4+ (300-x)*2] -800 = 300
So x = 225	So x = 250
And 300-x = 75	And 300-x = 50
Proposed mix:	Proposed mix:
Product A= 225	Product A= 250
Product B = 75	Product B = 50

16. An automobile manufacturing company finds that while the cost of making in its own workshop part No. 0028 is ₹6.00 each, the same is available in market at ₹5.60 with an assurance of continuous supply. Write a report to the Managing Director giving your views whether to make or buy this part. Give also your views in case the suppliers reduce the price from ₹5.60 to ₹4.60. The cost data is as follows;

	₹
Materials	**2.00**
Direct Labour	**2.50**
Other variable costs	**0.50**
Depreciation and other fixed costs	**1.00**

Solution:

Calculation for Relevant Cost of making and buying

	Make (₹)	Buy (₹)
Relevant cost of making:	2.00	
Material	2.50	
Labour	0.50	
Other variable cost		
Relevant cost of buying		
Purchase price		5.60
	5.00	5.60

Since the relevant cost of making is lower, it is recommended.

If however, the component is available at ₹4.60, buying will be recommended.

Note: Here depreciation and other fixed costs are sunk cost and not relevant.

17. A Company has two divisions – D_1, and D_2. D_1, manufactures10,000 units of a component per month operating at 80% of its capacity incurring variable cost of ₹50 per unit and fixed cost of ₹1.00,000per month. It can sell 8,000 units of the component per month in the external market @ ₹90 per unit.

So far D_1, has been transferring 10,000 units of the component per month to D_2 @ ₹70 per unit, the components are used by D_1, which is operating at its full capacity, for 10,000 units of its final product Q. D_2 incurs variable costs of ₹40 per unit and fixed costs of ₹50,000 per month, and sells Q in the external market at ₹150 per unit.

In view of the higher market price of the component, D_1, wants to increase its transfer price to ₹80 per unit. Suggest the minimum transfer price per unit of the component that D_1, should charge and also show the resultant monthly profit of the divisions at their 100% capacity utilization.

Solution:

Calculation of profit under present and proposed transfer price

	Present T.P = ₹ 70 p.u			Proposed T.P = ₹ 80 p.u		
	D_1	D_2	Total	D_1	D_2	Total
T.P/ Selling price	70	150		80	150	
Less. Variable cost						
Transferred in cost		70			80	
Conversion cost	50	40		50	40	
CPU	20	40		30	30	
Units transferred/sold	10000	10000		10000	10000	
Total Contribution	200000	400000		300000	300000	
Less. F.C	100000	50000		100000	50000	
Profit	100000	350000	450000	200000	250000	450000

Calculation of minimum transfer price:

(a) when capacity is maintained at 80%: Min. Transfer price = VCPU+ Opportunity Loss
= 50 + [8000*(90-50)]/10000 = ₹ 82 p.u

(b) when capacity is enhanced to 100%:
Total capacity = 10000*100/80 = 12500 units
Loss of contribution = 8000 – (12500-1000) = 5500 units.
Min. Transfer price = VCPU+ Opportunity Loss
= 50 + [5500*(90-50)]/10000 = ₹ 72 p.u

18. Show the optimum level of output, minimum transfer price perunit, divisional profits and total profit of the company at the optimum level considering the information given below:

Output	Supplying Division	Receiving Division	Total Profit
(Units)	Total Costs (₹)	Total Net Revenue (₹)	₹
1000	10000	24000	14000
1100	11000	26000	15000
1200	12150	27900	15750
1300	13550	29750	16200
1400	15250	31550	16300
1500	17250	33250	16000
1600	19550	34750	15200
1700	22350	36150	13800

N.B. Total Net Revenue means the total revenue less all costs except transfer costs.

Solution:

Calculation for optimum level of output, minimum transfer price per unit, divisional profits and total profit

Output (Units)	Supplying Division				Receiving Division				Total Profit
	TC	MC	Revenue @ ₹8 p.u	Profit = Rev - TC	TR	MR	Transferred in cost @ ₹8 p.u.	Profit	
1000	10000	N.A	17500	7500	24000	N.A	17500	6500	14000
1100	11000	1000	19250	8250	26000	2000	19250	6750	15000
1200	12150	1150	21000	8850	27900	1900	21000	6900	15750
1300	13550	1400	22750	9200	29750	1850	22750	7000	16200
1400	15250	1700	24500	9250	31550	1800	24500	7050	16300
1500	17250	2000	26250	9000	33250	1700	26250	7000	16000
1600	19550	2300	28000	8450	34750	1500	28000	6750	15200
1700	22350	2800	29750	7400	36150	1400	29750	6400	13800

Since total profit is the highest at 1400 unit level, this is the optimal level of output.

Transfer price = (1700+1800)/2 = ₹1750 per 100 units i.e.₹17.50per unit.

19. X Ltd. has two divisions — D_1 and D_2. D_1, manufactures three products - P, Q and R, which are sold in the external market. The following information are available in respect of the products of D_1:

	P	Q	R
Variable Cost per unit (₹)	**38**	**41**	**32**
Machine Hours required per unit	**2**	**3**	**4**
Selling Price per unit (₹)	**50**	**56**	**54**
Maximum External Demand (units)	**4000**	**4000**	**3000**

Total Fixed Costs: ₹ 50,000

Total Machine Hours available: 29,000

D_2 requires a component, similar to product R manufactured by D_1 for its product Z. So far, it has been purchasing the component from external supplier at ₹60 per unit and selling its final product to Z at ₹100 per unit incurring conversion cost (inclusive of fixed cost) of ₹20 per unit. Now, the manager of D_2, wants to procure 3000 units of R from D_1 at ₹55 per unit for manufacture of the same number of units of Z. Show the minimum transfer price per unit of R that may be fixed by D_1 and suggest whether the manager of D_1 should transfer 3000 units of R as proposed by the manager of D_2, at ₹55 per unit. Also show the impact of your suggestions on profit of the divisions and the company as a whole.

Solution:

Calculation for ranking of the product

	P	Q	R
Selling Price per unit (₹)	50	56	54
Variable Cost per unit (₹)	38	41	32

Contribution p.u.	12	15	22
Machine Hours required per unit	2	3	4
Contribution per machine hour	6	5	5.50
Ranking	I	III	II

Production plan:

Product as per ranking	Machine hour per unit	Maximum demand	Total Hours	Actual Production
P	2	4000	8000	4000
R	4	3000	12000	3000
Q	3	4000	9000 (b.f)	3000 (9000/3)
			29000	

D_2 requires 3000 units of R. To produce 3000 units of r, D_1 will require 12000 hours. This capacity can be arranged by stopping the current production of Q entirely (9000 hours) and by curtailing the production of R (3000 hours) for market. R to be sold in the market is (12000-3000)/4 =750 units.

Total loss of contribution in such case = (9000*5 +3000*5.50) = ₹61500

So, minimum transfer price = VCPU +Opportunity loss = ₹32 +61500/3000 = ₹52.50

Since the offer price from D_2 is higher, the transfer price of ₹55 per unit is acceptable.

Calculation of total profit

	D_1				D_2	Total
	Market		Transfer	Total		
	P	R	R		Z	
Market price/Transfer price	50	54	55		100	
Less: variable cost	38	32	32		75 (55+20)	
CPU	12	22	23		25	
Units sold/transferred	4000	750	3000		3000	
Total Contribution	48000	16500	69000	133500	75000	
Less Fixed cost				50000	Included in conversion cost	
				83500	75000	158500

20. PQR Ltd. is an engineering company engaged in the manufacture of three products –X, Y and Z all of which use the same machine which is available for 77000 hours p.a.

The standard costs of the product per unit are:

	X (₹)	Y(₹)	Z(₹)
Direct material	**140**	**80**	**160**
Direct labour (₹16 per machine hour)	**96**	**64**	**112**
Variable overhead	**72**	**80**	**84**
Total cost	**308**	**224**	**356**
Selling price per unit	**400**	**316**	**448**
Maximum demand (units)	**6000**	**5000**	**10000**

Fixed cost per annum ₹350000.

The company could buy in similar quality products at the following unit prices: X –₹ 350; Y – ₹280; Z – ₹400. You are required to (i) recommend which product(s) and how much the company should buy and (ii) calculate the profit of the company based on your recommendation.

Solution:

Statement showing ranking

	X (₹)	Y(₹)	Z(₹)
Direct material	140	80	160
Direct labour (₹16 per machine hour)	96	64	112
Variable overhead	72	80	84
Total variable cost	308	224	356
Selling price per unit	400	316	448
Contribution per unit	92	92	92
Purchase price per unit	350	280	400
Savings per unit if manufactured (purchase price – total variable cost)	42	56	44
Direct labour hours per unit (i.e. labour cost per unit/hourly rate)	6	4	7
Savings per hour	7	14	6.29
Ranking	II	I	III

Statement Showing Production plan and profit

Products as per ranking	Labour hours p.u	Maximum demand	Total hours	Actual production	CPU	Total Contribution
					₹	₹
Y	4	5000	20000	5000	92	460000
X	6	6000	36000	6000	92	552000
Z	7	10000	21000 (b.f)	3000	92	276000
			77000			1288000
Total contribution from goods produced and sold						1288000
Contribution from goods bought and sold (448 – 400)*(10000 – 3000)						336000
Total Contribution						1624000
Less. Fixed Cost						350000
Profit						1274000

21. Mr. X, a medical practitioner now spends ₹ 4.25 per kilometre on taxi fares for his profession. He is considering two other alternatives the purchase of a new car or, an old secondhand car. The estimated cost figures are.

	New Car	Secondhand Car
Purchase price (₹)	**226000**	**62000**

Sale price after 5 years (₹)	**70000**	**15000**
Repairs and Servicing per annum (₹)	**2400**	**4600**
Taxes and Insurance per annum (₹)	**2800**	**900**
Petrol consumption per litre	**15 km.**	**8 km.**
Petrol price per litre (₹)	**22.50**	**22.50**

Mr. X estimates 12.000 km. tour annually. Which of the three alternatives will be cheaper? If his practice expands and he has to travel 18,000 km. annually, what should be his decision?

Solution:

Calculation for cost per km when total tour is 12000 km.

Particulars	New Car	Old Car
Variable Cost:		
Cost of petrol –New Car(22.50/15)	1.50	
Old Car (22.50/8)		2.8125
Variable cost per km	1.50	2.8125
Fixed cost:		
Depreciation: (Purchase price –Salvage value)/life	31200	9400
Repairs	2400	4600
Taxes	2800	900
Total Fixed cost	36400	14900
Fixed cost per km (Total fixed cost/12000)	3.03	1.24
Total cost per km	4.53	4.0525

Since cost per km is lower for old car, it is recommended.

Calculation for cost per km when total tour is 18000 km.

Particulars	New Car	Old Car
Variable Cost:		
Cost of petrol –New Car(22.50/15)	1.50	
Old Car (22.50/8)		2.8125
Variable cost per km	1.50	2.8125
Fixed cost:		
Depreciation: (Purchase price –Salvage value)/life	31200	9400
Repairs	2400	4600
Taxes	2800	900
Total Fixed cost	36400	14900
Fixed cost per km (Total fixed cost/18000)	2.02	0.83
Total cost per km	3.52	3.6425

Since cost per km is lower for new car, it is recommended.

22. Better and Better Ltd. manufacturers a component in two identifiable and separate stets which are departmentalized. One is department A and the other is department B. Each department is treated as a Profit Centre.

Department A manufactures 30,000 components during the year out of which it is able to sell 5,000 components only in the market at a price of ₹ 6 per unit. The balance is transferred at the same price to Department B. The material and conversion cost worked out to ₹ 4 per unit. This department has a fixed cost of ₹ 25,000 to bear.

Department B makes and sells all the 25,000 units in the open market at a price of ₹ 19 per unit. The material und other conversion costs including transfer cost come to ₹ 16.25 per unit and the burden of fixed cost works out to₹ 18,000 in case of department B.

(a) Work out the profit for each department and the overall profit for the company, (b) Department B is not happy with the transfer price as it is able to get any number of components from the market at ₹ 5 per unit. It wants to buy all its requirement of 25,000 components from the market or in the alternatives, accept the transfer of units from Department A at ₹ 5 per unit only. Which course would you advisable from the overall interest of the company? (c) Placed in this predicament, department A wants to go all out for increasing the sales in the open market. How much more should it sell to break even in the operation?

Solution:

(a) Departmental Profit and Overall Profit of the firm:

	Dept A			Dept B	Total
	Market	Transfer	Total		
	₹	₹	₹	₹	₹
Transfer price/ market price	6	6		19	
Less. Variable cost					
Transferred-in cost	Nil	Nil		6	
Own Cost	4	4		10.25	
Contribution p.u	2	2		2.75	
Transfer/Sales	25000	5000		25000	
Total Contribution	50000	10000	60000	68750	
Less. Fixed cost			25000	18000	
Profit			35000	50750	85750

(b) In case the transfer price of ₹5 is accepted, total profit of the firm will remain the same. However, the profit of Department A will reduce by ₹5000 [i.e. (6-5)*5000] and that of B will increase by ₹ 5000.

If however the transfer price of ₹ 5 is not accepted and B purchases the component from outside, the profit will be as follows:

	Dept. A	Dept B	Total
	₹	₹	₹
Market price	6	19	
Less. Variable cost			

Own Cost	4	10.25	
Component cost		5.00	
Contribution p.u	2	3.75	
Transfer/Sales	5000	25000	
Total Contribution	10000	93750	
Less. Fixed cost	25000	18000	
Profit	(15000)	75750	60750

(c) Break even sales for Dept A = Fixed cost/ Contribution p.u = 25000/2 =12500 units.
So A must increase its sales by another (12500 -5000) =7500 units.

23. A company produces three products from a particular imported material which cost ₹10 per kg. The cost structure per unit of each product is given below:

Product	X	Y	Z
Sales price	**₹200**	**₹300**	**₹250**
Cost of materials Imported	**40**	**64**	**48**
Indigenous	**10**	**16**	**12**
Direct wages @ ₹ 6/- per hours -	**60**	**120**	**I08**
Variable overhead	**30**	**60**	**54**

You are required to prepare a statement showing comparative profitability of each of the products under each of the following circumstances,
(a) Imported material is the restricted supply, (b) Overall capacity measure in labour hours is the limiting factor, (c) When the maximum market demand for X is 1000 units Y-1800 units and Z-600 units and the import of materials if restricted to 10,000 kgs, determine the most profitable sales mix for the company.
Solution:

(a) Statement showing comparative profitability/ranking:

Particulars	X	Y	Z
Sales price	₹200	₹300	₹250
Less. Variable cost			
Cost of materials Imported	40	64	48
Indigenous	10	16	12
Direct wages @ ₹ 6/- per hours -	60	120	I08
Variable overhead	30	60	54
Contribution p.u	60	40	28
Imported material p.u (@ ₹10 per kg.) (in kg.)	4	6.4	4.8
Contribution per kg of imported material (₹) =Contribution p.u/ Imported material p.u	15	6.25	5.83
Ranking	I	II	III

(b) Statement showing comparative profitability/ranking:

Particulars	*X*	*Y*	*Z*
Contribution p.u	60	40	28
Labour hours p.u (@ ₹6 per hr.) (in hr.)	10	20	18
Contribution per kg of imported material (₹) =Contribution p.u/ Imported material p.u	6	2	1.56
Ranking	III	II	I

(c) Production plan when imported material is restricted supply

Product as per ranking	Material per unit	Maximum demand	Total material	Actual production	Contribution p.u	Total Contribution
	₹				₹	₹
X	4	1000	4000	1000	60	60000
Y	6.4	1800	6000 (b.f)	937.5 (i.e. 6000/1800)	40	37500
			10000			97500

24. A paint manufacturing company manufactures 4.00,000 of medium-sized tins of 'Spray Lac Paint.' per annum when working at normal capacity. It incurs the following costs of manufacturing per unit/tin.

	₹
Direct Material	**15.60**
Direct labour	**4.20**
Variable overheads	**5.00**
Fixed overheads	**8.00**
	32.80

Each tin of product is sold for ₹ 45 with variable selling and administrative expenses of ₹1.25 per tin. During the next quarter only 20000 tins can be produced and sold. The management plans to shut down the plant estimating that the fixed manufacturing cost can be reduced to ₹1,48,000 for the quarter. When the plant is operating, the fixed overheads are incurred at a uniform rate throughout the year. Additional costs of plant-shut down for the quarter are estimated at ₹ 28,000.

You are required:

(i) To express your opinion as to whether the plant should be shut down during the quarter and

(ii) To calculate the shut down point for quarter in unit of products.

(i) Calculation of Loss

	Continue	Shut Down
	₹	₹
Selling Price	45	
Variable cost (15.60+4.20+5.00+1.25)	26.05	
Contribution p.u	18.95	
Sales units	20000	

Total contribution	379000	
Less. Fixed cost [(400000*8)/4]	800000	
Loss	421000	
Fixed cost after shut down		148000
Additional shut down cost		28000
Loss under shut down		176000

Since loss is lower when the plant is shut down, shut down is recommended.

(ii) Shut down point = Fixed cost under shut down/Contribution p.u = 176000/18.95 = 9288 units.

25. A manufacturing company makes a single product which sells for ₹210 per unit and there is great demand for the product. The variable cost of the product per unit is as follows:—

Direct Material ₹56
Direct Labour (4 hours) ₹28
Variable Overhead ₹28

The labour force is currently working at full capacity. A customer has approached the company with a request for the manufacture special order at ₹40000.

The cost of the order would be ₹12000 for direct material and 800 labour hours will be required. Should the order be accepted?

Solution:

Calculation for acceptable price of the special order.

	₹
Direct Material	12000
Direct Labour (28/4)*800	5600
Variable O/H (28/4)*800	5600
Total cost	23200
Loss of contribution [24.50*800]	19600
Acceptable price	42800

Since the offer price is lower than the acceptable price, it should not be accepted.
Working Note: Contribution p.u = 210-(56+28+28) = ₹98
Contribution per hour = 98/4 = ₹24.50

Study Note – 3

BUDGETING AND BUDGETARY CONTROL

Section - I

1. Answer the following questions:

(a) Choose the correct answer from the given four alternatives.

(1) If budgets are prepared of a business concern for a certain period taking each and every function separately such budgets are called _____.
- **(a) Separate Budgets**
- **(b) Functional Budgets**
- **(c) Both of them**
- **(d) None of the above**

(2) Which of the following is not an example of functional budget?
- **(a) Production budget**
- **(b) Cost of production budget**
- **(c) Materials budget**
- **(d) None of the above**

(3) Which of the following is an essential of a budget?
- **(a) It is prepared for a definite future period.**
- **(b) It is a statement prepared prior to a defined period of time.**
- **(c) The Budget is monetary and I or quantitative statement of policy.**
- **(d) All of the above**

(4) When preparing a production budget, the quantity to be produced equals
- **(a) sales quantity + opening inventory of finished goods + closing inventory of finished goods**
- **(b) sales quantity – opening inventory of finished goods + closing inventory of finished goods**
- **(c) sales quantity – opening inventory of finished goods – closing inventory of finished goods**
- **(d) sales quantity + opening inventory of finished goods – closing inventory of finished goods**

(5) In comparing a fixed budget with a flexible budget, what is the reason for the difference between the profit figures in the two budgets?
- **(a) Different levels of activity**
- **(b) Different levels of spending**
- **(c) Different levels of efficiency**
- **(d) The difference between actual and budgeted performance**

(6) When budget allowances are set without the involvement of the budget owner, the budgeting process can be described as:
(a) top down budgeting
(b) negotiated budgeting
(c) zero based budgeting
(d) participative budgeting

(7) For which of the following would zero based budgeting be most suitable?
(a) Building construction
(b) Mining company operations
(c) Transport company operations
(d) Government department activities

Ans: 1-b; 2-d; 3-d; 4-b; 5-a; 6-a; 7-d.

(b) Match the statement in column I with the most appropriate statement in column II:

Column I	Column II
1.Principal budget factor	**a. 'rationalisation'**
2.Incremental budgeting	**b. summary budget.**
3.ZBB	**c. sales demand**
4. The Master Budget	**d. encourages slack**

Ans: 1-c; 2-d; 3-a; 4-b

(c) State whether the following statements are true or false:

1. **A budget is not a quantitative statement.**
2. **The principal budget factor is the factor which limits the activities of an organisation.**
3. **The flexible budget also called as Sliding Scale Budget.**
4. **The budget is imposed by lower management.**
5. **The sales budget is an example of functional budget.**
6. **Responsibility accounting is also called profitability accounting and activity accounting.**

Ans: 1-F; 2-T; 3-T; 4-F; 5-T; 6-T

Section-II

2. A company is expecting to have ₹ 25,000 cash in hand on 1st April 2017 and it requires you to prepare an estimate of cash position in respect of three months from April to June 2017, from the information given below:

Months	Sales (₹)	Purchase (₹)	Wages (₹)	Expenses (₹)
February	70,000	40,000	8,000	6,000
March	80,000	50,000	8,000	7,000
April	92,000	52,000	9,000	7,000
May	1,00,000	60,000	10,000	8,000
June	1,20,000	55,000	12,000	9,000

Additional Information:

(a) Period of credit allowed by suppliers - two months.

(b) 25 % of sale is for cash and the period of credit allowed to customer for credit sale one month.

(c) Delay in payment of wages and expenses one month.

(d) Income Tax ₹ 25,000 is to be paid in June 2017.

Solution

Particulars	April (₹)	May (₹)	June (₹)	Total (₹)
Opening balance of cash	25,000	53,000	81,000	1,59,000
Cash Respects:				
Cash Sales	23,000	25,000	30,000	78,000
Debtors	60,000	69,000	75,000	2,04,000
Total Cash Receipts - (I)	1,08,000	1,47,000	1,86,000	4,41,000
Cash Payments:				
Creditors	40,000	50,000	52,000	1,42,000
Wages	8,000	9,000	10,000	27,000
Expenses	7,000	7,000	8,000	22,000
Income tax	-	-	25,000	25,000
Total Payment - (2)	55,000	66,000	95,000	2,16,000
Closing Balance of Cash (1-2)	53,000	81,000	91,000	2,25,000

3. A company operates at 50 % of capacity utilization. At this level of operation, the sales value is ₹ 9,00,000. At 100 % capacity utilization the following costs and relationships will apply:

Factory Overheads ₹ 1,80,000 (50 % Variable)

Factory Cost 60 % of sales

Selling Costs (75 Variable), i.e., 20 % of sales

The company anticipates that its sales will increase up to 75 % of capacity utilization. The company also receives a special order from a government department. This order will occupy 15 % of capacity utilization of the plant. The prime cost in this order is ₹ 1,35,000 and the variable selling cost will only be 2 % of the sales value offered. Besides, the cost of processing the order is ₹ 8,000. The sales price offered is ₹ 1,45,000.

Required:

(a) Present a statement of profitability at 50 % and 75 % level of activity.

(b) Evaluate the government order and state whether it is acceptable or not.

Solution:

Particulars	50 % Capacity (₹)	75 % Capacity (₹)
Sales	9,00,000	13,50,000
Prime cost 50 % of sales 75 % of sales	4,50,000	6,75,000
Factory overheads:		
Variable Cost	45,000	67,500
Fixed Cost	90,000	90,000
Factory Cost (Prime cost + Factory overheads)	**5,85,000**	**8,32,500**
Selling Cost: Variable Cost	1,35,000	2,02,500
Fixed Cost	90,000	90,000
Total Cost (Factory Cost + Selling Cost)	**8,10,000**	**11,25,000**
Profit (Sales - Total Cost)	**90.000**	**2,25,000**

Working Notes:

Sales at 50% = ₹ 9,00,000

Sales at 100% = ₹ 18,00,000

Profitability at 100% Capacity

	₹	
Sales	18,00,000	
Prime Cost (10,80,000 - 1,80,000)	9,00,000	= 50% of sales
Factory Overhead	1,80,000	Given
Factory Cost	10,80,000	= 60% of sales
Selling Cost	3,60,000	= 20% of sales
Total Cost	**14,40,000**	
Profit (Sales - Total Cost) (18,00,000 - 1,44,0000)	3,60,000	

Evaluation of Government order (15 % Capacity)

	₹
Sales	1,45,000
Prime Cost	1,35,000
Factory overhead (Variable cost)	13,500
Selling cost variable @ 2 %	2,900
Processing cost	8,000
Total Cost	**1,59,400**
Loss (Sales - Total cost) (1,45,000 - 1,59,400)	1,440

Hence it is not acceptable.

4. The budgeted level of activity of a production department of a manufacturing company is 5,000 hours in a period. But a technical study assumes overhead behaviour mentioned below:

	₹ ('00) per hr.	Total in ₹ ('000)
Indirect wages, variable cost	**0.40**	**-**
Rent and tax, fixed cost	**-**	**320**
Consumable supplies, variable	**0.24**	**-**
Repairs: up to 2,000 hours	**-**	**100**
Additional each extra 500 hrs up to 4,000 hrs.	**-**	**35**
Additional 4,001 to 5,000 hrs.	**-**	**60**
Additional above 5,000 hrs.	**-**	**70**
Supervision up to 2,500 hrs	**-**	**400**
Additional each extra 600 hrs up to 4,900 hrs.	**-**	**100**
Additional above 4,900 hrs.	**-**	**150**
Power variable up to 3,600 hrs.	**0.25**	**-**
For hrs above 3,600 additional cost	**0.20**	**-**
Depreciation up to 5,000 hrs	**-**	**650**
Above 5,000 hrs	**-**	**820**
Clearing up to 4,000 hrs.	**-**	**60**
Above 4,000 hrs.	**-**	**80**
Lighting 2,100 to 3,500 hrs.	**-**	**120**
3,501 hrs to 5,000 hrs	**-**	**150**
Above 5,000 hrs	**-**	**175**

(a) Prepare fixed budget and a flexible budget at 70%, 85% and 110% of budget level of activity in one statement.

(b) Calculate a departmental hourly rate of overhead absorption.

Solution:

Particulars	Flexible budget			Fixed budget
Capacity	70%	85%	110%	100%
Hours	3,500	4,250	5,500	5,000
	₹ '000	**₹ '000**	**₹ '000**	**₹ '000**
Indirect wages @ ₹ 40hr	140	170	220	200
Rates & taxes consumable suppliers @ ₹ 24hr.	320	320	320	320
Repair	84	102	132	120
Supervision	(100+35*3) = 205	(100+35*4+60) = 300	(100+3584+60+70) = 370	(100+35*4+60) = 300
	(400+100*2) = 600	(100+100*3) = 700	(400+100*4+150) = 950	(400+100*4+150) = 950
Power				
Depreciation	87.5			

Clearing	650	103	128	118
Lighting	60	650	820	650
	120	80	80	80
		150	175	150
Total cost	**2,266.5**	**2,575**	**3,195**	**2,888**
Rate/hour	0.647	0.605	0.580	0.577

5. Short note on

(a) Forecast vs. Budget

Forecast is mainly concerned with an assessment of probable future events whereas Budget is a planned result that an enterprise aims to attain. Forecasting precedes preparation of a budget as it is an important part of the budgeting process. It is said that the budgetary process is more a test of forecasting skill than anything else. A budget is both a mechanism for profit planning and technique of operating cost control. In order to establish a budget it is essential to forecast various important variables like sales, selling prices, availability of materials, prices of materials, wage rates etc.

Both budgets and forecasts refer to the anticipated actions and events. But still there are wide differences between budgets and forecasts as given below:

(1) Forecasts is mainly concerned with anticipated or probable events whereas budget is related to planned events.
(2) Forecasts may cover for longer period or years whereas budget is planned or prepared for a shorter period.
(3) Forecast is only a tentative estimate but budget is a target fixed for a period.
(4) Forecast results in planning and result of planning is budgeting.
(5) The function of forecast ends with the forecast of likely events whereas the process of budget starts where forecast ends and converts it into a budget.
(6) Forecast usually covers a specific business function but budget is prepared for the business as a whole.
(7) Forecasting does not act as a tool of controlling measurement but purpose of budget is not merely a planning device but also a controlling tool.

(b) Zero-based budgeting (ZBB)

Zero-based budgeting was devised as a reaction to the traditional incremental approach to budgeting. Zero-based budgeting requires a completely clean sheet of paper every year. Each part of the organisation has to justify over again the budget it requires. The approach is particularly useful for the output-driven approach to budgeting because it forces questions to be asked about the programmes planned and the cost–benefit aspects of the plans. Some advantages and disadvantages of this type of budgeting are being discussed here.

The advantages of zero-based budgeting are:

It encourages management to focus on the goals and objectives of the organisation. It forces management to consider whether activities continue to be necessary.
It leaves space for new initiatives.
It allows management to set priorities over the activities of the business.
It gives an up-to-date benchmark to be used in evaluating actual outcomes.

The disadvantages of zero-based budgeting are:

It is a time-consuming exercise.
It requires management to apply higher skills in planning.
It diverts managers' attention from their primary areas of responsibility.
It could lose the benefit of longer-term comparisons of trends in efficiency and control.

(c) Master Budget

The master budget is the aggregation of all lower-level budgets produced by a company's various functional areas, and also includes budgeted statements, cash forecast, and a financing plan. The master budget is typically presented in either a monthly or quarterly format, or usually covers a company's entire fiscal year. An explanatory text may be included with the master budget, which explains the company's strategic direction, how the master budget will assist in accomplishing specific goals, and the management actions needed to achieve the budget. There may also be a discussion of the headcount changes that are required to achieve the budget.

A master budget is the central planning tool that a management team uses to direct the activities of a corporation, as well as to judge the performance of its various responsibility centers. It is customary for the senior management team to review a number of iterations of the master budget and incorporate modifications until it arrives at a budget that allocates funds to achieve the desired results. Hopefully, a company uses participative budgeting to arrive at this final budget, but it may also be imposed on the organization by senior management, with little input from other employees.

Study Note – 4

STANDARD COSTING & VARIANCE ANALYSIS

Standard Costing & Variance Analysis

Syllabus: Standard Costing & Variance Analysis

Computation of variances for each of the elements of costs, Sales Variances, Investigation of variances – Valuation of Stock under Standard Costing - Uniform Costing and Inter-firm comparison.

MCQ Type Questions:

1. **Which among the below is the reason behind Material Price Variance:**
   a) **Change in basis purchase price of material.**
   b) **Uneconomical size of purchase order.**
   c) **Payment of excess or less freight.**
   d) **All of the above.**

2. **In a factory Standard rate per hour ₹ 4, Standard time per unit of output – 20 hours, Units produced -500, Actual hours worked-12,000. Compute Labour Efficiency Variance.**
   a) **₹ 6000 (Favourable)**
   b) **₹ 8000 (Adverse)**
   c) **₹ 9,600 (Favourable)**
   d) **₹ 8000 (Favourable)**

3. **MSE Manufacturing gives you the following details.**
   Standard Price per kg of Material ₹ 2, Actual Material used 2,000 kg, Actual cost of Material ₹ 3,000. Actual output 2,100 kg. Compute Material Price Variance.
   a) **₹ 1050 (Favourable)**
   b) **₹ 1142 (Favourable)**
   c) **₹ 1000 (Favourable)**
   d) **None of the above**

Answer:

1-d;

2-b; (Hints: Labour Efficiency Variance=SR(SH-AH)=4(500×20-12,000)=8,000 (Adverse)

3-c. (Hints: Material Price Variance = (SP-AP)×AQ = (2-3000/2000)2000 = (2 - .5)2000 = 1000 (Favourable)

Theoretical /Descriptive Questions:

1. **Mention the limitations of Uniform Costing. What are the prerequisites of Uniform Costing System?**

Limitations of Uniform Costing

a. The various member-units in an industry differ widely with regard to location, age, condition of plant and degree of mechanism. This difference is sometimes so wide that it does not permit efficient use of uniform costing system.
b. For smaller units, this system becomes too expensive to operate. The cost incurred in operation of this system may not commensurate with the benefits derived.
c. Uniform costing system may promote a monopolistic tendency. Thus, it may prove harmful to the consumers.
d. The standard terminology used in the uniform costing system may not be understood properly by the member companies. However, this objective can be overcome by introduction of uniform Costing Manual.

Prerequisites of Uniform Costing System

a. The member of the trade association or Chamber of Commerce should work with a spirit of mutual trust and cooperation.
b. Member should exchange their ideas freely, without fearing the leakage of secrecy.
c. The well-organized and large scale sector should be prepared to pass on the technological development in the process or method of production to the other companies who are unable to conduct their own research and developmental activities.
d. The companies must furnish full and correct information to the Association so that efficiency of the member-companies can be compared.
e. The member should not work with a sense of rivalry or jealousy.

Practical Questions:

Illustration-1

The standard set for material consumption was 200 kg @ ₹ 4.50 per kg. In a cost period:
Opening stock was 200 kg @ ₹ 5.00 per kg.
Purchase made 500 kg @ ₹ 4.30 per kg.

Consumption 220 kg.
Calculate a) Usage b) price variance

i) When variance is calculated at a point of purchase
ii) When variance is calculated at a point of issue on FIFO basis
iii) When variance is calculated at a point of issue on LIFO basis.

Solution:

a) Computation of Material Usage Variance

Material Usage Variance = SQSP-AQSP
= SP(SQ-AQ)
= 4.50(200-220)
= 90(A)

b) Computation of Material Price Variance

i) When variance is calculated at appoint of purchase
Price Variance = AQSP-AQAP
=(220×4.5)-(220×4.30)
=990-946
=44(F)

ii) When variance is calculated at a point of issue on FIFO basis
Price Variance=AQSP-AQAP
=(220×4.50)-[(200×5.00)+(20×4.30)]
=990-(1000+86)
=990-1086
=96(A)

iii) When variance is calculated at a point of issue on LIFO basis
Price Variance=AQSP-AQAP
=(220×4.50)-(220×4.30)
=990-946
=44 (F)

Illustration-2

X Ltd. present the following information for January, 2018:
Budgeted production of product P = 200 UNITS.
Standard consumption of Raw Material= 2 kg per unit of P.
Standard price of material= ₹ 6 per kg.
Actually 250 units of P were produced and material A was purchased at ₹ 8 per kg and consumed at 1.8 kg per unit of P. Calculate the material cost variances.

Solution:

Actual

Actual production of P from material A = 250 units
For one unit actual production of P 1.8 kg of material A is required.
Hence, for 250 units of P = 250×1.8=450 kg of material A is required.
Actual cost of output of P for 250 units=250×1.8×8=₹ 3,600.

Standard

Again, standard consumption of raw material A for one unit of P is 2kg.

So, as per standard rate for production of 250 units of P = 250×2=500 kg of raw material A is required.

Hence, standard cost of production of 250 kg of P = 250×2×6=₹ 3,000.

Material Cost Variance=Standard Cost-Actual Cost=3000-3600=600(A)

Material Price Variance=(SP-AP)SQ=(6-8)450=900

Material Yield Variance=(SP×SQ)-(SP×SM)=(6×500)-(6×450)=300 (F)

Material Usage Variance=(SP×SQ)-(SP×AQ)=(6×500)-(6×450)=300 (F)

Illustration-3

HBL Construction Limited has entered into a contract at an agreed price of ₹ 1,50,00,000 subject to an escalation clause for material and labour as spent out on the contract and the corresponding actual are as follows:

		Standard	Actual	
Material	**Quantity (tonne)**	**Rate per tonne**	**Quantity (tonnes)**	**Rate per tonne**
A	**3,000**	**1,000**	**3,400**	**1,100**
B	**2,400**	**800**	**2,300**	**700**
C	**500**	**4,000**	**600**	**3,900**
D	**100**	**30,000**	**90**	**31,500**
Laour	**Hours**	**Hourly Rate**	**Hours**	**Hourly Rate**
L_1	**60,000**	**15**	**56,000**	**18**
L_2	**40,000**	**30**	**38,000**	**35**

You are required to:

(i) Give your analysis of admissible escalation claim and determine the final contract price payable.

(ii) Prepare the contract account, if all the expenses other than material labour related to the contract are ₹ 13,45,000.

(iii) Calculate the following variance and verify them:

- **a. Material cost variance**
- **b. Material price variance**
- **c. Material usaage variance**
- **d. Labour cost variance**
- **e. Labour rate variance**
- **f. Labour efficiency variance**

Solution

(i) Statement showing additional claim due to escalation clause

Material	Standard Quantity/Hours (a)	Standard Rate (b)	Actual Rate (c)	Variation in Rate (₹) (d)=(c-b)	Escalation Claim (₹) (e)=(a×d)
A	3,000	1,000	1,100	+100	+3,00,000
B	2,400	800	700	-100	-2,40,000
C	500	4,000	3,900	-100	-50,000
D	100	30,000	31,500	+1500	+1,50,000
	Material escalation claim				**1,60,000**
Labour					
L_1	60,000	15	18	+3	+1,80,000
L_2	40,000	30	35	+3	+2,00,000
	Labour escalation claim				**3,80,000**

Statement showing Final Contract Price

Particulars	₹	₹
Agreed contract price		1,50,00,000
Add: Agreed escalation claim:		
Material cost	1,60,000	
Labour cost	3,80,000	5,40,000
		1,55,40,000

(ii)

Contract Account

Particulars	₹	Particulars	₹
To Material		By Contractee's A/c	1,55,40,000
A- 3,400×1,100			
B- 2,300×700			
C- 600×3,900			
D- 90×31,500	1,05,25,000		
To Labour			
L_1 – 56,000×18			
L_2 – 38,000×35	23,38,000		
To Other Expenses	13,45,000		
To Profit and Loss A/c	13,32,000		
	1,55,40,000		**1,55,40,000**

(iii)

Material Variance

SQ×SP	AQ×AP	AQ×SP
A-3,000×1,000=30,00,000	3,400×1,100=37,40,000	3,400×1,000=34,00,000
B- 2,400×800=19,20,000	2,300×700= 16,10,000	2,300×800=18,40,000
C- 500×2,000= 20,00,000	600×3,900=23,40,000	600×4,000=24,00,000
D- 100×30,000=30,00,000	90×31,500=28,35,000	90×30,000=27,00,000
Total =99,20,000	**=1,05,25,000**	**=1,03,40,000**

Material Cost Variance=(SQ×SP)-(AQ×AP)=99,20,000-1,05,25,000=₹ 6,05,000 (A)
Material Price Variance=(AQ×SP)-(AQ×AP)=(1,03,40,000-1,05,25,000)=₹ 1,85,000 (A)
Material Usage Variance = (SQ×SP)-(AQ×SP)=99,20,000-1,03,40,000=₹ 4,20,000 (A)

Labour Variance

SH×SR	AH×AR	AH×SR
L_1- 60,000×15=9,00,000	56,000×18=10,08,000	56,000×15=8,40,000
L_2 – 40,000×30=12,00,000	38,000×35=13,30,000	38,000×30=11,40,000
Total =21,00,000	**=23,38,000**	**=19,80,000**

Labour Cost Variance= (SH×SR)-(AH×AR)=21,00,000-23,38,000=₹2,38.000(A)
Labour Rate Variance= (AH×SR)-(AH×AR)= 19,80,000-23,38,000
Labour Efficiency Variance= (SH×SR)-(AH×AR)= 21,00,000-19,80,000=₹ 1,20,000(F)

Illustration-4

M P Ltd. operates a system of Standard Costing. The company has a normal monthly machine hour capacity of 100 machines working 8 hours per day for 25 working days in the month of April 2014.

a. **The standard time required to manufacture one unit of product is 4 hours. The budgeted fixed overhead was ₹ 1,50,000.**
b. **In the month of April 2014, the company actually worked for 24 days for average 750 machine hours per day.**
c. **The actual production was 4500 units, and the actual fixed overhead was ₹ 1,60,000.**

You are required to compute:

i. **Fixed overhead efficiency variance**
ii. **Fixed overhead capacity variance**
iii. **Fixed overhead calendar variance**
iv. **Fixed overhead expenditure variance**
v. **Fixed overhead volume variance**
vi. **Fixed overhead cost variance**

Solution:

Computation of Variance

Name of Variance	Formula	Value	Variance (F/A)
Fixed overhead efficiency variance	Standard Rate/Hr(Standard hours for actual production-Actual Hours)	7.5(18000-18000)	Nil
Fixed overhead capacity variance	Standard Rate/Hr(Actual hours – Budgeted Hours)	7.5(18000-19200)	9000 (A)
Fixed overhead calendar variance	Standard Rate/Hr(Actual days – Budgeted days)	6000(24-25)	6000(A)
Fixed overhead expenditure variance	(Budgeted fixed overhead –Actual fixed overhead)	150000-160000	10000(A)
Fixed overhead volume variance	Standard Rate/Unit (Actual output-Budgeted output)	30(4500-5000)	15000(A)
Fixed overhead cost variance	Fixed overhead recovered for actual output-Actual fixed overhead	(30×4500)-160000	25000 (A)

Summary of Variance

Particulars	Variance	Variance
Fixed overhead expenditure variance		10000(A)
Fixed overhead volume variance		
Fixed overhead efficiency variance	Nil	
Fixed overhead capacity variance	9000 (A)	
Fixed overhead calendar variance	6000(A)	15000(A)
		25000(A)

Working Notes:

(i) Standard Rates

Standard fixed overhead rate per unit= 150000/5000= 30

Standard fixed overhead rate per hour=150000/20000=7.5

Standard fixed overhead rate per day=150000/25=6000

Standard hours for actual production=4500×4=18000

(ii) Budgeted and Actual Information

Particulars	Budget	Actual
Fixed overheads for the month	150000	160000
Working days per month	25	24
Working hours per month	20000(100×8×25)	18000(750×24)
Production per month	5000(20000/4)	4500
Budgeted hours	19200(100×8×24)	--

Illustration-5

The following information is related to labour of Aditya Ltd. engaged in a week of November 2014 for Job –SH.

Particulars	skilled	Semi-skilled	Unskilled	Total
No of workers in standard gang	16	12	8	36
Standard rate per hour (₹)	60	30	10	-
No of workers in actual gang	-	-	-	-
Actual rate per hour	70	20	20	-

In a 40 hours week, the gang produced 1080 standard hours. The actual number of semi-skilled workers is two times of the actual number of unskilled workers. Total number of actual workers is same as standard gang. The rate variance of semi skilled workers is ₹ 6,400 (F).

You are required to find the following:

a. The actual number of workers/labours in each category.

b. Labour gang (mix) variance.

c. Labour sub-efficiency variance.

d. Labour rate variance.

e. Labour cost variance.

Solution

Rate variance of semi skilled workers=6400 (F)

Rate variance=(Standard Rate-Actual rate)Actual Hours

or 6400 =(30-20)

or Actual Hours=6400/10=640

No of semi skilled workers=640/40=16

No of unskilled workers=16/2=8

No of skilled workers=36-16-8=12

Analysis of Given Data

Particulars			Standard			Actual		
	No.	Hours	Rate	Amount	No	Hours	Rate	Amount
Skilled	16	640	60	38400	12	480	70	33600
Semi Skilled	12	480	30	14400	16	640	20	12800
Un skilled	8	320	10	3200	8	320	20	6400
				56000				52800

Computation of standard hours:

$$\text{Standard Hours} = \frac{\text{Standard hours for that worker}}{\text{Standard Hour for all the workers}} \times \text{Actual Quantity for that worker}$$

$$\text{For Skilled Workers – Standard Hours} = \frac{640}{1440} \times 1080 = 480$$

$$\text{For Semi Skilled Workers – Standard Hours} = \frac{480}{1440} \times 1080 = 360$$

For Skilled Workers – Standard Hours = $\frac{320}{1440} \times 1080 = 240$

Computation of Required Values

	SRSH (1) ₹	SRRSH (2) ₹	SRAH (3) ₹	ARAH (4) ₹
Skilled	480 × 60 = 28800	38400	480 × 60 = 28800	33600
Semi Skilled	360 × 30 = 10800	14400	640 × 30 = 19200	12800
Unskilled	240 × 10 = 2400	3200	320 × 10 = 3200	6400
	42000	56000	51200	52800

Where

1. SRSH=Standard Cost of Standard Labour=₹ 42,000
2. SRRSH=Revised Standard Cost of Labour=₹ 56,000
3. SRAH=Stnadard Cost of Actual Labour=₹ 51,200
4. ARAH=Actual Cost of Labour=₹ 52,800

Computation of Labour Variance:

1. Labour gang (mix) variance=(2)-(3)=[56000-51200]=₹ 4800 (F)
2. Labour sub-efficiency variance=(1)-(2)=[42000-56000]=₹ 14000(A)
3. Labour rate variance=(3)-(4)=[51200-52800]=₹ 1600 (A)
4. Labour cost variance=(1)-(4)=[42000-52800]=₹ 10,800 (A)

Illustration-6

The share of production and the cost based fair price computed separately for a common product for each of the four companies separately for a common product for each of the four companies in the same industry are as follows:

Company

Particulars	A	B	C	D
Share of production (40%)	40	25	20	15
Costs:				
Direct Materials (₹/Unit)	75	90	85	95
Direct Labour (₹/Unit)	50	60	70	80
Depreciation (₹/Unit)	150	100	80	50
Other Overheads (₹/Unit)	150	150	140	120
Total (₹/Unit)	425	400	375	345
Fair Price (₹/Unit)	740	615	550	460
Capital employed per unit:				
i. Net Fixed Assets (₹/Unit)	1500	1000	800	500
ii. Working Capital (₹/Unit)	70	75	75	75
Total (₹/Unit)	1570	1075	875	575

Required:

What should be the uniform price that should be fixed for the common product?

Solution:

Total production percentage for all companies is 40+25+20+15=100.

Let us assume that total production be 100 units.

Particulars	Company A	Company B	Company C	Company D
Sales value	$740\times 40 = 29600$	$615\times 25 = 15375$	$550\times 20 = 11000$	$460\times 15 = 6900$
Total cost	$425\times 40 = 17000$	$400\times 25 = 10000$	$375\times 20 = 7500$	$345\times 15 = 5175$
Profit (Fair price cost)	$315\times 40 = 12600$	$215\times 25 = 5375$	$175\times 20 = 3500$	$115\times 15 = 1725$
Return on capital employed	$\frac{315}{1570}\times 100 = 20.06\%$	$\frac{215}{1075}\times 100 = 20\%$	$\frac{175}{875}\times 100 = 20\%$	$\frac{115}{575}\times 100 = 20\%$

Total sales value=29600+15375+11000+6900=₹62,875

Uniform price for Industry=62875/100=₹628.75

Illustration-7

The share of total production and the cost based fair price computed separately for each of the four units in industry are as follows:

units	A	B	C	D
Share of production	**40**	**25**	**20**	**15**
Direct Materials	**300**	**360**	**340**	**380**
Direct Labour	**200**	**240**	**280**	**320**
Depreciation	**600**	**400**	**320**	**200**
Other Overheads	**600**	**600**	**560**	**480**
Total	**1700**	**1600**	**1500**	**1380**
20% Return on Capital Employed	**1260**	**860**	**700**	**460**
Fair Price (₹/Unit)	**2960**	**2460**	**2200**	**1840**
Capital employed per unit:				
iii. Net Fixed Assets (₹/Unit)	**6000**	**4000**	**3200**	**2000**
iv. Working Capital (₹/Unit)	**300**	**300**	**300**	**300**
Total (₹/Unit)	**6300**	**4300**	**3500**	**2300**

Required:

What should be the uniform price fixed for the product of the industry?

Solution:

Computation of Uniform Price:

Weighted Average Cost = [1700×40%]+[1600×25%]+[1500×20%]=[1380×15%]

= 680+400+300+207=₹ 1587

Weighted Average Return on Capital Employed (profit) =[1260×40%]+[860×25%]+[700×20%]+[460×15%]

=504+215+140+69 = ₹ 928

Uniform Price = 1587+928 = ₹ 2515.

Study Note – 5

LEARNING CURVE

1. Choose the correct alternative.

(i) Which of the following factors does not affect Learning Curve

a. Method of production
b. Labour strike
c. Shut down
d. Efficiency rate

(ii) Which of the following is not a reason to use the concept of Learning Curve?

a. Labour efficiency
b. Introducing new technology
c. Value chain effect
d. Standardization, specialization, and methods improvements

(iii) Learning curve theory is not applicable to

a. Direct labour
b. Material
c. Spoilage and defective works
d. Overhead

Solution: (i) c; (ii) b; (iii) d.

2. State true or false.

(i) Learning curve passes through three stages.
(ii) Learning curve suggests great opportunities for cost reduction.
(iii) Application of learning curve concept pre-requisites uninterrupted flow of work.
(iv) Learning curve effects make the value chain inefficient.
(v) The more experience a firm has in producing a particular product, the higher is its costs.

Solution: i. True; ii. True; iii. True; iv. False; v. False.

3. Write short note on: Learning Curve

Solution:

Learning Curve Theory is concerned with the idea that when a new job, process or activity commences for the first time it is likely that the workforce involved will not achieve maximum efficiency immediately. Repetition of the task is likely to make the people more confident and knowledgeable and will eventually result in a more efficient and rapid operation. Eventually the learning process will stop after continually repeating the job. As a consequence the time to complete a task will initially decline and then stabilize once efficient working is achieved. The cumulative average time per unit is assumed to decrease by a constant percentage every time

that output doubles. The pictorial presentation of this decline in the average time per unit with cumulative production is called Learning Curve.

An individual acquires skill, knowledge and ability through experience. As a result the performance of a worker improves and he takes less time per unit of activity. In other words, his productivity improves. This improvement in productivity of a worker is due to learning effect.

4. Write a short note on: Experience Curve

Solution:

The experience curve is an idea developed by the Boston Consulting Group (BCG) in the mid-1960s. Working with a leading manufacturer of semiconductors, the consultants noticed that the company's unit cost of manufacturing fell by about 25% for each doubling of the volume that it produced. This relationship they called the experience curve: the more experience a firm has in producing a particular product, the lower are its costs. There is no fundamental economic law that can predict the existence of the experience curve, even though it has been shown to apply to industries across the board. Its truth has been proven inductively, not deductively. The logical consequence of experience curve is that the experienced firms having large market share will have cost advantage over the other competitors. However, this is not true always.

Different products provided different opportunities to gain experience. Large products (such as nuclear reactors) are inherently bound to be produced in smaller volumes than small products (such as semiconductors). It is not easy for a firm to double the volume of production of something that it takes over five years to build, and whose total market may never be more than a few hundred units. Hence it is almost impossible to have the experience curve effect in those products. Moreover, use of technology may allow, even a new entrant, to gain considerable cost advantage.

5. Discuss the limitations of Learning Curve Theory.

Solution:

The following points limiting the usefulness of learning curves should be noted:-

1. The learning curve is useful only for new operations where machines do not constitute a major part of the production process. It is not applicable to all productions, e.g. new and experienced workmen.
2. The learning curve assumes that the production will continue without any major interruptions. If for any reason the work in interrupted, the curve may be deflected or assume a new slopes
3. Changes other than learning may effect the learning curve. For example, improvement in facilities, arrangements, and equipment as well as personnel morale and performance may be factors influencing the curve. On the other hand, negative developments in employee attitudes may also affect the curve and reverse or retard the progress of improvement.
4. The characteristic 80 percent learning curve as originally obtaining in the air force industry in U.S. A. has been usually accepted as the percentage applicable to all industries. Studies show that there cannot be a unique percentage which can be universally applied.

Study Note – 6

INTRODUCTION TO FINANCIAL MANAGEMENT

Part - B

Section - III

1. Answer the following questions:

(a) Choose the correct answer from the given four alternatives. [1x6=6]

(1) Profit Maximization is the main objective of business because:
- **(a) Profit acts as a measure of efficiency and**
- **(b) It serves as a protection against risk.**
- **(c) Both**
- **(d) none**

(2) Stock holder's wealth = _____
- **(a) No. of shares owned x Current stock price per share**
- **(b) No. of shares owned x Current stock price per share**
- **(c) No. of shares owned x Current stock price per share**
- **(d) none**

(3) Working Capital Management refers to a Trade-off between _____and Profitability.
- **(a) Liquidity**
- **(b) Risk**
- **(c) Both of the above**
- **(d) None of the above**

(4) Which one of the following is a medium term source?
- **(a) Public Deposits**
- **(b) Lease Financing**
- **(c) Euro Debt Issue**
- **(d) All of the above**

(5) The lease period in such a contract is less than the useful life of asset. Here we are talking about _____.
- **(a) Operating or Service Lease**
- **(b) Service Lease**
- **(c) Financial Lease**
- **(d) None of the above**

(6) Which one is the Benefit(s) of Factoring?

(a) Better Cash Flows

(b) Better Assets Management

(c) Better Working Capital Management

(d) All of the above

(7) Find the present value of ₹ 1,000 receivable 6 years hence if the rate of discount is 10 percent.

(a) 564.5

(b) 554.5

(c) 574.5

(d) 600

(8) The term _____means manipulation of accounts in a way so as to conceal vital facts and present the financial statements in a way to show a better position than what it actually is.

(a) window dressing

(b) creative accounting

(c) window accounting

(d) modified accounting

(9) Collateralized borrowing and lending obligation (CBLO) is a discounted instrument available in electronic book entry for the maturity period ranging from _____.

(a) 1 day to 19 days

(b) 1 day to 15 days

(c) 1 day to 30 days

(d) None of the above

(10) IPO refers to _____; the first time a company comes to public to raise money.

(a) Immediate Public Offer

(b) Immediate Public Offering

(c) Initial Public Offer

(d) Initial Public Offering

(11) SPO refers to _____, the second and subsequent time a company raises money from the public directly.

(a) Second Public Offering

(b) Subsequent Public Offering

(c) Subsequent Public Offer

(d) Seasonal Public Offering

(12) Liquid Liability = Current Liability – Bank Overdraft – _____

(a) Cash Credit

(b) Trade Credit

(c) Both of the above

(d) None of the above

Ans: 1-c; 2-a; 3-c; 4-d; 5-a; 6-d; 7-a; 8-a; 9-a; 10-d; 11-d; 12-a.

(b) Match the statement in Column I with the most appropriate statement in column II:

Column I	Column II
1. It represents the ownership interest in the company.	**a. Debenture**
2. is also owner's capital but has a maturity period.	**b. Venture Capital**
3. issued keeping in view the need and cash flow profile of the company as well as the investor.	**c. Equity Share Capital**
4. is a form of equity financing especially designed for funding high risk and high reward projects.	**d. Preference Share Capital**

Ans: 1-c; 2-d; 3-a; 4-b

(c) State whether the following statements are True or False [1x4=4]

1. **There is a conflict between profitability and liquidity of a firm.**
2. **The Finance Manager has to bring a trade-off between risk and return by maintaining a proper balance between debt capital and equity share capital.**
3. **The earlier objective of profit maximization is now replaced by wealth maximization.**
4. **The modern approach to the Financial Management is concerned with only the solution of a problem - financing of a business enterprise.**
5. **The investment decision is concerned with the selection of assets.**
6. **One of the most important functions of the Finance Manager is to ensure availability of adequate financing.**

Ans.: 1-T; 2-T; 3-T; 4-F; 5-T; 6-T

Section IV

Short note on

(a) Time Value of Money

Time value of money refers to the value of one unit of money in different time periods. In other words, the value of the money which is changed with the change in time is called Time Value of Money. If an individual is offered an alternative either to accept ₹ 1000 at present or one year later, he would prefer ₹ 1000 at present. The basic reason of his choice of receiving ₹ 1000 at present is the time value of money which means the value of the money is changed with the change in time. For this change of value, one rupee of today is more valuable than one rupee of tomorrow, because of the following reasons;

(a) Investment opportunities
(b) Uncertainty
(c) Inflation

The present value of certain sum of money is more valuable than future value of the same amount. In other words, the future value of certain sum of money is less than the present value of the same amount.

Time value of money refers to the value of one unit of money in different time periods. In other words, the value of the money which is changed with the present changing of times, is called time Value of Money. The significance of time value of money is mentioned below:

(a) Existence of interest
(b) Decision-making
(c) Invention of compounding and discounting techniques
(d) Making productive to the capital
(e) Time preference for money

(b) Wealth Maximization

Wealth maximization is a modern approach of the financial management where we consider the concept of time value of money. According to this criterion, the financial activities of a firm are conducted in such a way so that the net wealth of the firm is maximum. Wealth Maximization is considered as the appropriate objective of an enterprise. When the firms maximizes the stock holder's wealth, the individual stockholder can use this wealth to maximize his individual utility. Wealth Maximization is the single substitute for a stock holder's utility.

The wealth maximization criterion is more acceptable in case of taking investment decisions in financial management because (1) In wealth maximization criterion, wealth refers to the net present value. So wealth maximization refers to the maximization of net present value of a project. (2) It is considered in wealth maximization criterion as income streams of the entire life of a project are discounted is such a case. (3) Under this approach, the aspects of risk and uncertainty are considered.

A Stock holder's wealth may be calculated by the following way:
Stock holder's wealth = No. of shares owned x Current stock price per share Higher the stock price per share, the greater will be the stock holder's wealth.

(c) Hire Purchase System

Hire Purchase System is a special system of purchase and sale. When goods are purchased on hire-purchase system, purchaser pays the price in instalments. These installments may be Monthly, Quarterly or Yearly. Goods are delivered to the purchaser at the time of Hire Purchase Agreement but purchaser will become the owner of goods only on the payment of last installment. All the installments paid are treated as hire charges till the last installment is paid off.

"Under the Hire-purchase system, goods are delivered to a person who agrees to pay the owner by equal periodical installments, such installments are to be treated as hire of these goods until a certain fixed amount has been paid, when these goods become the property of the hire." However, **Some of the characteristics of Hire Purchase System are mentioned below:**

1. Goods are delivered by the seller to the buyer.
2. Buyer agrees to pay hire purchase price (i.e., cash price + interest) in
3. Installments paid are treated as hire charges till the payment of the last installment.
4. After the payment of the last installment, ownership is transferred in the name of the buyer.
5. In the case of default, in the payment by the buyer, the seller has got a right to repossess the goods, as ownership lies with the seller, till the payment of last installment.

Study Note – 7

TOOLS FOR FINANCIAL ANALYSIS AND PLANNING

Section-III

Answer the following questions:

(a) Choose the correct answer from the given four alternatives.

(1) Ratio analysis is the process of determining and interpreting numerical relationships based on _____.
- **(a) Financial values**
- **(b) Financial statements**
- **(c) Financial numerical information**
- **(d) All of the above**

(2) Ratio analysis is based on _____ measure.
- **(a) relative**
- **(b) absolute**
- **(c) Both of the above**
- **(d) None of the above**

(3) The persons interested in the analysis of financial statements can be grouped as _____.
- **(a) Owners or investors**
- **(b) Creditors**
- **(c) Financial executives**
- **(d) All of the above**

(4) The term 'Operating Profit' means profit before _____.
- **(a) interest**
- **(b) tax**
- **(c) interest and tax**
- **(d) interest or tax**

(5) Debt- equity Ratio is an example of _____.
- **(a) Short term solvency Ratio**
- **(b) Long term solvency Ratio**
- **(c) Profitability Ratio**
- **(d) None of the above**

(6) In Cash Flow Statement, Cash includes_____.
- **(a) cash on hand**
- **(b) demand deposits with banks**
- **(c) cash on hand and demand deposits with banks**
- **(d) cash on hand or demand deposits with banks**

(7) The treatment of interest and dividends received and paid depends upon the nature of the enterprise. For this purpose, the enterprises are classified as _____.

(a) (i) Financial enterprises, and (ii) Operating enterprises.

(b) (i) Financial enterprises, and (ii) Other enterprises.

(c) (i) Financial enterprises, and (ii) Non-Financial enterprises.

(d) (i) Trading enterprises, and (ii) Non - Trading enterprises.

(8) Cash Flow Statement is _____ for Income Statement or Funds Flow Statement.

(a) not a substitute

(b) a substitute

(c) depends on situation

(d) None of the above

(9) Funds Flow Statement reveals the change in _____ between two Balance Sheet dates.

(a) Working capital

(b) Internal capital

(c) Share capital

(d) Both (a) & (c)

Ans: 1-d; 2-a; 3-d; 4-c; 5-b; 6-c; 7-b; 8-a; 9-a.

(b) Match the statement in Column I with the most appropriate statement in column II:

Column I	Column II
1. This ratio is the most rigorous test of a firm's liquidity position. In case the ratio is '1'; it means the firm can meet its current liabilities any time.	**a. Defensive Interval Ratio**
2. The ratio indicates the number of times the fixed financial charges are covered by income before interest and tax.	**b. Proprietary Ratio**
3. This ratio denotes the liquidity of a firm in relation to its ability to meet projected daily expenditure from operations.	**c. Super-quick Ratio**
4. The ratio focuses attention on the general financial strength of the business enterprise.	**d. Fixed Charges Cover Ratio**

Ans: 1-c; 2-d; 3-a; 4-b

(c) State whether the following statements are True or False

1) Funds Flow Statement is a substitute of Income Statement or a Balance Sheet.

2) Unrealised gains and losses arising from changes in foreign exchange rates are not cash flows.

3) A high proprietary ratio will indicate a relatively little danger to the creditors or vise-versa in the event of forced reorganization or winding up of the company.

4) Cash equivalents include purely short term and highly liquid investments which are readily convertible into cash and which are subject to an insignificant risk of changes in value.

5) An example of cash flows arising from investing activities is Cash proceeds from issuing shares.

6) Debtors Turnover Ratio or Debt Collection Period Ratio measures the quantity of debtors since it indicates the speed with which money is collected from the debtor.

7) Decrease in working capital is a source of fund.

8) According to Accounting Standard - 3 (Revised) an enterprise should prepare a Cash Flow Statement and should present it for each period with financial statements prepared.

Answer: 1-F; 2-T; 3-T; 4-T; 5-F; 6-F; 7-T; 8-T

Section IV

7. (a) With the help of the following information complete the Balance sheet of National Ltd.

Equity share capital	**₹ 1,00,000**
The relevant ratios of the company are as follows:	
Current debt to total debt	**0.40**
Total debt to owner's equity	**0.60**
Fixed assets to owner's equity	**0.60**
Total assets turnover	**2 times**
Inventory turnover	**8 times**

Solution:

National Ltd.
Balance Sheet

Liabilities	₹	Assets	₹
Owner equity	1,00,000	Fixed assets	60,000
Current debt	24,000	Cash	60,000
Long term debt	36,000	Inventory	40,000
Total	1,60,000	Total	1,60,000

Working Note:

1. Total debt = 0.60 * Owners equity = 0.60 * ₹ 1,00,000 = ₹ 60,000
   Current debt to total debt = 0.40, hence Current debt = 0.40 * ₹ 60,000
2. Fixed assets = 0.60 * Owners equity = 0.60 * ₹ 1,00,000 = ₹ 60,000
3. Total equity = Total debt + Owners equity = ₹ 60,000 + ₹ 1,00,000 = ₹ 1,60,000
4. Total assets consisting of fixed assets and current assets must be equal to ₹ 1,60,000 (Assets = Liabilities + Owners equity). Since fixed assets are ₹ 60,000 hence, current assets should be ₹ 1,00,000
5. Total assets to turnover = 2 times : inventory turnover = 8 times

Hence, Inventory / Total assets = 2/8 = 1/4, Total assets = ₹ 1,60,000
Therefore, Inventory = ₹ 1,60,000/4 = ₹ 40,000 Balance on Asset side
Cash = ₹ (1,00,000 – 40,000) = ₹ 60,000

(b) From the information given below calculate the amount of Fixed assets and Proprietor's fund.

Ratio of fixed assets to proprietors fund	**= 0.75**
Net working capital	**= ₹ 6,00,000**

Solution:

Calculation of Fixed Assets and Proprietor's Fund

Since Ratio of Fixed Assets to Proprietor's Fund	= 0.75
Therefore, Fixed Assets	= 0.75 Proprietor's Fund
Net working capital	= 0.25 Proprietor's Fund
₹ 6,00,000	= 0.25 Proprietor's Fund
Therefore, Proprietor's Fund	$= \frac{₹6,00,000}{0.25} = ₹ 24,00,000$
Since, Fixed Assets	= 0.75 Proprietor's Fund
Therefore, Fixed Assets	= 0.75 * ₹ 24,000 = ₹ 18,00,000

8. The balance Sheet of BP & Sons Limited as on 31st March, 2016 and 31st March, 2017 are given below:

Balance Sheet as on 1.03.2016 & 31.03.2017

(₹ 000)

Liabilities	31.03.16	31.03.17	Assets	31.03.16	31.03.17
Share capital	1,440	1,920	Fixed assets	3,840	4,560
Capital reserve	-	48	Less: Depreciation	1,104	1,392
General reserve	816	960		2,736	3,168
Profit and loss Account	288	360	Investment	480	384
9% Debenture	960	672	Cash	210	312
Current liabilities	576	624	Other current assets	1,134	1,272
Proposed dividend	144	174	(including stock)		
Provision for Tax	432	408	Preliminary expenses	96	48
Unpaid dividend	-	18			
Total	4,656	5,184	Total	4,656	5,184

Additional Information:

1. **During the year 2016 – 2017, Fixed assets with a book value of ₹ 2,40,000 (accumulated depreciation ₹ 84,000) was sold for ₹1,20,000**
2. **Provided ₹ 4,20,000 as depreciation.**
3. **Some investments are sold at a profit of ₹ 48,000 and profit was credited to Capital reserve.**
4. **It decided that stocks be valued at cost, whereas previously the practice was to value stock at cost less 10 per cent. The stock was ₹ 2,59,200 as on 31.03.2016. the stock as on 31.03.2017 was correctly valued at ₹ 3,60,000**
5. **It decided to write off Fixed Assets costing ₹ 60,000 on which depreciation amounting to ₹ 48,000 has been provided.**
6. **Debentures are redeemed at ₹ 105**

You are required to prepare a Cash flow statement.

Solution:

Cash Flow Statement (as on 31st March, 2017)

(A) Cash flows from Operating Activities

Particulars	Amount (₹)	Amount (₹)
Profit and Loss Account		43,200
{3,60,000 – (2,88,000 + 28,800)}		
Adjustments:		
Increase in General reserve		
Depreciation		
Provision for tax		
Loss on sale of machine	1,44,000	
Premium on Redemption of debenture	4,20,000	
Proposed dividend	4,08,000	
Preliminary Exp: w/o	36,000	
Fixed assets w/o	14,400	12,56,400
Fund from Operation	1,74,000	**12,99,600**
Increase in Sundry Current Liabilities	48,000	48,000
Increase in Current Assets {12,72,000 – (11,34,000 + 28,800)}	12,000	(1,09,200)
Cash before tax		**12,38,400**
Tax paid		4,32,000
Cash from Operation Activities		**8,06,400**

(B) Cash from investing Activities

Purchases of fixed assets	(10,20,000)	
Sale of investment	1,44,000	
Sale of fixed assets	1,20,000	**(7,56,000)**

(C) Cash from Financing Activities

Issue of Share capital	4,80,000	
Redemption of debenture	(3,02,000)	
Dividend paid	(1,26,000)	**51,600**
Net increase in cash and cash equivalents		1,02,000
Opening cash and cash equivalent		2,10 000
Closing cash		**3,12,000**

Working Notes:

Fixed Assets Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Balance b/d	27,36,000	By Cash	1,20,000
To Purchases (b/f)	10,20,000	By Loss on Sale	36,000
		By Depreciation	4,20,000
		By Assets w/o	12,000
		By Balance c/d	31,68,000
	37,56,000		**37,56,000**

Depreciation Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Fixed Assets (on sales)	84,000	By Balance b/d	11,04,000
To Fixed Assets w/o	48,000	By Profit and Loss a/c	4,20,000
To Balance c/d	13,92,000		
	15,24,000		**15,24,000**

9. The following is the Balance Sheet of SD Limited as on 31st March 2016 and 31st March, 2017.

Particulars	Amount (₹) 31st March 2016	Amount (₹) 31st March, 2017
Share capital	**44,00,000**	**66,00,000**
Reserves and Surplus	**27,50,000**	**38,50,000**
Depreciation	**8,80,000**	**13,20,000**
Bank loan	**17,60,000**	**8,80,000**
Sundry Creditors	**13,20,000**	**14,85,000**
Proposed dividend	**4,00,000**	**6,00,000**
Provision for taxation	**4,00,000**	**5,50,000**
	1,19,10,000	**1,52,85,000**
Assets		
Land	**33,00,000**	**44,00,000**
Plant and Machinery	**50,60,000**	**69,30,000**
Inventories	**19,80,000**	**22,00,000**
Sundry debtors	**11,00,000**	**17,05,000**
Cash and Bank balances	**4,70,000**	**50,000**
	1,19,10,000	**1,52,85,000**

Additional Information:

1. **The machine which was purchased earlier for ₹ 6,00,000 was sold during the financial year 2016 – 2017 for ₹ 40,000. The book value of the machine was ₹ 60,000. A new machine was purchased during the financial year.**
2. **The company had issued new shares to the extent of ₹ 22,00,000**

You are required to prepare:

(i) Statement showing changes in the Working capital

(ii) Statement of sources and application of funds.

Solution:

Statement showing changes in Working Capital

Particulars	Amount (₹) 31st March, 2016	Amount (₹) 31st March, 2017	Increase	Decrease
Current assets				
Inventories	19,80,000	2,20,000	2,20,000	-
Sundry debtors	11,00,000	17,05,000	6,05,000	-
Cash and Bank balances	4,70,000	50,000	-	4,20,000
	35,50,000	**39,55,000**		
Current liabilities				
Sundry creditors	13,20,000	14,85,000	-	1,65,000
Provision for Taxation	4,00,000	5,50,000	-	1,50,000
	17,20,000	**20,35,000**		
Working capital	18,30,000	19,20,000		
Net increase in Working capital	90,000	-	-	-
	19,20,000	**19,20,000**	**8,25,000**	**8,25,000**

Sources and Application of Funds

Sources	Amount (₹)	Application	Amount (₹)
Issue of Shares	22,00,000	Payment of dividend	4,00,000
Funds from operation	27,00,000	Bank loan repaid	8,80,000
Sale of Machinery	40,000	Purchase of land	11,00,000
		Purchase of Machinery	24,70,000
		Net increase in Working capital	90,000
	49,40,000		**49,40,000**

Working Notes:

Reserves and Surplus Account

Particulars	Amount (₹) Dr.	Particulars	Amount (₹) Cr.
To Depreciation	9,80,000	By Balance b/f	27,50,000
To Proposed Dividend	6,00,000	By Profit & loss a/c	27,00,000
To Loss on Sale of Machinery	20,000		
To Balance c/d	38,50,000		
	54,50,000		**54,50,000**

Provision for Depreciation Account

Particulars	Amount (₹) Dr.	Particulars	Amount (₹) Cr.
To Machinery a/c	5,40,000	By balance b/f	8,80,000
To Balance c/d	13,20,000	By Profit & loss a/c	9,80,000
	18,60,000		**18,60,000**

Machinery Account

Particulars	Amount (₹) Dr.	Particulars	Amount (₹) Cr.
To Balance b/f	50,60,000	By Depreciation a/c	5,40,000
To Bank	24,70,000	By Cash	40,000
		By Loss on sale of Machinery	20,000
		By Balance c/d	69,30,000
	75,30,000		**75,30,000**

10. Write a short note.

Significance of funds flow statement

Funds Flow Statement is a statement by which we study changes in the financial position of a business enterprise between beginning and ending financial statements dates. It is a statement showing sources and uses of funds for a period of time. Funds flow statement is called by various names such as Sources and Application of Funds; Statement of Changes in Financial Position; Sources and Uses of Funds; Summary of Financial Operations: Where came in and Where gone out Statement; Funds Generated and Expended Statement; Sources of Increase and Application of Decrease; Funds Statement, etc.

There is a lot of significance of preparing fund flow statement. A funds flow statement is an essential tool for the financial analysis and is of primary importance to the financial management. Now-a-days, it is being widely used by the financial analysts, credit granting institutions and financial managers. The basic purpose of a funds flow statement is to reveal the changes in the working capital on the two balance sheet dates. It also describes the sources from which additional working capital has been financed and the uses to which working capital has been applied.

Such a statement is particularly useful in assessing the growth of the firm, its resulting financial needs and in determining the best way of financing these needs. By making use of projected funds flow statements, the management can come to know the adequacy or inadequacy of working capital even in advance. It is also useful in the intermediate and long-term financing of the firm, repayment of long-term debts, expansion of the business, allocation of resources, etc.

Study Note – 8

WORKING CAPITAL MANAGEMENT

MCQ Type Questions:

1. **A firm following an aggressive working capital strategy would:**
   a. **Hold substantial amount of fixed assets.**
   b. **Minimize the amount of short term borrowing.**
   c. **Finance fluctuating assets with long term financing.**
   d. **Minimize the amount of fund in very liquid assets.**

2. **Which of the following would be consistent with a conservative approach to financing working capital?**
   a. **Financing short-term needs with short-term funds.**
   b. **Financing short-term needs with long-term debt.**
   c. **Financing seasonal needs with short-term funds.**
   d. **Financing some long-term needs with short-term fund**

3. **To financial analysts, "net working capital" means the same thing as _____.**
   a. **total assets**
   b. **fixed assets**
   c. **current assets**
   d. **current assets minus current liabilities.**

4. **Baumol's Model of Cash Management attempts to:**
   a. **Minimise the holding cost**
   b. **Minimization of transaction cost**
   c. **Minimization of total cost**
   d. **Minimization of cash balance**

5. **Which of the following is not considered by Miller-Orr Model?**
   a. **Variability in cash requirement**
   b. **Cost of transaction**
   c. **Holding cost**
   d. **Total annual requirement of cash.**

Answer: 1-d; 2-b; 3-d; 4-c; 5-d.

Theoretical /Descriptive Questions:

1. Briefly explain the 'Hedging Approach' to financing working capital requirements of a firm.

The hedging approach is also known as the matching approach. With this approach, short term or seasonal variation in current assets would be financed with short term debt; the permanent component of current assets and all fixes assets would be met with long term debt. The basic objective of this method of financing is that the permanent component of current assets, and fixed assets would be met with long term funds and the short term or seasonal variations in current be financed with short term debt. For example, machine with a useful life of 5 years should be financed through a 5-year loan. Building can be financed by 25-year mortgage bond. Assets having useful life of 30 days may be financed with a 30-day borrowing.

The justification of the matching policy is that since the purpose of financing is to invest in an asset, the liability should be liquidated when the life of the asset expires. Use of long term sources for financing short term assets will be costly as the funds will remain idle after the expiry of assets lives. Similarly, financing long term assets with short term sources inconvenient and costly as they are to be renewed on a continuous basis upto the lives of the assets concerned.

2. Explain the concept of 'Zero Working Capital Strategy'.

Zero working capital is a situation in which there is no excess of current assets over current liabilities to be funded. The concept is used to drive down the level of investment required to operate a business, which can also increase the return on investment for shareholders. Management prefers low levels of working capital since working capital earns an extremely low rate of return. Some companies are now driving working capital to record low levels, so called zero working capital. There are two requirements to implement zero working capital i.e. (a) demand based production where demand based organizations do everything only as they are demanded: fill customer orders, receive supplies, manufacture products and other functions are done only as needed. (b) Receivable and payable terms under which credit is granted to customers must be curtailed, while payment terms to suppliers must be extended. Ideally, cash should be received from customers before it is due for payment to suppliers. This essentially means that customer payments are directly funding the payments to suppliers. Zero working capital would call for a fine balancing act in Financial Management, and the success in this endeavour would get reflected in healthier bottom lines.

3. The lockbox system

It is a simple method used in reducing collection float and accelerating firm's collections or remittances. When a firm adopts the lockbox system, it takes a post office box in its name, called lockbox, and requests its customers to mail their payments to these lockboxes. These lockboxes are attended by local collection banks or local branch or depot personnel one or more times every day (if possible even on holidays). These cheques are deposited directly into the local bank account of the firm. If it is through the local bank, then the company authorizes its bank to collect its sale receipts from the lockboxes.

The bank then sends particulars of cheques along with letters or other accompanying materials to the firm for information. After the cheques are realized, surplus funds from the local banks are transferred (usually by wire) to the central account or accounts of the firm. Thus, the lockbox system helps to reduce the mailing time, because cheques are received at a nearby post office instead of at corporate headquarters, and deposited and cleared locally. It also helps in reducing the processing time as the deposits are made by the local bank. Hence, firm saves on its time and efforts for processing the mails and reduces the availability delay as the firm encourages its customers to draw the cheque on local banks.

4. Baumol's Cash Management Model

According to this model optimum cash level is that level of cash where the carrying costs and transactions costs are the minimum. The carrying costs refer to the cost of holding cash, namely, the interest foregone on marketable securities. The transaction costs refer to the cost involved in getting the marketable securities converted into cash. This happens when the firm falls short of cash and has to sell the securities resulting in clerical, brokerage, registration and other costs.

The optimum cash balance according to this model will be that point where these two costs are minimum. The Baumol's model finds a correct balance by combining holding cost and transaction costs, so as to minimize the

The formula for determining optimum cash balance is

$$C = \sqrt{\frac{2A \times F}{0}}$$

Where
C = Optimum cash balance
A = Annual (or monthly) cash disbursement
F = Fixed cost per transaction
O = Opportunity cost of one rupee per annum (or per month)

5. Stochastic models or Miller-Orr Cash Management Model

The Miller and Orr Model (MO) model overcomes the demerits of the Baumol model. This model assumes that the net cash flows are normally distributed with a zero value of mean and standard deviation. In other words, the MO model extended the existing Baumol model and stated that cash balances take too erratic pattern of distribution over a time period. However, over long periods, they tend to show normal distribution. The MO model basically states that there are two control limits:

1. **The upper control limit**: This states the upper limit for cash balance. If at any time the cash balance exceeds this limit, then extra cash is transferred to marketable securities and investments.
2. **The lower control limit along with the return point**: This states the lower limit for cash balance. If at any time the cash balance exceeds this limit, the investments are liquidated and liquidity of the firm is enhanced.

Thus when the cash flows of the firm deviate randomly, they hit the upper limit. At this point, the firm purchases adequate amount of marketable securities, which helps the firm to reduce its free cash and thus return to a normal level of cash balance (return point). In the same way, when the firm's cash flows deviate lower and hit the lower limit, the firm liquidates its investments (marketable securities) so that its cash balance returns to the normal level (return point).

Assumptions

The basic assumptions of the model are:

- The major assumption with this model is that there is no underlying trend in cash balance over time.
- The optimal values of 'h' (upper limit) and 'z' (return point) depend not only on opportunity costs, but also on the degree of like fluctuation in cash balances.

Limitations

The model is having the following limitations:

- The first and important problem is in respect of collection of accurate data about transfer costs, holding costs number of transfers and expected average cash balance.
- The model does not take into account the cost of time devoted by financial managers in dealing with the transfers of cash to securities and vice-versa.
- The model does not take into account the short-term borrowings as an alternative to selling of marketable securities when cash balance reaches lower limit.

The spread between the upper and lower cash balance limits can be computed using Miller and Orr Model as follow:

$$Z = 3\left(\frac{3}{4} \times \frac{\text{Transaction Cost} \times \text{Variance of Cash Flows}}{\text{Interest Rate}}\right)^{\frac{1}{3}}$$

$$\text{Return Point} = \text{Lower Limit} + \frac{Z\,(\text{Spread})}{3}$$

$$\text{Variance of Cash Flows} = (\text{Standard Deviation})^2$$

Practical Questions:

Illustration-1

The information given below is available for a given firm which wants to adopt a lockbox system. Suggest the feasibility of adopting the lockbox system by the firm.

Average number of daily payments to lockbox	**200**
Average size of payments	**₹ 1,000**
Rate of interest per day	**0.02%**
Saving in mail time	**1 day**
Saving in processing time	**1 day**
Processing charge per cheque	**₹ 0.3**

Solution:

The lockbox system will increase the collected balance for the firm by -
[200 payments/day × ₹ 1,000 per payment × (1 + 1) days saved] = ₹ 4,00,000
Now, this ₹ 4,00,000 can be invested @ 0.02% per day.

₹ 4,00,000 invested at 0.02 per cent per day will give rise to a daily return of 0.02% × 4,00,000 = ₹ 80 per day
The bank charges ₹ 0.3 per cheque for processing the cheques under the lockbox scheme. Then the cost of adopting lockbox system = 0.3 × 200 = ₹ 60 per day. The firm earns a profit of ₹ 80 – ₹ 60 = ₹ 20 per day.
The firm earns a profit of ₹ 80 – ₹ 60 = ₹ 20 per day.

Since the opportunity cost of the present system is ₹ 80, which exceeds the per annum cost of the lockbox system ₹ 60, the system should be adopted.

Illustration – 2

ABC Ltd. has an estimated cash payments of ₹ 8,00,000 for a one month period and the payments are expected to steady over the period. The fixed cost per transaction is ₹ 250 and the interest rate on marketable securities is 12% p.a. Calculate the optimum transaction size.

Solution

The optimum transaction size will be calculated as under:

$$C = \sqrt{\frac{2AF}{0}}$$

Where,
A= Estimate monthly cash payment i.e. ₹ 8,00,000
F = Cost per transaction i.e. ₹ 250
O = Interest per annum i.e. 12%p.a.(For one month, the rate of interest is 1% or 0.01)

Optimum Cash Balance	$= \sqrt{\frac{2 \times 250 \times 8,00,000}{0.01}}$	=₹ 2,00,000
Optimum transaction size	= 2,00,000	
Average Cash Balance	= ₹ 2,00,000/2	=₹ 1,00,000
Number of Transactions	= ₹ 8,00,000/₹ 2,00,000	=4 transactions

Illustration – 3

Lower control limit set	**₹ 1,000**
Interest rate per day	**0.025%**
Standard deviation of daily cash flows (variance of ₹ 2,50,000)	**₹ 500**
Switching costs per transaction	**₹ 20**

Solution:

$$\text{Sparead} = 3\left(\frac{3}{4}\times\frac{\text{Transaction Cost}\times\text{Variance of Cash Flows}}{\text{Interest Rate}}\right)^{\frac{1}{3}} = 3\left(\frac{\frac{3}{4}\times 20\times 2,50,000}{0.00025}\right)^{\frac{1}{3}} = ₹\ 7,400$$

Upper Limit = Spread + Lower Limit =7,400+1,000=8,400

Return Point = Lower Limit+(1/3x Spread) =1,000+(1/3x7,400) =1,000+2,467 = ₹ 3,467

Illustration – 4

A company is presently having credit sales of ₹ 12 lakh. The existing credit terms are 1/10, net 45 days and average collection period is 30 days. The current bad debts loss is 1.5%. In order to accelerate the collection process further as also to increase sales, the company is contemplating liberalisation of its existing credit terms to 2/10, net 45 days. It is expected that sales are likely to increase 1/3 of existing sales, bad debts increase to 2% of sales and average collection period to decline to20 days. The contribution to sales ratio of the company is 22% and opportunity cost of investment in receivables is 15% per cent (pre tax). 50 per cent and 80 Per cent of customers in term of sales revenue are expected to avail cash discount under existing and liberalisation scheme respectively. The tax rate is 30%.

Should the company change its credit terms? (Assume 360 days in a year).

Solution:

Evaluation of Credit Policy

Working Notes:

i. Computation of Cash Discount

Cash Discount = Total credit sales x % of customers who take up discount x rate

Present Policy = $\frac{12,00,000\times 50\times 0.01}{100}$ = ₹ 6,000

Proposed Policy = 16,00,000 x 0.08 x 0.02 = ₹ 25,600

ii. Opportunity Cost of Investment in Receivables

Present Policy = 9,36,000 x (30/360) x (70% of 15)/100 = 78,000 x 10.5/100 = ₹ 7,280

Statement showing Evaluation of Credit Policies

Particulars	Present Policy	Proposed Policy
Credit Sales	12,00,000	16,00,000
Variable Cost @78% of sales	9,36,000	12,48,000
Bad Debts @1.5% and 2%	18,000	32,000
Cash Discount	6,000	25,600
Profit before tax	2,40,000	2,94,400
Tax @ 30%	72,000	88,320
Profit after tax	1,68,000	2,06,080
Opportunity Cost of Investment in Receivables	8,190	7,280
Net Profit	1,59,810	1,98,800

Advise: Proposed policy should be adopted since the net benefit is increased by (₹ 1,98,800 – 1,59,810) = ₹ 38,990.

[Note: Opportunity cost of investment in receivables can be computed alternatively taking contribution @ 22 per cent into consideration. The net benefit then would change accordingly to ₹ 1,95,137.**]**

Illustration – 5

Narang Ltd. currently has sales of ₹ 30,00,000 with an average period of two months. At present no discounts are offered to the customers. The management of the company is thinking to allow a discount of 2% on cash sales which result in:

a. The Average collection period would reduce to one month
b. 50% of customers would take advantage of 2% discount
c. The company normally requires a 25% return on its investment

Advise the management whether to extend discount on cash sales or not.

Solution

Current Debtors	(₹ 3000000*2/12)	500000
Revised Debtors	(₹ 3000000*1/12)	250000
Reduction of investment in Debtors balance		250000
Discount to be offered	=3000000*50/100*2/100	= 30000
Increase in profit due to decrease in debtors = 250000*25/100		= 62500
Net increase in profit	=62500-30000= 32500	

Analysis- It is suggested to offer the 2% discount on cash sales, which will result increase in profit by ₹ 32500.

Cost of Cash Discount $= \left[\frac{2}{100-2} \times \frac{365}{60-0}\right] \times 100 \quad = \left[\frac{2}{98} \times \frac{365}{60}\right] \times 100 \quad = 12.4\%$

Since cost of discount 12.4% is less than the rate of return on investment 25%, it is suggested to extend the discount terms of cash sales.

Illustration – 6

A D Ltd. sells goods to domestic market on a gross profit of 25% on sales without considering depreciation. Its estimates for the next year are as follows:

Particulars	Amount (₹ Lakh)
Sales:	
Domestic market at 2 months credit	**1,600**
Export selling price 10% below home price (export at 3 months credit)	**540**
Costs:	
Material used (Suppliers extend 2 months credit)	**600**
Wages paid (1/2 month in arrear)	**400**
Manufacturing expenses (paid 1 month in arrear)	**600**
Sales promotion (payable quarterly in advance)	**80**
Administration expenses (paid 1 month in arrear)	**200**

The company maintains one month's stock of each of raw material and finished goods. A cash balance of ₹ 20 lakh is also maintained.
You are required to work out the working capital requirement of the company.

Solution:

Working Notes:

a. Cost of production

	₹
Material used	600
Wages paid	400
Manufacturing expenses	600
Administration expenses	200
	1800

b. Export sales at equivalent domestic price=₹ 540L÷0.90=₹ 600 L.

Particulars	₹ in Lakh
A. Current Assets:	
Cash balance to be maintained	20.00
Stock of inventories:	
Raw Material (600×1/12) =50.00	
Finished Goods (1800×1/12=150.00	200.00
Debtors:	
Domestic market sales (1600×0.75×2/12)	200.00
Export Market (600×0.75×3/12)	112.00
Requirement of sales production expenses	20.00
	552.00

B. Current Liabilities:	
For Raw Material (600×2/12)	100.00
For Wages (400×2/24)	16.66
For Manufacturing expenses (600×1/12)	50.00
For Administration expenses (200×1/12)	16.67
	183.33

Working Capital Required=A-B=552.00-183.33=369.17 lakh.

Illustration - 7

A company manufactures a small computer component. The component is sold for ₹ 1,000 and its variable cost is ₹ 700. The company sold on an average, 300 units every month in 2014-15. At present the company grants one month credit to its customers. The company plans to extend the credit to 2 months on account of which the following is expected:

Increase in sales is 25%
Increase in stock is ₹ 1,50,000
Increase in creditors ₹ 60,000

Should the company extend the credit terms if:

a. **All customers avail of the extended period of 2 months.**
b. **Only new customers avail of 2 months credit, assuming that the increase in sales is due to new customers.**

The company expects a minimum rate of return of 30% on its investment. (Consider debtors at sales value).

Solution:

Statement showing the analysis of credit policy of the company

Particulars	**Option I All customers avail extended credit policy**	**Option II Only new customers avail extended credit policy**
Profitability of additional sales:		
Present annual turnover (300×12×1000)	36,00,000	36,00,000
Increase in turnover	9,00,0000	9,00,0000
	45,00,000	45,00,000
Revised sales PV Ratio = $\frac{1000-700}{100} \times 100$	30%	30%
Increase in contribution (9,00,000×30%)	2,70,000	2,70,000
Cost of carrying additional debtors and stock:		
Proposed/Additional debtors	45,00,000×2/12	9,00,000×2/12

Less:	=7,50,000	=1,50,000
Existing debtors (36,00,000×1/12)	3,00,000	---
Increase in debtors	4,50,000	1,50,000
Investment in additional debtors (variable cost being	3,15,000	1,05,000
70% of sales value)	1,50,000	1,50,000
Increase in stock	4,65,000	2,55,000
Less: Increase in credit	60,000	60,000
Net additional investment in working capital	4,05,000	1,95,00
Expected returns (b) [30% of 4,05,000] and [30% of 1,95,000]	1,21,500	58,500
Excess of profit over cost (a-b)	1,48,500	2,11,500

Suggestion:

From the above statement company can extend credit policy in the both cases. However, in view of higher profit second option is more profitable. Hence, the company should adopt option II.

Illustration – 8

S Ltd. produces a product with the following revenue cost structure:

Particulars	₹ Per unit
Raw material	**115**
Direct material	**80**
Overheads	**37**
Total cost	**232**
Profit	**58**
Selling price	**290**

The following additional information is available:

a. **Average raw materials in stock; one month.**
b. **Average work in process: half-a-month – Raw Materials 100%, Direct labour 50%, Overheads 50% complete.**
c. **Average finished gods in stock: one month.**
d. **Credit allowed by suppliers: one month.**
e. **Credit allowed to debtors: two months.**
f. **Time lag in payment of wages: half-a-month.**
g. **Overheads: one month.**
h. **One fourth of sales are on cash basis.**
i. **Cash balance is expected to be ₹ 1,65,000.**

You are required to prepare a statement showing the Working Capital requirement of the company to finance a level of activity of ₹ 60,000 units of annual output. Assume uniform production throughout the year. Wages and overheads accrue uniformly. Debtors are to be taken at cost.

Solution:

Statement showing estimate of Working Capital

Particulars	₹	₹
Current Assets:		
Stock of Raw material (60,000 units×115×1/12)		5,75,000
Work –in –progress:		
Raw materials (60,000 units×115×1/12×1/2)	2,87,500	
Direct labour (60,000 units×80×1/12×1/2×1/2)	1,00,000	
Overheads (60,000 units×37×1/12×1/2×1/2)	46,250	4,33,750
Stock of finished goods (60,000 units×232×1/12)		11,60,000
Debtors (60,000 units×3/4×232×1/12)		17,40,000
Cash balance		1,65,000
	(a)	40,73,750
Current liabilities:		
Creditors for raw material (60,000 units×115×1/12)		5,75,000
Creditors for wages (60,000 units×80×1/12×1/2)		2,00,000
Creditors for overheads (60,000 units×37×1/12)		1,85,000
	(b)	9,60,000
Net Working Capital	(a)-(b)	31,13,750
Total Working Capital Requirement		**31,13,750**

Study Note – 9

COST OF CAPITAL, CAPITAL STRUCTURE THEORIES, DIVIDEND DECISIONS AND LEVERAGE ANALYSIS

1. Answer the following questions:

(A) Choose the correct answer from the given four alternatives:

(i) A firm is said to be financially unlevered firm if the firm has …….
- **(a) only external equity in its capital structure.**
- **(b) only owner's equity in its capital structure.**
- **(c) both external equity and owner's equity in its capital structure.**
- **(d) only equity share capital in its capital structure.**

(ii) The term 'optimal capital structure' implies that combination of external equity and internal equity at which ……..
- **(a) the overall cost of capital is minimised.**
- **(b) the overall cost of capital is maximised.**
- **(c) the market value of the firm is minimised.**
- **(d) the market value of firm is greater than the overall cost of capital.**

(iii) Net Income Approach to capital structure decision was proposed by …….
- **(a) J. E. Walter**
- **(b) M.H. Miller and D.Orr**
- **(c) E. Solomon**
- **(d) D. Durand**

(iv) There is a reciprocal relationship between ……..
- **(a) DOL and DFL**
- **(b) DOL and margin of safety ratio.**
- **(c) DFL and margin of safety ratio.**
- **(d) DOL and break-even-point.**

(v) The genesis of financial risk lies in …….
- **(a) capital budgeting decision.**
- **(b) capital structure decision.**
- **(c) dividend decision.**
- **(d) liquidity decision.**

(vi) Financial break-even point is that level of EBIT at which ……

(a) EPS > 0

(b) EPS < 0

(c) EPS = 0

(d) EPS > 1

Answer: (i) – b; (ii) – a; (iii) – d; (iv) – b; (v) – b; (vi) – c.

(B) Match the statement in column I with the most appropriate statement in column II:

Column I		Column II	
i)	Optimal dividend payout	a)	Business risk
II)	Optimal capital structure	b)	Financial margin of safety
III)	DFL	c)	Gordon
IV)	DOL	d)	Durand

Answer: (i) – c; (ii) – d; (iii) – b; (iv) – a;

(c) State whether the following statements are true or false:

i) The business risk is independent of capital structure because the operating profitability is not influenced by the sources from which the funds have been raised.

ii) Under CAPM model, it is assumed that unsystematic risk can be avoided by the investors by considering different kinds of securities in their portfolio.

iii) According to Walter's model, the optimal dividend payout ratio of a growth firm is 100 per cent.

iv) "The investment policy adopted by the company is fixed". This assumption is made in Gordon's Dividend Model.

Answer: (i) True, (ii) True, (iii) False, (iv) False

Section – IV

2. (a) Narrate the assumptions underlying Walter's dividend model.

(b) Based on the following information, you are required to determine the market value of equity shares of SC India Ltd. as per Gordon's model:

Earnings of the company	**₹ 25,00,000**
Dividend paid	**₹ 15,00,000**
Number of shares outstanding	**5,00,000**
Price earning ratio	**8**
Rate of return on investment	**0.15**

Are you satisfied with the current dividend policy of the company? If not, what should be the optimal dividend payout ratio in this case?

Answer :

(a) Walter's dividend model is based on the following assumptions:

i) All investments are financed through retained earnings only. No debt or new equity share capital is issued by the company.

ii) The company's internal rate of return (r) remains constant.

iii) The cost of capital for the company (k) remains constant.

iv) As r and k are constant, the business risk associated with the company also remains unchanged.

v) All earnings are either distributed as dividends or reinvested internally immediately.

vi) Beginning earnings per share (E) and dividend per share (D) never change. The values of E and D may be changed in the model to derive results, but, any given value of E and D are assumed to remain constant in determining a given value.

vii) The Company has an infinite life.

(b) As k is the reciprocal of price earning ratio, $k = \frac{1}{8} = 0.125$

$$E = \frac{\text{Total Earnings}}{\text{No. of shares outstanding}} = \frac{₹\,25,00,000}{5,00,000} = ₹\,5$$

$$D = \frac{\text{Dividend paid}}{\text{No. of shares outstanding}} = \frac{₹\,15,00,000}{5,00,000} = ₹\,3$$

$$b = 1 - \frac{D}{E} = 1 - \frac{₹\,3}{₹\,5} = \frac{2}{5} = 0.4$$

$$P = \frac{E(1-b)}{k - br} = \frac{₹\,5(1-0.4)}{0.125 - 0.4 \times 0.15} = ₹\,46.15 \text{ (approx.)}$$

No, we are not satisfied with the current dividend policy.

Since r (=0.15) > k (=0.125), SC India Ltd. is considered as a growth company. According to Gordon's model, the optimal dividend payout ratio for a growth company is nil. Therefore, in the case of AG India Ltd., the optimal dividend payout ratio should be zero.

3. (a) State the assumptions of M-M Dividend Model.

(b) Prove the M-M 'dividend irrelevance' theorem.

Answer:

(a) M-M dividend model is based on the following assumptions:

(i) Capital markets are perfect. It implies that (a) all information are freely available in the market; (b) there is no transaction cost; (c) no investor can influence market prices; and (d) there is no tax differential between dividends and retained earnings or between dividends and capital gains.

(ii) All investors are rational.

(iii) The investment policy adopted by the company is fixed.

(iv) Investment opportunities and future profits of all companies are known to investors with certainty. The perfect certainty assumption is later dropped by M-M.

(b) To prove their argument M-M begin with the simple valuation model –

$P_0 = \frac{1}{(1+k)} (D_1 + P_1)$ where, P_0 = market price per share at time 0

D_1= Dividend per share at time 1

P_1= Market price per share at time 1

k = Cost of equity capital

If no external financing is used, the value of the company (V) will be equal to the value of outstanding equity shares of the company at time 0. It represents the product of the market price per share at time 0 and the number of outstanding equity shares (n).

Thus, $V = nP_0 = \frac{n(D_1 P_1)}{(1+k)}$

If m number of equity shares are issued at time 1 at price P_1 (the prevailing market price at time 1) to finance the investment programme, the value of the company at time 0 is obtained:

$$V = nP_0 = \frac{n(D_1 + P_1) + mP_1 - mP_1}{(1+k)}$$

$$= \frac{nD_1 + nP_1 + mP_1 - mP_1}{(1+k)}$$

$$= \frac{nD_1 + (n+m)P_1 - mP_1}{(1+k)} \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(i)}$$

This equation implies that the value of the company is the present value of the dividends to be received in time 1 plus the value of shares outstanding at time 1, less the value of the new shares. The total amount raised through issue of new shares is –

$mP_1 = I - (E - nD_1)$ where, I = total requirement for investment at time 1

E = net earnings of the company at time 1

Substituting the above value for mP_1 in Eq. (i), M-M get –

$$V = nP_0 = \frac{nD_1 + (n+m)P_1 - I + E - nD_1}{(1+k)}$$

$$= \frac{(n+m)P_1 - I + E}{(1+k)}$$

As D_1 is not found in the above equation and as I, E, k and $(n+m)P_1$ are independent of D_1, M-M reach the conclusion that the dividend policy has no bearing on the value of the company.

4. (a) Sunny Ltd. having earnings of ₹ 10 per share is capitalized at a rate of 30% and has a rate of return on investment of 35%. What should be the price per share at 40% dividend payout ratio according to Walter's model? In this the optimal payout ratio according to Walter?

(b) Mukesh India Ltd. Belongs to a risk-class for which the appropriate P/E ratio is 10. It currently has 50,000 outstanding equity shares selling at par at ₹100 each. The company is contemplating the declaration of ₹ 8 as dividend per share at the end of the current fiscal year which has just started. Based on the assumptions underlying the M-M theory, answer the following questions:

i) What will be the price per share at the end of the year:
a) if dividend is not declared and
b) if dividend is declared?

ii) Assuming that the company pays the dividend, has a net earnings of ₹500,000 and intends to make a new investment of ₹ 10,00,000 during the period, how many new shares must be issued?

ii) Does the payment of dividend affect the value of the company?

Answer:

(a)

$$P = \frac{D + \frac{r}{k}(E - D)}{k}$$

$$= \frac{(₹10 \times 40\%) + \frac{0.35}{0.30}₹(10 - 4)}{0.30}$$

$$= \frac{₹\,4 + ₹\,7}{0.30}$$

$$= ₹\,36.67$$

According to Walter's model, the price per share at 40% dividend payout ratio will be ₹36.67.

No, this is not the optimal dividend payout ratio because TNS India Ltd. is a growth firm (as r > k) and according to Walter's model, the optimal dividend payout ratio for a growth firm is nil.

(b) i) If dividend is not declared, the price per share at the end of the year will be:

$$P_0 = \frac{(D_1 + P_1)}{(1 + k)}$$

$$\text{or, } ₹100 = \frac{0 + P_1}{1 + 0.1} \qquad \left[\because k = \frac{1}{\text{P/E Ratio}} = \frac{1}{10} = 0.1\right]$$

$\therefore P_1 = ₹100 \times 1.1 = ₹\,110$

If dividend is declared, the price per share at the end of the year will be:

$$P_0 = \frac{(D_1 + P_1)}{(1 + k)}$$

$$\text{or, ₹100} = \frac{8 + P_1}{1 + 0.1}$$

$\therefore P_1 = ₹100 \times 1.1 - ₹8 = ₹102$

ii) $mP_1 = I - (E - nD_1)$

Here, P_1=₹ 102; I = ₹ 10,00,000; E = ₹ 5,00,000

and nD_1 = 50,000 x ₹ 8 = ₹ 4,00,000

Putting these values in the above equation, we get –

₹102m = ₹10,00,000 – ₹(5,00,000 – 4,00,000)

or, ₹102m = ₹9,00,000

$\therefore$ m = ₹9,00,000/₹102 = 8824 (approx)

$\therefore$ 8824 new shares must be issued.

iii) If dividend is not declared,

P_1 = ₹110

Amount to be raised by issuing new shares will be –

mP_1 = ₹(10,00,000 – 5,00,000) = ₹5,00,000

$$\therefore \text{No. of new shares to be issued (m)} = \frac{₹\,5,00,000}{P_1}$$

$$= \frac{₹\,5,00,000}{₹\,110}$$

$$= \frac{50,000}{11}$$

$$\therefore \text{Value of the company (V)} = \frac{(n+m)P_1 - I + E}{(1+k)}$$

$$= \frac{\left(50000 + \frac{50000}{11}\right) \times ₹\,110 - ₹\,10,00,000 + ₹\,5,00,000}{1 + 0.1}$$

$$= \frac{₹\,(5500,000 + 5,00,000) - ₹\,10,00,000 + ₹\,5,00,000}{1.1}$$

$$= \frac{₹\,55,00,000}{1.1}$$

$$= ₹\,50,00,000$$

If dividend is declared,

P_1 = ₹102

$$m = \frac{₹\,9,00,000}{₹\,102} = \frac{9,00,000}{102}$$

$$\therefore \text{ Value of the company (V)} = \frac{(n+m)P_1 - I + E}{(1+k)}$$

$$= \frac{\left(50000 + \frac{9,00,000}{102}\right) \times ₹102 - ₹10,00,000 + ₹5,00,000}{1+0.1}$$

$$= \frac{₹(5100,000 + 9,00,000) - ₹10,00,000 + ₹5,00,000}{1.1}$$

$$= \frac{₹\ 55,00,000}{1.1}$$

$$= ₹50,00,000$$

Thus, the value of the company remains the same whether it declares dividend or not.

5. (a) Define cost of capital. Distinguish between explicit and implicit costs of capital.

(b) State the significance of cost of capital.

Answer:

(a) The term 'cost of capital' can be defined in two ways. In operational terms, cost of capital is defined as the discount rate that would be used in determining the present value of the estimated future cash proceeds and eventually deciding whether the project is worth undertaking or not. In economic terms, cost of capital is defined as the opportunity cost of the funds to be invested in a project where the opportunity cost is quantified by the maximum expected rate of return from the next best alternative foregone.

When a firm raises its capital from any specific source, initially cash inflow arises and in future, a series of cash outflows in respect of payment of periodic interest / dividend and repayment of principal amount arise. The discount rate that equates the present value of the cash inflows with the present value of cash outflows associated with any specific source of capital is called the explicit cost of that source of capital. The implicit cost of capital represents the opportunity cost of capital. It implies the rate of return that can be earned on the best alternative investment foregone. This kind of cost is associated with the use of capital. So, whatever be the source of capital, each and every source of capital has its implicit cost.

(b) Cost of capital has a great significance in financial decisions. Specially, in capital budgeting and capital structure decisions cost of capital plays a vital role. In the present value approach to capital budgeting decisions, cost of capital is used as the discount rate for the purpose of measuring the net present value (NPV) of the projects. In the profitability index approach to capital budgeting decisions, cost of capital is applied in ascertaining the present value of future cash flows. In the internal rate of return (IRR) approach to capital budgeting decisions, the computed IRR is compared with the cost of capital. It provides a yardstick to measure the worth of investment proposals and also acts as an 'accept-reject' criterion in capital budgeting decisions. The concept of cost of capital also plays an important role in making capital structure decisions. The cost of capital is influenced by changes in capital structure. In trying to achieve its target capital structure overtime, a firm should aim at minimizing the cost of capital and maximizing the market value of the firm.

6. (a) Asif J. Ltd. has 12% perpetual debt of ₹ 4,00,000. The tax rate is 40%. Ascertain the cost of debt assuming that the debt is issued (i) at par, (ii) at a discount of 10%, and (iii) at a premium of 10%.

(b) Sona Awal Ltd. issued 12% debentures @ ₹100 each in order to raise ₹15,00,000 to finance a project. The flotation cost was 10%. The debentures were redeemable at par at the end of 5 years. The income tax rate applicable to the company was 40%. Ascertain the cost of debt.

Answer:

(a) (i) When the debt is issued at par

$I = ₹4,00,000 \times \frac{12}{100} = ₹\ 48,000$

$P = ₹\ 4,00,000$

$t = 40\% = 0.4$

$k_d = \frac{₹\ 48,000}{₹\ 4,00,000}(1 - 0.4) = 0.072 = 7.2\%$

(ii) When the debt is issued at a discount of 10%

$I = ₹\ 48,000$

$P = ₹\ 4,00,000 - (4,00,000 \times 10\%) = ₹\ 3,60,000$

$t = 0.4$

$k_d = \frac{₹\ 48,000}{₹\ 3,60,000}(1 - 0.4) = 0.08 = 8\%$

(iii) When the debt is issued at a premium of 10%

$I = ₹\ 48,000$

$P = ₹\ 4,00,000 + (4,00,000 \times 10\%) = ₹\ 4,40,000$

$t = 0.4$

$k_d = \frac{₹\ 48,000}{₹\ 4,40,000}(1 - 0.4) = 0.065455 = 6.5455\%$

(b) $k_d = \frac{I(1-t) + \frac{1}{n}(F - P)}{\frac{1}{2}(F + P)}$ where k_d = cost of redeemable debt

I = annual interest payment
= ₹15,00,000 x 12% = ₹180,000

P = net proceeds at the time of issue of debt
= ₹15,00,000 – ₹(15,00,000 x 10%)
= ₹13,50,000

F = principal value of debt at the time of redemption
= ₹15,00,000

t = tax rate = 40% = 0.40

n = number of years to maturity = 5 years

$$\therefore k_d = \frac{1,80,000(1-0.4)+\frac{1}{5}(15,00,000-13,50,000)}{\frac{1}{2}(15,00,000+13,50,000)}$$

$$= \frac{1,08,000+30,000}{14,25,000}$$

= 9.68% (approx)

7. (a) Raja Ltd. issued 10% debentures of ₹100 each repayable at par after 5 years from the date of issue for raising fund of ₹12,00,000 to finance a project. The flotation cost was 15% which was written off equally over its life. The tax rate applicable to the company was 40%. Ascertain the cost of debt.

(b) Ratul India Ltd. issues 15% irredeemable preference shares. Its face value is ₹100 and the expense relating to the issue of shares is 10%. Ascertain the cost of such preference share if it is issued - i) at par, ii) at a discount of 10% and iii) at a premium of 10%.

Answer:

(a) $NP_0 = \frac{I_1+P_1}{(1+k_d)} + \frac{I_2+P_2}{(1+k_d)^2} + \frac{I_3+P_3}{(1+k_d)^3} + \ldots\ldots\ldots + \frac{I_n+P_n}{(1+k_d)^n}$

where, NP_0 = net proceeds from issue of debt

= ₹12,00,000 – ₹(12,00,000 x 15%) = ₹10,20,000

I_1 = cash outflow on account of interest payment in year 1

= ₹12,00,000 x 10% x (1-0.4) = ₹72,000

Similarly,

I_2 = ₹(12,00,000 – 2,40,000) x 10% x (1-0.4) = ₹57,600

I_3 = ₹(9,60,000 – 2,40,000) x 10% x (1-0.4) = ₹43,200

I_4 = ₹(7,20,000 - 2,40,000) x 10% x (1-0.4) = ₹28,800

I_5 = ₹(4,80,000 – 2,40,000) x 10% x (1-0.4) = ₹14,400

k_d= cost of debt

n = number of years to maturity = 5 years

$$₹10,20,000 = \frac{72000+240000}{(1+k_d)} + \frac{57600+240000}{(1+k_d)^2} + \frac{43200+240000}{(1+k_d)^3} + \frac{28800+240000}{(1+k_d)^3} + \frac{14400+240000}{(1+k_d)^3}$$

$$\text{or, } ₹10,20,000 = \frac{312000}{(1+k_d)} + \frac{297600}{(1+k_d)^2} + \frac{283200}{(1+k_d)^3} + \frac{268800}{(1+k_d)^4} + \frac{254400}{(1+k_d)^5}$$

The value of k_d can be ascertained by using the trial and error method with the help of present value table in the following way –

Year	Cash Outflow ₹	At 12% rate		At 13% rate	
		PV Factor	Total PV ₹	PV Factor	Total PV ₹
1	312000	0.893	278616.00	0.885	276120.00
2	297600	0.797	237187.20	0.783	233020.80
3	283200	0.712	201638.40	0.693	196257.60
4	268800	0.636	170956.80	0.613	164774.40
5	254400	0.567	144244.80	0.543	138139.20
			1032643.20		1008312.00

By using simple interpolation we get –

$$k_d = 12\% + \left[\frac{₹1032643.20}{₹(1032643.20 - 1020000) + ₹(1020000 - 1008312)} \times (13-12)\right]\%$$

$$= 12\% + \left[\frac{₹12643.20}{₹(12643.20 + 11688)} \times 1\right]\%$$

= 12 % + 0.519629 %

= 12.52% (approx.)

(b) Here, D = ₹100 x 15% = ₹15

i) When the shares are issued at par:

P = ₹ 100(1-10%) = ₹90

$$\therefore k_p = \frac{D}{P} = \frac{₹15}{₹90} = 16.67\%$$

ii) When the shares are issued at a discount of 10%:

P = ₹ 90(1-10%) = ₹81

$$\therefore k_p = \frac{D}{P} = \frac{₹15}{₹81} = 18.52\%$$

iii) When the shares are issued at premium of 10%:

P = ₹ 110(1-10%) = ₹99

$$\therefore k_p = \frac{D}{P} = \frac{₹15}{₹99} = 15.15\%$$

8. (a) Derive the Dividend Growth Model for measurement of cost of equity.

(b) The current market price of an equity share of ₹100 is ₹150 and underwriting commission inclusive of all costs of issue is 5% on issue price. The dividend per share paid for the last five years were as follows –

Year	**:**	**2012**	**2013**	**2014**	**2015**	**2016**
₹	**:**	**10.00**	**10.80**	**11.67**	**12.60**	**13.61**

The company has a fixed dividend payout ratio and current growth in earnings and dividend is likely to be maintained in future. Estimate the cost of equity.

Answer:

(a) Let D_0 be the dividend in the initial year and let g be the constant growth rate of dividend. Then the dividend in the second year will be $D_0(1+g)$, the dividend in the third year will be $D_0(1+g)(1+g)$ i.e. $D_0(1+g)^2$ and so on.

Let P_0 be the market price of equity share. Thus, the original equation mentioned earlier can be rewritten as follows –

$$P_0 = \frac{D_0(1+g)}{1+k_e} + \frac{D_0(1+g)^2}{(1+k_e)^2} + \frac{D_0(1+g)^3}{(1+k_e)^3} + \ldots\ldots\ldots\ldots\ldots + \text{upto infinity}$$

$$= \sum_{t=1}^{a} \frac{D_0(1+g)^t}{(1+k_e)^t}$$

This is also in a geometric progression with

the first term (a) = $\frac{D_0(1+g)}{(1+k_e)}$ and

the common ratio (r) = $\frac{(1+g)}{(1+k_e)}$

Assume that $k_e > g$ so that $r < 1$.

$$\therefore P_0 = \frac{a}{1-r}$$

$$\text{or, } P_o = \frac{\frac{D_0(1+g)}{(1+k_e)}}{1-\frac{(1+g)}{(1+k_e)}} = \frac{\frac{D_0(1+g)}{(1+k_e)}}{\frac{1+k_e-1-g}{(1+k_e)}}$$

$$\text{or, } P_o = \frac{D_0(1+g)}{(1+k_e)} \times \frac{(1+k_e)}{(k_e-g)}$$

$$\text{or, } P_o = \frac{D_0(1+g)}{(k_e-g)}$$

$$\text{or, } (k_e - g) = \frac{D_0(1+g)}{P_0}$$

$$\therefore k_e = g + \frac{D_0(1+g)}{P_0}$$

The above model is popularly known as the dividend growth model.

(b) Let g be the growth rate of dividend

₹13.61 = $(1+g)^4$ x ₹10.00

or, $\frac{₹13.61}{₹10.00} = (1+g)^4$

or, $1.361 = (1+g)^4$

Taking logarithms on both sides –

Log 1.361 = 4 log (1+g)

$\therefore g = 8\%$

Here, $k_e = g + \frac{D_0(1+g)}{P_0}$ where, P_0 = ₹150 – ₹(150 x 5%) = ₹142.50

D_0 = ₹13.61

g = 8%

$\therefore k_e = 8\% + \frac{₹13.6(1+8\%)}{₹142.50}$

= 0.08+0.10315

= 0.18315

= 18.32 % (approx)

9. (a) The following data are available for ABC& Co.:

	₹
Operating Profit	**200,000**
Excess of sales revenue over variable cost	**400,000**
Interest on long-term debt	**100,000**

If the company's sales revenue declines by 5%, then what will be the percentage change in EPT?

(b) Rahul Technologies Ltd. has a capital structure consisting of:

(i) ₹800,000 in the form of equity shares of ₹10 each,

(ii) ₹400,000 in the form of 12% preference shares,

(iii) ₹1200,000 in the form of 10% debentures and

(iv) ₹400,000 as retained earnings.

The company's EBIT is ₹480,000. Assuming a corporate income tax rate of 60%, ascertain:

(A) financial break-even-point,

(B) financial margin of safety,

(C) financial margin of safety ratio and

(D) degree of financial leverage.

Answer:

(a) Operating profit (EBIT) = ₹ 200,000

Excess of sales revenue over variable cost = S – V

= Contribution (C) = ₹ 400,000

Interest on long-term debt = ₹ 100,000

$$\therefore DOL = \frac{C}{EBIT} = \frac{₹400,000}{₹200,000} = 2$$

$$Or, DFL = \frac{EBIT}{EBIT - I} = \frac{₹200,000}{₹200,000 - ₹100,000} = 2$$

$$Thus, DTL = DOL \times DFL = 2 \times 2 = 4$$

$$DTL = \frac{\%\ change\ in\ EPS}{\%\ change\ in\ sales\ volume}$$

$$Or, 4 = \frac{\%\ change\ in\ EPS}{5}$$

$$\therefore \%\ change\ in\ EPS = 4 \times 5 = 20$$

(b) (A)Financial break-even-point (FBEP) =

Here, I = ₹1200,000 x 10% = ₹120,000

D_P = ₹400,000 x 12% = ₹ 48,000

$$\therefore FBEP = ₹120,000 + \frac{48,000}{1 - 60\%}$$

$$= ₹120,000 + ₹120,000 = ₹240,000$$

(B) Financial margin of safety (FMS) = EBIT – FBEP

= ₹480,000 – ₹240,000

= ₹ 240,000

(C)FMS ratio = $\frac{EBIT - FBEP}{EBIT}$

$$= \frac{₹480,000 - 240,000}{₹480,000} = 0.5$$

(D)Degree of financial leverage (DFL) =

$$\frac{\text{EBIT}}{\text{EBIT} - I - \frac{D_P}{1-t}}$$

$$= \frac{₹480{,}000}{₹480{,}000 - 120{,}000 - \frac{48000}{1-60\%}}$$

$$= \frac{₹480{,}000}{₹480{,}000 - 120{,}000 - 120{,}000}$$

$$= \frac{₹\ 480{,}000}{₹\ 240{,}000} = 2$$

10. Short notes on

(a) EBIT-EPS analysis

(b) Indifference point

(c) Assumptions of Dividend Growth Model

(d) DTL

Answer:

(a) EBIT-EPS analysis:

It is one of the most widely used technique employed in designing an appropriate capital structure. In fact, it is an analysis by which the sensitivity of EPS to changes in EBIT under different financing alternatives can be measured. EBIT-EPS analysis examines the effect of financial leverage on the behaviour of EPS under different financing alternatives and with varying levels of EBIT. This analysis provides great insight into the relative advantages of the financing alternatives. A company has the choice to raise funds for financing its investment proposals from different sources in different proportions. If the EBIT-EPS analysis is used for making the choice of the combination of the various sources, the alternative that yields the highest EPS should be selected as the most profitable financing plan.

(b) Indifference Point:

The EBIT level at which the EPS is the same for two alternative financing plans is known as the indifference point. In other words, it refers to that EBIT level at which EPS remains the same irrespective of external equity-internal equity mix. At this point two alternative financing plans are equally desirable and the finance manager will be indifferent between alternative financing plans as far as the EPS is concerned. If the expected level of EBIT is greater than the indifference point, the use of fixed charge bearing capital in the capital structure would be advantageous from the view point of EPS. On the other hand, if the expected level of EBIT is lower than the indifference point, the use of equity in the capital structure would be advantageous from the view point of EPS.

(c) Assumptions of Dividend Growth Model:

i) The market price of equity share depends on the expected dividends.

ii) The dividend in the initial year (D_0) is greater than zero (i.e. $D_0 > 0$).

iii) The dividend payout ratio [i.e. (1 – retention ratio)] is constant.

iv) The growth rate of dividend (g) is constant and it is equal to the return on equity (ROE) times the retention ratio (b) [i.e. g = ROE x b].

(e) DTL :

If operating and financial leverages combine themselves in a multiplicative form, the outcome is called combined or total leverage. Combined or total leverage refers to the extent of which a firm has fixed operating costs as well as fixed financial changes. DTL measures the percentage change in EPS which results from a change of one per cent in sales volume. It also measures the firm's ability to cover the aggregate of fixed operating and financial charges. In other words, the total risk associated with the firm is measured by the DTL. The value of DTL must be greater than 1. If the value of DTL is equal to 1 then it implies that there is no fixed operating cost in the cost structure of the firm and there is no fixed charge bearing capital in its capital structure.DTL provides a risk profile of the firm. The higher the value of DTL, the greater is the total risk associated with the firm.

Study Note – 10

CAPITAL BUDGETING – INVESTMENT DECISIONS

1. **Choose the correct alternative:**

   (i) In mutually exclusive projects, projects which are selected for comparison must have
   - **a) positive net present value**
   - **b) negative net present value**
   - **c) zero net present value**
   - **d) none of the above**

   (ii) In a single projects situation, results of internal rate of return and net present value lead to
   - **a) cash flow decision**
   - **b) cost decision**
   - **c) same decisions**
   - **d) different decisions**

   (iii) The discount rate which forces net present values to become zero is classified as
   - **a) positive rate of return**
   - **b) negative rate of return**
   - **c) external rate of return**
   - **d) internal rate of return**

   (iv) A point where profile of net present value crosses horizontal axis at plotted graph indicates project
   - **a) costs**
   - **b) cash flows**
   - **c) internal rate of return**
   - **d) external rate of return**

   (v) Payback period in which an expected cash flows are discounted with the help of project cost of capital is classified as
   - **a) discounted payback period**
   - **b) discounted rate of return**
   - **c) discounted cash flows**
   - **d) discounted project cost**

   (vi) Number of years forecasted to recover an original investment is classified as
   - **a) payback period**
   - **b) forecasted period**
   - **c) original period**
   - **d) investment period**

   (vii) In proper capital budgeting analysis, we evaluate incremental
   - **a) Accounting income**
   - **b) Cash flow**
   - **c) Earnings**
   - **d) Operating profit**

(viii)The term mutually exclusive investments mean:

(a) Choose only the best investments.

(b) Selection of one investment precludes the selection of an alternative.

(c) The elite investment opportunities will get chosen.

(d) There are no investment options available.

Solution: (i) (a); (ii) (c); (iii) (d); (iv) (c); (v) (a); (vi) (a); (vii) (b); (viii) (b).

11. State true or false:

(i) When NPV is zero PI will be one.

(ii) In case the IRR of a project is higher than the cost of capital, NPV will be positive.

(iii) In calculating Discounted Payback Period, IRR is used as the discounting rate.

(iv) IRR is also known as the highest opportunity cost that the project can bear.

(v) Accounting Rate of Return (ARR) method does not consider time value of money.

Solution: (i) True; (ii) True; (iii) False; (iv) True; (v) True.

12. Match the following:

A	**ARR method**	**I**	**Assumes that reinvestment rate is IRR**
B	**Cost of capital**	**II**	**Is used when projects differ in terms of investment**
C	**PI method**	**III**	**is known as minimum required rate of return**
D	**IRR method**	**IV**	**Consistent with the objective of wealth maximization**
E	**NPV**	**V**	**Does not consider time value of money**

Solution: A. V; B. III; C. II; D. I; E. IV

4. X and Co. intends to invest ₹ 10 lakh in a project having a life of 4 years. The cash inflows from the project at the end of year one to the fourth year are expected as ₹ 3,00,000, ₹ 4,20,000, ₹ 4,00,000 and ₹ 3,30,000 before charging depreciation and tax. You are required to calculate the Accounting Rate of Return of the project and comment on the use of the rate of return. Tax rate is 50%.

Solution:

$$\text{Accounting or Average Rate of Return (ARR)} = \frac{\text{Average Annual Profit after Tax}}{\text{Average Investment}} \times 100$$

$$\text{Where, Average annual profit after tax} = \frac{\text{Total Profit after depreciation and tax throughout the life}}{\text{Project Life}}$$

$$\text{and, Average Investment} = \frac{\text{Initial Investment} + \text{Salavge Value}}{2}$$

Statement Showing Profit After Tax during the life of the project

Year	Earnings before Depreciation and Tax (₹)	Depreciation (₹)	Earnings before Tax (₹)	Tax @ 50%	Earnings After Tax (₹)
1	3,00,000	2,50,000 (1000000/4)	50,000	25,000	25,000
2	4,20,000	2,50,000	1,70,000	85,000	85,000
3	4,00,000	2,50,000	1,50,000	75,000	75,000
4	3,30,000	2,50,000	80,000	40,000	40,000
Total Earning After Tax (A)					2,25,000
Project life (B)					4 years
Average Earning After Tax (A/B)					56,250
Average Investment = (1000000+0)/2					500000

$$\text{ARR} = \frac{56250}{500000} \times 100 = 11.25\%.$$

5. Compute the pay-back period for the project

End of the year	**1**	**2**	**3**	**4**	**5**
Book value of Fixed Assets (₹)	**90**	**80**	**70**	**60**	**50**
Profit after tax (₹)	**20**	**22**	**24**	**26**	**28**

Solution:

In the problem, the initial investment is not given but it can be observed that the book value of fixed assets reduces by 10 over the years, so it can be assumed that depreciation per year is ₹ 10 under SLM. Also, the initial investment at 0 year may be taken as ₹ (90+10=) 100.

Calculation of Annual Cash Inflows after Tax (CIAT)

Year	**Profit After Tax (PAT)**	**Depreciation**	**CIAT =PAT + Depreciation**	**Cumulative CIAT**
1	20	10	30	30
2	22	10	32	62
3	24	10	34	96
4	26	10	36	132
5	28	10	38	170

The Pay-back period lies somewhere between the 3rd and the 4th year, which is to be calculated by applying simple interpolation method. So pay-back period (say, x) is calculated as under:

$$\frac{x-3}{4-3} = \frac{100-96}{132-96}$$

Or, x = 3.11

Hence, pay-back period is 3.11 years.

6. From the information given below compute the Pay Back Period.

Initial Outlay	**₹ 80,000**
Estimated life	**5 years**
Profit after tax:	
End of year 1	**₹ 6,000**
2	**₹ 14,000**
3	**₹ 4,000**
4	**₹ 6,000**
5	**₹ 10,000**

Depreciation has been calculated under straight line method.

Solution:

Statement Showing Calculation of Cash Inflows after Tax (CIAT)

Year	Profit After Tax (PAT) (₹)	Depreciation (₹ 80,000 / 5 years) (₹)	CIAT = (PAT + Depreciation) (₹)	Cumulative CIAT (₹)
1	6,000	16,000	22,000	22,000
2	14,000	16,000	30,000	52,000
3	4,000	16,000	20,000	72,000
4	6,000	16,000	22,000	94,000
5	10,000	16,000	26,000	1,20,000

It is evident from above that pay-back period (PBP) lies between 3rd and 4th year, which can be calculated by applying simple interpolation method as under:

$$\frac{PBP - 3}{4 - 3} = \frac{80000 - 72000}{94000 - 72000}$$

Or, PBP = 3.3636 years

7. A company is considering two mutually exclusive project with the following details:

Particulars	Project A	Project B
Life of the project (years)	**4**	**5**
Initial Investment (₹)	**22000**	**27000**
Net Cash Flow (₹)		
Year 1	**11000**	**18000**
Year 2	**14000**	**16000**
Year 3	**17000**	**16000**
Year 4	**19000**	**12000**
Year 5	**-**	**10000**

Cost of capital of the company is 10%.

Calculate NPV of the projects and recommend the projects that can be accepted.

Solution:

Calculation of NPV

Year	Project E	Project F	PVIF @ 10%	Project E	Project F
1	11,000	18,000	0.909	9999	16362
2	14,000	16,000	0.826	11564	13216
3	17,000	16,000	0.751	12767	12016
4	19,000	12,000	0.683	12977	8196
5	-	10,000	0.621	0	6210
Total PV of Cash flow				47307	56000
(-)Initial Investment				22000	27000
NPV				25307	29000

Since NPV is higher for Project B, it is acceptable.

8. From the particulars given below calculate the IRR of the project.

(i) Net cash flow after tax over the four years of the project life.

Year	1	2	3	4
CFAT (₹)	5000	8000	10000	4000

(ii) Initial outlay is ₹ 20,000, Salvage value at the end of the project life is Nil

(iii) Present value of ₹ 1 receivable at the end of year 1, 2, 3 and 4

12%	.892	.797	.712	.636
13%	.885	.783	.693	.613
14%	.877	.770	.675	.592
15%	.867	.756	.658	.572
16%	.862	.743	.641	.552

Solution:

We apply trial and error approach to calculate the IRR.

$$\text{Fake Payback Period} = \frac{\text{Initial Investment}}{\text{Average Annual Cash Inflow}} = \frac{20000}{(5000+8000+10000+4000)/4} = 2.963 \text{ years.}$$

From the 4th year row of the PVIFA table we find that the value nearest to the fake payback period is 2.963 and the corresponding rate is 13%. So 13% should be the first trial rate.

Calculation of NPV at alternative rates.

Year	CFAT	PVIF@ 13%	PV of CIAT	PVIF @14%	PV of CIAT
1	5000	0.885	4425	0.877	4385
2	8000	0.783	6264	0.770	6160
3	10000	0.693	6930	0.675	6750
4	4000	0.613	2452	0.592	2368
Total Present Value			20071		19663
Less. Initial Investment			20000		20000
NPV			71		(-)337

From the above table it is evident that IRR lies between 13% and 14% (as NPV at IRR = 0).

Applying simple interpolation, we get,

$$\frac{IRR - 13}{14 - 13} = \frac{0 - 71}{337 - 71}$$

Or, IRR – 13 = 0.17

Or, IRR = 13.17%

So, IRR of the project is 13.17%.

9. A firm whose cost of capital is 10% is considering two mutually exclusive projects, X and Y, the details of which are:

Investment	**Project X ₹ 70,000**	**Project Y ₹ 70,000**
Net Cash flow:		
Year		
1	**10,000**	**50,000**
2	**20,000**	**40,000**
3	**30,000**	**20,000**
4	**45,000**	**10,000**
5	**60,000**	**10,000**
	1,65,000	**1,30,000**

Compute Net Present Value and Profitability index for the two projects and comment on the result.

Answer:

Calculation of NPV and PI of Projects.

Year	NCF		PVIF @ 10%	PV of CF	
	Project X	Project Y		Project X	Project Y
1	10,000	50,000	0.909	9090	45450
2	20,000	40,000	0.826	16520	33040
3	30,000	20,000	0.751	22530	15020
4	45,000	10,000	0.683	30735	6830
5	60,000	10,000	0.621	37260	6210

Total PV of Cash flow				116135	106550
(-) Initial Investment				70000	70000
NPV				46135	36550
$PI = \frac{\text{Total PV of CF}}{\text{Initial Investment}}$				1.659	1.522

Thus, under both the methods project X should be accepted

10. A Company can make either of two investments at the beginning of 2003. Assuming a required rate of return of 10% p.a., evaluate the investment proposals under (i) Pay Back Profitability, (ii) Discounted Pay Back Period and (iii) Profitability Index. The particulars relating to the projects are given below:

	Project E	**Project F**
Initial outlay (₹)	**20,000**	**28,000**
Estimated life (years)	**5**	**5**
Scrap value (₹)	**Nil**	**Nil**
Net Cash Flow (₹)		
End of 2003	**4,000**	**7,500**
2004	**5,000**	**8,750**
2005	**6,000**	**7,500**
2006	**9,000**	**7,500**
2007	**5,000**	**7,500**

It is estimated that each of the alternative proposals will require an additional working capital of ₹ 2,000 which will be received back in full after the expiry of each project life. The present value of Re. 1, to be received at the end of each year, at 10% p.a. is given below:

Year	**1**	**2**	**3**	**4**	**5**
P.V. factor (₹)	**0.909**	**0.827**	**0.751**	**0.683**	**0.621**

Solution:

(i) Evaluation of Projects under Payback Profitability

Year	Project E NCF (₹)	Project F NCF (₹)
1	4000	7500
2	5000	8750
3	6000	7500
4	9000	7500
5	7000(5000+2000)	9500(7500+2000)
Total NCF	31000	40750
(-) Initial Investment	22000(20000+2000)	30000(28000+2000)
Payback Profitability	9000	10750

Under Payback Profitability method Project F with higher payback profit is acceptable.

(ii) Evaluation of projects under Discounted Payback Period (DPBP) method

Year	NCF		PVIF @ 10%	PV of CF		Cumulative CF	
	Project E	Project F		Project E	Project F	Project E	Project F
1	4,000	7,500	0.909	3636	6817.5	3636	6817.5
2	5,000	8,750	0.826	4130	7227.5	7766	14045
3	6,000	7,500	0.751	4506	5632.5	12272	19677.5
4	9,000	7,500	0.683	6147	5122.5	**18419**	**24800**
5	7,000	9,500	0.621	4347	5899.5	**22766**	**30699.5**

We apply simple interpolation method to calculate DPBP as follows –

For Project E

$$\frac{PBP - 4}{5 - 4} = \frac{22000 - 18419}{22766 - 18419}$$

Or, PBP = 4.82 years

Similarly, for Project F

$$\frac{PBP - 4}{5 - 4} = \frac{30000 - 24800}{30699.5 - 24800}$$

Or, PBP = 4.88 years

Thus Project E with lower DPBP is acceptable.

(iii) Evaluation of projects under PI method.

$$\text{PI for Project E} = \frac{\text{Total PV}}{\text{Initial Investment}} = \frac{22766}{22000} = 1.035$$

$$\text{PI for Project F} = \frac{\text{Total PV}}{\text{Initial Investment}} = \frac{30699.5}{30000} = 1.023$$

Since PI is higher for Project E, it is acceptable.

11. BGR Limited is considering a number of plant improvement projects with an allocable fund of ₹10,00,000. The following projects are under consideration.

Projects	Outlay (₹)	Present Value (₹)
A	**6,00,000**	**7,25,000**
B	**5,00,000**	**6,00,000**
C	**4,00,000**	**5,00,000**
D	**3,00,000**	**4,00,000**
E	**2,00,000**	**2,75,000**
F	**50,000**	**75,000**

Solution:

Calculation of NPV

Projects	Outlay (₹)	Present Value (₹)	NPV (₹)
A	6,00,000	7,25,000	1,25,000
B	5,00,000	6,00,000	1,00,000
C	4,00,000	5,00,000	1,00,000
D	3,00,000	4,00,000	1,00,000
E	2,00,000	2,75,000	75,000
F	50,000	75,000	25,000

Let us assume that the term 'benefit' means the Present Value of Cash Flow and not NPV.
Then, the revised initial outlay of project C if combined with project A = ₹(4,00,000 – 50,000) = ₹ 3,50,000 and that of project D if combined with project B = ₹(3,00,000 – 50,000) = ₹2,50,000.
Similarly, the revised NPV of project C if combined with A = ₹(5,00,000 – 3,50,000) = ₹1,50,000 and that of project D if combined with B = ₹(4,00,000 – 2,50,000) = ₹1,50,000.

Evaluation of Feasible Combination

Combinations	Initial Outlay (₹)	NPV (₹)
A, C, F	10,00,000 (6,00,000 + 3,50,000 + 50,000)	3,00,000 (1,25,000 + 1,50,000 + 25,000)
B, D, E, F	10,00,000 (5,00,000 + 2,50,000 + 2,00,000 + 50,000)	3,50,000 (1,00,000 + 1,50,000 + 75,000 + 25,000)
A, D, F	9,50,000 (6,00,000 + 3,00,000 + 50,000)	2,45,000* (1,25,000 + 1,00,000 + 25,000 – 50,000 × 0.10)
B, C, F	9,50,000 (5,00,000 + 4,00,000 + 50,000)	2,20,000* (1,00,000 + 1,00,000 + 25,000 – 50,000 × 0.10)
C, D, E, F	9,50,000 (4,00,000 + 3,00,000 + 2,00,000 + 50,000)	2,95,000* (1,00,000 + 1,00,000 + 75,000 + 25,000 – 50,000 ×0.10)

*Here, ₹(50,000 × 0.10) = ₹5,000 is the loss due to unutilised investment.
Since NPV is the highest for the combination (B, D, E, F), the projects to be selected are B, D, E and F.

12. A firm proposes to market a cheaper variety of its existing brand to be sold for ₹20 per unit, estimated product-life being five years. The sales volume for the five years has been estimated to be 30,000 units for the first year, 40,000 units for each of the next two years and 20,000 units for each of the last two years. The variable cost p.u. is ₹10. Production of the cheapest brand will entail an initial expenditure of ₹ 4,50,000 in purchasing and installing a new plant with estimated economic life of five years and scrap value of ₹50,000. The fixed cost of ₹ 2,00,000 per annum including depreciation on the plant on straight-line basis will be needed for producing and marketing the cheaper brand. Introduction of this cheaper variety is also likely to have an adverse impact on the demand of the existing dearer brand resulting in loss of contribution estimated at ₹20,000 per annum.

Assuming cost of Capital to be 10% and marginal tax rate to be 40%, you are required to evaluate proposal and give your reasoned recommendation as to its acceptance or rejection. The PV factors at 10% for five years are 0.909, 0.826, 0.751, 0.683 and 0.62.

Solution

Calculation of Cash Flow before Depreciation and Tax (CBDT)

Year	Sales (Units)	Sales @ ₹ 20 p.u (₹)	Variable Cost @ ₹10 p.u (₹)	Fixed Cost excluding Depreciation (₹)	CBDT (₹)
1	30,000	6,00,000	3,00,000	1,20,000	1,80,000
2	40,000	8,00,000	4,00,000	1,20,000	2,80,000
3	40,000	8,00,000	4,00,000	1,20,000	2,80,000
4	20,000	4,00,000	2,00,000	1,20,000	80,000
5	20,000	4,00,000	2,00,000	1,20,000	80,000

Note: Depreciation = ₹(4,50,000 – 50,000) Π 5 = ₹80,000 p.a.
Fixed cost excluding depreciation = ₹(2,00,000 – 80,000) = ₹1,20,000

Calculation of Cash Flow After Tax (CFAT)

Year	CBDT (₹)	Depreciation	Taxable Profit (₹)	Tax (₹)	CFAT excluding Loss of Contribution	Loss of Contribution (₹)	CFAT (₹)
(1)	(2)	(3)	(4)	(5)	(6) = (2) – (5)	(7)	(8) = (6)+(7)
1	1,80,000	80,000	1,00,000	40,000	1,40,000	20,000	1,20,000
2	2,80,000	80,000	2,00,000	80,000	2,00,000	20,000	1,80,000
3	2,80,000	80,000	2,00,000	80,000	2,00,000	20,000	1,80,000
4	80,000	80,000	Nil	Nil	80,000	20,000	60,000
5	80,000	80,000	Nil	Nil	80,000	20,000	1,10,000

*Note: The cash flow of fifth year includes ₹50,000 scrap value.

Calculation of NPV

Year	**CFAT (₹)**	**PVIF @ 10%**	**PV of CF**
1	1,20,000	0.909	1,09,080
2	1,80,000	0.826	1,48,680
3	1,80,000	0.751	1,35,180
4	60,000	0.683	40,980
5	1,10,000*	0.621	68,310
Total PV			5,02,230
(–) Initial Investment			4,50,000
NPV			52230

Since NPV of the project is positive, it may be recommended.

13. An investor facing two mutually exclusive projects having life span of four years each provides you the following particulars.

Particulars	Proposal X	Proposal Y
Life of the project (years)	**4**	**4**
Initial Investment (₹)	**1,60,000**	**48,000**
Net Cash Flow (₹)		
Year 1	**56,000**	**19,600**
Year 2	**56,000**	**19,600**
Year 3	**56,000**	**19,600**
Year 4	**56,000**	**19,600**

Rank the two proposals under NPV and IRR method assuming a cost of capital of 10% p.a. Is there any conflict in ranking? If so, how will you resolve the same?

Solution:

Calculation for NPV of the Proposals

Year	Proposal X	Proposal Y	PVIF @ 10%	Proposal X	Proposal Y
1	56,000	19,600	0.909	50,904	17,816
2	56,000	19,600	0.826	46,256	16,190
3	56,000	19,600	0.751	42,056	14,720
4	56,000	19,600	0.683	38,248	13,386
Total PV of Cash flow			1,77,464		62,112
(–) Initial Investment			1,60,000		48,000
NPV			17,464		14,112
Rank			1		2

Calculation for IRR of the proposals

Proposal X:

Here fake payback period = Initial Investment 1,60,000 = Annual Cash Flow 56,000 = 2.857

From the PV table we find that the value nearest to 2.857 for 4 years is 2.855 for 15%. So 15% can be taken (approximately) as the IRR.

Proposal Y:

Here fake payback period = Initial Investment 48,000 = Annual Cash Flow 19,600 = 2.4490

From the PV table we find that the value nearest to 2.449 for 4 years is 2.448 for 23%. So 23% can be taken (approximately) as the IRR.

So, ranking based on IRR is:
Proposal X = Rank 2
Proposal Y = Rank 1

Thus, there appears a conflict between the proposals as regards to their ranking under the two methods.

Final Selection:
Between NPV and IRR, NPV method is always a better approach because –

(a) NPV method attempts maximization of the benefits from any project in terms of present value. Therefore, this is in line with the corporate objective of valuemaximization of the firm.

(b) NPV is based on more rational assumption regarding the re-investment rate than that of IRR.

Thus, finally we adopt NPV method and select proposal X having higher NPV.

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