

**APPROACHES/ MEANING OF F.M.**

The basic message behind the statement “Financial Management is concerned with the solutions of the three major decisions a firm must make the investment decision, the financing decision and the dividend decision”, is self-evident.

A firm created because the founders of the firm believe that there is an opportunity to make profitable investment. This profitable investment need to be financed and profit distributed amongst those who have contributed the capital. Hence, there is need for decisions such as how to finance investment? How to distribute profit among shareholders?

Modern Approach of financial management basically provides a conceptual and analytical framework for financial decisions making. It emphasizes on an efficient and broken down into three different decisions:-

- 1) Investment Decisions;
- 2) Financing Decisions; and
- 3) Dividend Decisions

**1) Investment Decisions**

These involve the allocation of resources among various type of assets. What portion of the firm’s fund should be invested in various current assets such as cash, marketable securities and receivable and what portion in fixed assets, such as inventories and plant and equipment. The assets mix affects the amount of income the firm can earn.

For examples, a manufacturer is in business to earn income with fixed assets such as machinery and not with current assets. However, placing too high a percentage of its asset in new building or new machinery may leave the firm short of cash to meet an unexpected need or exploit sudden opportunity.

The firm’s financial managers much invest in fixed assets, but not too much. Besides determining the assets mix, financial manager must also decide what type of fixed and current assets to acquire. All this covers area pertaining to capital budgeting and working capital management.

**2) Financial Decision**

It is the next step in financial management for executing the investment decisions once taken. A look at the balance – sheet of a company indicates that it obtains finance from shareholders ordinary, preference, debenture holders, or long - term loans from the institutions, banks and other sources.

These are variations in the provisions contained in preference shares, debentures, loans papers etc. thus financing decisions are concerned with the determination of how much to obtain from one source and how much from other or others i.e. the financing mix of capital structure. Efforts are made to obtain an optimal financing mix for a particular company.

This necessities study of capital structure is also the short and intermediate term financing plans of the company. In more advanced companies financing decision today, has become fully – integrated with top – management policy formulation via capital budgeting, long – range planning, evaluation of alternate uses of funds, and establishment of measurable standards of performance in financial terms.

**3) Dividend Decisions**

The third major decision of financial management is the decision relating to the dividend policy. The dividend decision should be analysed in relation to the financing decision in relation to the financing decision of a firm.

Two alternatives are available in dealing with the profits of a firm; they can be retained in the business. Which courses should be followed – dividend or retention?

One significant element in the dividend decision is therefore the dividend payout ratio, i.e. what proportion of net profits should be paid out to the shareholders.

The decision will depend upon the preference of the shareholders and investment opportunities available within the firm.

The second major aspect of the dividend decision is the factors determining dividend policy of a firm in practice

**Q. 1. (Dec 2008)** Investment, financing and dividend decisions are inter-related.

( June 2005) State with reasons whether the investment financing and dividend decisions are inter-related.

**Ans. 1. Objective**

- The underlying objective of all the three decisions viz. — Investment, Financing and Dividend decisions, is “maximization of Shareholders’ wealth”.
- The Finance Manager has to consider the joint impact of these three decisions on the market price of the Company’s Shares.

**2. Linkage**

- A new project (investment) needs finance. Also, a Company may have to expand/develop its operations, which require funds. Hence Investment Decisions is based on the Financing Decision.
- The Financing decision is influenced by, and influences the Dividend decision, since Retained Earnings used in internal financing means reduction in dividends paid to Shareholders.
- So, the inter-relationship between the three types of decisions should be analyzed jointly, in order to maximize the Shareholders’ wealth.

**3. Decision-Making:** The three decisions can be linked to maximize Shareholders’ Wealth, in the following manner —

a) Investment Decisions:

- ✓ Investment in Long Term Projects should be made after Capital Budgeting and uncertainty analysis.
- ✓ Projects which give reasonable returns (higher than cost) in order to add to the surplus of the Shareholders’, should be selected.
- ✓ The returns should be high enough as to distribute reasonable dividends and also retain adequate resources for the Company’s growth prospects.

b) Financing Decisions:

- ✓ Proper balancing between long-term and short-term funds, as well as own funds and loan funds, will help the Firm to minimize its overall cost of capital and increase its wealth/value.
- ✓ Low cost of funds will mean higher profit margins, which can be used for dividend distribution as well as internal financing of new projects/growth plans.

c) Dividend Decisions:

- ✓ The optimum dividend pay-out ratio ensures that shareholders’ wealth is optimized.
- ✓ Where the funds at the disposal of the Company earn a higher return than if distributed to shareholders, wealth maximization can be achieved by retaining the funds, rather than declaration of dividend.

**Q. 2. [June 2003]** Write short notes on “Profit maximisation” vs. “Wealth maximisation”?

**Ans. Profit Maximisation**

Profit maximisation is one of the objectives of financial management since profit act as a reward for taking risk and is also an icon of business performance.

Evaluation of profit maximisation as one of the objectives of financial management:-

**Advantages of Profit Maximisation**

- 1) The ultimate objective of each business is profit maximisation.
- 2) Profit acts as a reward for taking risk.
- 3) It helps to counteract with the future uncertainties.
- 4) Profit is also an icon of business performance.
- 5) Last but not the least; profit is the measuring rod which measures the financial soundness of any organisation.

**Disadvantages of Profit Maximisation**

Reasons as to why profit maximisation is not an objective of financial management:-

- 1) Profit maximisation is a narrow approach and ignores many obligations.
- 2) Profit is a vague term since different persons have different perspective for the very same term.
- 3) It ignores the timing of return.
- 4) Does not take into account the risk factor.
- 5) Lastly, it is a short term concept only.

**Wealth Maximisation**

It is a long term objective of financial management whereby the business strives to increase the wealth of the shareholders i.e. the stockholding of individual shareholder by maximising the market price per share.

**Advantages of Wealth Maximisation**

- 1) As against the profit maximisation, the approach of wealth maximisation is long term in nature.
- 2) It does consider the timing impact.
- 3) It takes into account the concept of risk and uncertainty.

**Disadvantages of Wealth Maximisation**

- 1) Lack of direct relationship between financial decisions and prices of shares.
- 2) Merely an increase in shareholder's wealth does not lead to wealth maximisation since there exist a large number of other stake holders also.

**Q. 3. [Dec 2006]** Write a short note on 'Economic Value Added'.

**(June 2009)** Discounted cash flow is very close to economic value added. Comment.

**(Dec 2006)** Economic value added (EVA) and wealth maximization.

**(Dec 2005)** Economic value added (EVA) concept is in conformity with the objective of wealth maximization. Explain.

**Ans.**

- Economic value added (EVA) is the after tax cash flow generated by a business minus the cost of the capital.
- EVA underlines shareholder value. Discounted cash flow is very close to economic value added, with the discount rate being the cost of capital.
- There are two key components to EVA.
  - The net operating profit after tax (NOPAT) and
  - the capital charge, which is the amount of capital times the cost of capital.
- In other words, it is the total pool of profits available to provide cash return to those who provided capital to the firm.
- $EVA = (\text{Operating Profit}) - (\text{A Capital Charge})$   
 $EVA = \text{NOPAT} - (\text{Cost of Capital} \times \text{Capital})$
- Although EVA is a value based measure, and it gives in valuations exactly same answer as discounted cash flow, the periodic EVA values still have some accounting distortions.
- That is because EVA is after all an accounting-based concept and suffers from the same problems of accounting rate of returns (ROI etc.) In other words, the historical assets values that distort ROI distort EVA values also.

**Q. 4. [June 2007]** Write notes on Financial Distress?

**Ans.** The term 'financial distress' denotes a situation wherein the financial position and affairs of any firm is endangered.

- A Capital structure with high quantum of debt can prove adverse in case there is paucity of cash inflows.
- Failure to pay interest and principal can further worsen the situation since there will be a mounting pressure from providers of finance.
- Further, it may lead the organisation to what is known as financial distress.
- Under financial distress the firm repays the debt taken and accumulated interest by resorting to such practices like selling asset at low prices which consequentially prove quite disastrous to the organisation as a whole.
- But if the organisation is unable to settle out its dues, there arises the situation of what is known as bankruptcy.

**Q. 5. [June 2007]** Distinguish between of the following: 'Financial Distress' and 'Insolvency'?

**Ans.**

S No.	Financial Distress	Insolvency
1	It is a condition where the obligations of the firm are met with great difficulty.	It is a condition where the obligations of the firm are not met.
2	It is short term.	It is forever.
3	Firm can recover from this situation.	Firm has to close down in this situation.
4	It is majorly caused due to external factors.	It is majorly caused by both external & internal factors.
5	Financial Distress slowly leads to bankruptcy.	Insolvency is another form of bankruptcy.
6	This is the cause.	This is the effect.

**Q. 6. [June 1999]** "The financial manager's primary task is to plan for the acquisition and use of funds so as to maximise the value of the firm". Do you agree? Comment.

**Ans.**

- Financial management is concerned with the effective procurement, utilisation and ultimate disposal of funds.
- It is the function of financial managers to maximise the wealth of the owners.
- It is the financial manager who strikes out the balance between profitability and liquidity.
- Financial manager has the following responsibilities on his shoulder:-
  - Forecasting the funds so required.
  - Procurement of funds.
  - Effective utilisation of funds.
  - Keeping cost control
  - Maintaining liquidity.
  - Forecasting high profitability.
- He is thus concerned with the triple decisions of investment, financing and dividend which lay the very foundation of financial management.
- In the modern day world, the responsibilities of financial manager have increased drastically covering a wide scope of activities.
- Thus, it can be concluded that financial manager is concerned with the acquisition and use of funds so as to maximise the value of firm.

**Q. 7. [June 2001]** Explain the salient features of financial sector reforms in India.

**Ans.** Salient / peculiar features of financial sector reforms undertaken in India are as follows:-

**1) Policy framework**

Financial sector reforms in relation to policy framework means simplification of certain factor being:-

- Allowing banks to freely determine the interest rate policy thereby freeing them from the clutches of administered interest rates.
- Lowering down the requirements for depositing the amounts in relation to Capital Reserve Ratio (CRR) and Statutory Liquidity Ratio (SLR) enhances the bank's accessibility to funds and thus create more credit.
- Granting funds to priority sectors with higher demands at general interest rate is surely a step towards bank's profitability since this caters both to the needs of the country ensuring that the funds are channelised to priority sector and at the same time guarantees the same to be lucrative assignment to banks also.

**2) Improvement in Financial health**

With a view to improve the financial health, following two initiatives were taken:-

- Prudential norms and regulations
- Greater transparency and accountability.

**3) Institutional Strengthening**

Measures were taken to strengthen the banking system by introducing competitiveness so as to gear them to face challenges and threat created from other banks and NBFC.

**Q. 8. [Dec 2001]** "In the current economic scenario, financial management has assumed much greater significance. It is now a question of survival of entities in the total spectrum of economic activity, with the pragmatic re-adjustment of financial management." Comment.

**Ans.** Financial management is concerned with the efficient procurement and utilisation of the funds.

It embraces in it all the activities concerned with raising funds, investing them in the desired areas and distributing surplus so earned to the shareholders termed as financing, investment and dividend decisions respectively.

**Investment decision**

These decisions are concerned with allocation of funds which will result in future benefits. Before making investment, cut off rate needs to be decided. Also, evaluation of the various projects has to be done in terms of net present value and decide which project to invest in.

**Financing decision**

Once it is decided where to invest, the next question is to decide how to acquire funds for investing the same in the desired projects. Financing decision also ambits in itself the decision regarding the proportion of debt and equity. It aims towards achieving what is known as optimum capital mix.

**Dividend decisions**

This decision takes into account the manner in which the surplus generated is to be distributed and how much to retain. Determination of dividend payout ratio and retention ratio depends upon a large number of factors.

**Q. 9. [June 2002]** "The responsibilities of the financial managers are linked to the goal of ensuring liquidity, profitability or both and are also related to the management of assets and funds of any business enterprise." Comment.

**Ans.** Finance manager occupies a pivotal position in the organizational structure. Some of the functions performed by a finance manager are as follows:-

**Forecast**

Finance manager has to forecast the financial requirement of the organisation.

**Procurement**

He has to decide the correct proportion between debts and capital. He tries to set an optimum capital structure. A large number of options are available at his disposal from where he tries to select the best.

**Investment**

After the finance manager forecasts I estimate the fund requirement, he chalks out the course of action to be taken and procures the desired amount of funds from the best source. There is need for actual execution by investing the funds in the desired projects.

**Dividend decision**

It is upon the finance manager to decide how to dispose off the surplus considering the various relevant factors. He is to decide the optimum dividend payout ratio and retention ratio.

**Liquidity maintenance**

Liquidity maintenance is of crucial importance since liquidity mismanagement may even lead to situation of financial distress and eventually insolvency / bankruptcy.

**Cash management**

Financial manager has to ensure that neither there is shortage of cash nor there is situation of idle cash. Thus, he has to properly channelise idle cash and also carefully handle situations wherein deficit cash balance exist.

**Q.10. [Dec 2002]** “Financial sector reforms aim at promoting a diversified, efficient and competitive financial sector with ultimate objective of improving the allocative efficiency of available resources, increasing the return on investments and promoting an accelerated growth of real sectors of economy.” Comment.

**Ans.** Financial sector reforms aims at promoting diversified, efficient and competitive financial sector with ultimate objective of improving the allocative efficiency of available resources, increasing the return on investments and promoting an accelerated growth of real sectors of economy.

Following reforms in the field of financial system were needed:-

- Structural reforms in indigenous financial systems.
- Easy reach to international financial system.
- Developing markets for long term as well as short term financial instruments.
- Formulation of policies to handle up cases of bankruptcy of financial intermediaries.
- Introduction of prudential norms and regulation.
- Injecting weaker banks by means of restructuring.
- Altering the policy framework of financial sector by allowing them to freely determine interest rate and relaxing the CRR and SLR requirements.
- Strengthening financial infrastructure and also managerial.
- Competence.

**Q.11. [June 2007]** ‘Wealth maximisation’ objective of the financial management is redefined as ‘value maximisation’. Comment.

**Ans.**

- Wealth maximisation objective of the financial management is redefined as value maximisation.
- The objective of wealth maximisation talks about increasing the wealth of equity shareholders.

- Increase in wealth of shareholders calls for increase in market price of shares.
- Thus, what is required ultimately is the increase in market price or market value of shares.
- Therefore, the concept of wealth maximisation can better be construed as value maximisation.

**Q.12. [Dec 2007]** Taxation provisions have a significant effect on financial planning of a company. Comment.

**Ans.**

- It is true to say that taxation provisions have a significant effect on financial planning of a company.
- Financial management is concerned with the effective procurement and utilisation of funds.
- The scope of financial management is wide enough and covers in its purview the investment, financing and dividend decisions.
- Finance manager has to assess and consider the impact of taxes in relation to each of these three decisions.
- While determining investment decisions the amount of debt should be taken into consideration since interest on debt is a charge also the amount of tax on distribution of dividend in case of dividend decisions are to be taken care off.

**Q.13. [June 2008]** “An investor suffers dilution of financial interest when he does not exercise his pre-emptive rights.” Comment.

**Ans.**

- Section 81 of the Companies Act, 1956 covers the concept of pre-emptive rights.
- According to Section 81, the company shall be bound to offer the new issue to existing shareholders before making them available to the new ones.
- Existing shareholders shall have the option whether to subscribe the new shares or not.
- In case shareholder does not exercise his pre-emptive rights his financial interest dilutes.

**Q.14. [Dec 2009]** Financial sector acts as conduit for the transfer of financial resources from net savers to net borrowers. Comment.

**Ans.**

- In any economy, the financial sector plays a major role in the mobilization and channelising of saving.
- Financial institutions, instruments and markets which constitute the financial sector.
- They act as conduit for the transfer of financial resources from net savers to net borrowers.
- Financial sector performs this basic economic function of intermediation essentially through transformation mechanisms.

**Q.15. [June 2010]** Traditional approach of business finance considers efficient utilization of resources. Comment.

**Ans.**

- The traditional approach of finance was concerned merely with procurement of funds.
- The approach includes passes instrument selection, institutions through which funds are raised and legal and accounting practices and their relationship with the enterprise.
- The traditional approach played very little role in financial planning and direction.
- Efficient utilization of resources alongwith financing decisions requires financial planning and proper direction.

**Q.16. [Dec 2011]** Comment on the following:

- a) **Financial gearing is a double-edged sword.**
- b) **Financial policy and corporate strategy are most significant concerns of top management.**

**Ans. a) Financial gearing is a double-edged sword**

- Financial leverage is calculated as a relation between EBIT (Earning Before Interest and Tax) and EBT (Earning Before Tax)
- A high financial leverage has a positive impact on EPS (Earning Per Share) and consequently MPS (Market Per Share)
- A higher EBIT has potential of covering interest expense and consequently result in higher EPS.
- Financial gearing is often termed as a fair weather friend.
- It is so, because a high financial leverage may prove out to be quite a risky if EBIT is not sufficient to cover the interest expense.
- Thus, financial gearing proves out to be a double edged sword since it will help to accelerate the EPS when the company is doing well. However, in case the vice versa happens i.e. the company is not performing well, EPS of geared company falls down in a greater proportion than that of a low geared company.

**b) Financial policy and corporate strategy are most significant concerns of top management**

- Financial policy & corporate strategy are the most significant concerns of the top management.
- Financial policy is the backbone and helps the top management to determine strategy.
- They are the basic tools which aid management in taking decisions & execution of plans.
- Financial policy ambits in itself all the 3 dimensions - financing, investing & dividend decision.

**Q.17. [Dec 2007]** Distinguish between of the following: 'Business risk' and 'Financial risk'?

**Ans.**

S. No.	Business Risk	Financial Risk
1	It is the risk that encompasses in it the threat of variation of return	Financial risk is the risk associated with fixed rate charges like interest etc.
2	It is concerned with Earning Before Interest and Tax i.e. EBIT	It deals with EAIT i.e. Earning After Interest and Tax.
3	It is also called operating risk	Inability to manage the financial risk to lead to a situation known as financial distress.

**Q.18. [Dec 1998]** Discuss the impact of globalisation on the financial decision making of corporate enterprises. Also discuss the impact of liberalisation on Indian industry?

**Ans.**

- The New Economic Policy (N.E.P.) was introduced in the year 1991.
- Liberalisation, privatisation and globalisation were the chief sectoral reforms adopted as per the N.E.P.
- These initiatives were taken with a view to increase the country's competitiveness and meet the global challenge.
- All these sectoral reforms aimed towards effective and efficient use of the resources.
- Globalisation aims at integrating the economy of the country with that of the world's economy.
- Integration of domestic market with that of global market has surely unveiled new opportunities, though at the very same time some sort of threat in form of challenges and competition have also crept in.
- Liberalisation, on the other hand, refers to the simplification process whereby the country adopts liberalised and flexible approach like delicensing and deregulation.



- Both the processes of globalisation and liberalisation have augmented trade and had contributed a long way in the growth and development of Indian economy.

**Q.19. [June 2003]** Liquidity and profitability are competing goals for the finance manager. Comment.

**Ans.**

- Liquidity ensures the ability of the firm to honour its short term commitments, that means, the firm has adequate cash, to pay for its bills, to make unexpected large purchases and to meet contingencies, at all times.
- It also reflects the ability of the firm to convert its assets into cash and pay off liabilities quickly.
- Under liquidity management, the finance manager is expected to manage all its current assets including near cash assets in such a way as to ensure its effectively with the view to minimize its costs.
- Under profitability objective, the finance manager is expected to utilize the funds of the firm in such a manner as to ensure the highest return.
- However, the two objectives of the liquidity and profitability have inverse relationship
- If liquidity increases profitability decreases and vice-a-versa.

**Time Value of Money**

The time value of money has been referred to as an axiom of financial management. The concept of TVM refers to the fact that money received today is different in its worth from the money receivable at some other time in future. In other words, the same principle can be stated as that the money receivable in future is less valuable than the money received today. There are several reasons for this preference for current money as follows:

1. Future Certainty
2. Preference for present consumption.
3. Reinvestment opportunity.

The Future Value (FV) of Present Value (PV) Money is calculated as follows:

$$FV = PV (1+r)^n$$

where

$$\begin{aligned} FV &= \text{future value} \\ PV &= \text{present value} \\ r &= \% \text{ rate of interest} \\ n &= \text{Time gap} \end{aligned}$$

Example:

The above formula can be also written in terms of finance as

$$FV = PV (CV f(r,t))$$

Note:

If compounding is made N number of times in a year then FV is calculated as follows:

$$FV = PV (1+r/M)^{M.n.}$$

Or

$$FV = PV \times CV f(r/M, Mn)$$

**Effective Rate of Interest**

The effective rate of interest is the annually compounded rate of interest that is equivalent to an annual interest rate compounded more than once per year. The effective rates of interest are equal whenever they generate the F.V.

Mathematically:

$$1+r_e = (1+r/M)^{M \times n} - 1$$

where

$$\begin{aligned} r_e &= \text{effective rate of interest} \\ r &= \text{normal rate of interest p.a.} \\ M &= \text{number of compounding period in a year.} \end{aligned}$$

**Future value of a series of equal cash flows or annuity of cash flows:**

When same amount is deposited under same interval of time in that case future value is determined by using the formula of compound value annuity factor.

$$FV = \text{Annuity amount} \times CVAf_{(r,n)}$$

**Discounting Technique**

The reverse of compounding technique is known as discounting technique. In case of discounting technique the future cash inflow determined in terms of present cash inflow. There are two way of finding PV of FV.

1. Present Value Factor
2. Present Value Annuity Factor

1. In case of present value factor the cash inflow in future in a particular point of time for example. If we receive Rs. 1000 after five years then PV is calculated as

$$PV = 1000 \times PV f(r,5)$$

2. Present value annuity factor is used. If certain amount in each year received for example. If Rs. 1000 is received at the end of each year from 1 to 5.

$$PV = 1000 \times PVA f(r, 5)$$

Perpetuity: - A perpetuity may be defined as an infinity series of equal cash flows occurring at regular intervals.

$$PV_p = \frac{\text{Annual Cash Flow}}{r}$$

**For example:**

Find out the present value of an investment which is expected to give a return of Rs. 2500 p.a. indefinitely & the rate of interest is 12%.

$$PV_p = \frac{2500}{0.12} = 20833.33$$

$$PV_p = \frac{\text{Annual Cash Flow}}{r}$$

$$\text{at } r = 8\% = 0.08$$

$$PV_p = \frac{80}{0.08} = 1000 \text{ No.}$$

$$\text{at } r = 5\% = 0.05$$

$$PV_p = \frac{80}{0.05} = 1600 \text{ Yes}$$

**Annuity Due: -**

The discussion of FV or the PV of an annuity was based on the presumption that the cash flows occur at the end of each of the periods starting from now. However, in practice the cash flow may also occur in the beginning of each period. Such a situation is known as annuity due.

FV of an annuity due

$$FV = [\text{Annuity amount} \times CVA f(r, n)] (1+r)$$

PV of an annuity due

$$PV = [\text{Annuity amount} \times CVA f(r, n)] (1+r)$$

**Sinking Funds**

It is a fund which is created to accumulate a target amount over a given period inclusive of interest for a period in such a way that the annual amount being subscribed over the period is same for all years.

FV of an annuity due

$$FV = [\text{Annuity amount} \times CVA f(r, n)]$$

It may be noted that factor  $1/CVA f(r, n)$  is also known as the sinking fund value factor.

**Capital Recovery**

Some times, one may be interested to find out the equal amount paid in order to redeem a loan of a specified amount over a specified period together with the interest at a given rate for that period. For example, Rs.1,00,000 borrowed today is to be repaid in five equal installments payable at the end of each next 5 years in such a way that the interest at 10% p.a. this annuity amount is calculated as follows:

$$PV = [\text{Annuity amount} \times PVAf(r, n)]$$

$$\begin{aligned} \text{Annuity Amount} &= \frac{PV}{PV f(r, n)} \\ &= \frac{1,00,000}{3.791} = 26.378 \end{aligned}$$

- INTRODUCTION
- COMPOUNDING TECHNIQUE
- EFFECTIVE RATE OF INTEREST

**Q. 1.** A deposit of Rs. 10, 000 is made in a bank for a period of 1 year. The bank offers two options:

- (i) to receive interest at 12% p.a. compounded monthly or
- (ii) to receive interest at 12.25% p.a. compounded half yearly.

**Ans.** 12.68 %

Which option should be accepted?

**Ans.** 12.65%

• **DISCOUNTING TECHNIQUE**

**Q. 2.** Find out present values of the following:

- a) Rs. 1, 500 receivables in 7 years a discount rate of 15%;

**Ans.** 564

- b) an annuity of Rs. 760 starting after 1 year for 6 years at an interest rate of 12%.

**Ans.** 3125

- c) an annuity of Rs. 5, 500 starting in 7 years time lasting for 7 years at a discount rate of 10%;

**Ans.** 15110

- d) an annuity of Rs. 1, 000 starting immediately and lasting until 9<sup>th</sup> year at a discount rate of 20%;

**Ans.** 4837

• **DISCOUNTING TECHNIQUE IN CASE OF PERPETUITY**

**Q. 3.** Find out the present value of an investment which is expected to give a return of Rs. 2, 500 p.a. indefinitely and the rate of interest is 12% p.a.

**Ans.** 20833.33

**Q. 4.** A finance company makes an offer to deposit a sum of Rs. 1, 100 and then receive a return of Rs. 80 p.a. perpetually. Should this offer be accepted if the rate of interest is 8%? Will the decision change if the rate of interest is 5%?

**Ans.** 1000

**Q. 5.** Find out present values of the following:

A perpetuity of Rs. 400 starting in year 3 at a discount rate of 18%.

**Ans.** 1596

• **SINKING FUNDS**

**Q. 6.** An amount of Rs. 1, 00, 000 is required at the end of 5 years from now to repay a debenture liability. What amount should be accumulated every year at 10% rate of interest so that it ultimately becomes Rs. 1, 00, 000 after 5 years?

**Ans.** 16380

• **CAPITAL RECOVERY**

**Q. 7.** Calculate yearly installment to be paid for Rs. 1, 00, 000 borrowed today is to be repaid in five equal installments payable at the end of each of next 5 years in such a way that the interest at 10% p.a. for the intervening period is also repaid.

**Ans.** 26378

• **DEFFERED ANNUITY**

**Q. 8.** A loan of Rs. 1, 00, 000 is taken on which interest is payable @ 10%. However, the repayment is to start only at the end of third year from now. What should be the annual payment is the total loan and interest is to be repaid in six installments?

**Ans.** 27784

**Q. 9.** What is the present value of cash flows of Rs. 750 per year forever (a) at an interest rate of 8% (b) at an interest rate of 10% ?

**Ans.** 9375, 7500

**Q.10.** A company has issued debentures of Rs. 50 lacs to be repaid after 7 years. How much should the company invest in a sinking fund earning 12% in order to be able to repay debentures ?

**Ans.** 495589

**Q.11.** What is the present worth of operating expenditures of Rs. 1, 00, 000 per year which are assumed to be incurred continuously throughout in 8 year period if the effective annual rate of interest is 12% ?

**Ans.** 496763

**Q.12.** A firm purchases a machinery for Rs. 8, 00, 000 by making a down payment of Rs. 1, 50, 000 and remainder in equal installments of Rs. 1, 50, 000 for six years. What is the rate of interest to the firm?

**Ans.** 10%

**Q.13.** Mr. X borrows Rs. 1, 00, 000 at 8% compounded annually. Equal annual payments are to be made for 6 years. However, at the time of fourth payment, the individual elects to pay off the loan. How much should be paid ?

**Ans.** 60207

**Q.14.** Ten year from now Mr. X will start receiving a pension of Rs. 3, 000 a year. The payment will continue for sixteen years. How much is the pension worth now, if his interest rate is 10% ?

**Ans.** 9952

**Q.15.** Novelty Industries is establishing a sinking fund to redeem Rs. 50, 00, 000 bond issue which matures in 15 years. How much do they have put into the fund at the end of each year to accumulate the Rs. 50, 00, 000, assuming the funds are compounded at 7% annually?

**Ans.** 19873

**Q.16.** XYZ Ltd. is creating a sinking fund to redeem its Preference capital of Rs. 5 lac issued on Jan 1, 1998 and maturing on Dec 31, 2009. The annual payment will start on Jan 1, 1998. The company will make equal payments and expects that the fund will earn 12% per year. How much will be the amount of sinking fund payment?

**Ans.** 18500

# CHAPTER 3.

## Cost of Capital

### COST OF CAPITAL

A company may raise long term funds from various sources such as Debt, Equity Share Capital, Preference share Capital, retained earnings each source has its own risk return expectation. Capital is a scarce source, hence has a cost. However, cost of each source difference.

#### Cost of Debt

##### 1. Cost of Debt ( $K_d$ )

A company may raise debt funds which carry an interest cost. The rules for computation of  $K_d$  have the similar principles however debts can be categorized into two types.

##### 2. Irredeemable/ perpetual debt:

There is no fixed period at the end of which the principle amount will be refund. However interest thereon is payable annually.

##### 3. Redeemable Debt:

This debt has a predetermined finite life at the end of which the principle amount will be repaid.

#### Impact of taxation on computation of $K_d$ :

Interest is a tax deductible expense. Since interest save tax, hence the effective cost of debt is post tax interest cost or interest (Net of tax) in relation to the funds to be used (Net proceeds).

#### Optimal choice of debt:

If a company can raise debt funds from more than one source, then it shall choose the debt which has a lesser effective or lower  $K_d$ .

**Q. 1.** A company has 10 per cent non – redeemable debentures of `5,00,000. Tax rate 40 %. Determine cost of capital if debt has been issued: (i) at par, (ii) at 10 per cent discount, and (iii) at 20 per cent premium.

**Ans.** 6.67%, 5%

**Q. 2.** A company issued `80,000. 12 per cent debentures of `100 each. Tax 40 per cent, redeemable after 10 years. Floating cost 10 per cent of issue price. Find cost of capital if issued at (i) par, (ii) 10 per cent discount and (iii) 10 per cent premium

#### Problem & solution based on cost of debt

**Q. 3. (a)** A company issues `10,00,000 16% Debentures of `100 each. The company is in 35% tax bracket. You are required to calculate the cost of debt, if debentures are issued at (i) par; (ii) 10% discount; (iii) 10% premium. ?

(b) If brokerage is paid at 2%, what will be the cost of debentures if issue is at par?

**Ans. (a)** Cost of Debentures after tax when debenture are:

$$(i) \text{ Issued at par } K_d = \frac{160000}{980000} \times (1 - 0.35) = 10.61\%$$

$$(ii) \text{ Issued at discount of 10\% } K_d = \frac{160000}{900000} \times (1 - 0.35) = 11.55\%$$

$$(iii) \text{ Issued at 10\% premium } K_d = \frac{160000}{1100000} \times (1 - 0.35) = 9.45\%$$

(b) If brokerage is paid @ 2% and debentures are issued at par:

$$\frac{160000}{980000} \times (1 - 0.35) = 10.61\%$$

- Q. 4.** (i) (A) A company issues `10,00,000 12% Debentures of `100 each. The debentures are redeemable after the expiry period of 7 year. The company is in 35% tax bracket. Required: to calculate the cost of debt after tax, if debentures are issued at  
 (a) par; (b) 10% discount (c) 10% premium.  
 (ii) If brokerage is paid at 2%, what will be the cost of debentures if issue is at par.  
 (B) X Ltd. issues 12% debentures of face value `100 each and realises `95 per debenture. The debentures are redeemable after 10 years at a premium of 10%. calculate the cost of capital presuming income tax rate is 50%.

**Ans. (A)(i)** 
$$K_d = \frac{I(1-t) + \frac{RV - NP}{N}}{\frac{RV + NP}{2}} \times 100$$

(a) 
$$K_d = \frac{12(1-0.35) + \frac{(100-100)}{7}}{\frac{100+100}{2}} = 7.8\%$$

(b) 
$$K_d = \frac{12(1-0.35) + \frac{(100-90)}{7}}{\frac{90+100}{2}} = \frac{7.8+1.43}{95} = 9.71\%$$

(c) 
$$K_d = \frac{12(1-0.35) + \frac{(100-110)}{7}}{\frac{110+100}{2}} = \frac{7.8-1.43}{105} = 6.067\%$$

(ii) 
$$K_d = \frac{12(1-0.35) + \frac{(100-98)}{7}}{\frac{98+100}{2}} = \frac{7.8+0.29}{99} = 8.17\%$$

(B) 
$$K_d = \frac{12(1-0.5) + \frac{(110-95)}{10}}{\frac{110+95}{2}} = 7.32\%$$

- Q. 5.** Calculate the cost of issued capital in each of the following cases:

- (i) A company issues 10% debentures of `10,00,000: (a) At par (b) At 10% discount (c) At 20% premium. Assuming the tax rate to be 28%.  
 (ii) A company has 11% debentures at `5, 00,000 standing in its balance sheet as on 31-03-2009 maturing after 5 years. Assume the same debentures could be issued now only at a discount of 20%, assuming the tax rate to be 28%.

**Ans. (a) (i)** Issued at Par 
$$K_d = \frac{1000000(1-0.28)}{1000000} = 0.072 = 7.2\%$$

(ii) Issued at Discount 
$$K_d = \frac{1000000(1-0.28)}{900000} = 0.08 = 8.0\%$$

$$(iii) \text{ Issued at Premium } K_d = \frac{100000(1-0.28)}{12000000} = 0.06 = 6.0\%$$

(b) Cost of debt (Post – Tax). [Where Redemption is not at par]

$$K_d = \frac{I(1-t) + (RV - NP) / MP}{(RV + NP) / 2} = \frac{55000(1-0.28) + (500000 - 400000) / 5}{(500000 + 400000) / 2} = 0.1324 = 13.24\%$$

## Previous year Problems & Solutions

**Q. 6. (I.C.W.A. Final June 1998)** Calculate the cost of capital in the following cases;

- (i) X Ltd. issues 12% debentures of face value `100 each and realises `95 per debenture. The debentures are redeemable after 10 years at a premium of 10%.
- (ii) Y Ltd. issues preference shares of face value `100 each carrying 14% dividend and he realizes `92 per share. The shares are repayable after 12 years at par.

**Note** - Both companies are paying income-tax at 50%.

**Ans. i) Cost of Debentures ( $K_d$ )**

$$= \frac{\left[ 12 + \left( \frac{110 - 95}{10} \right) \right] (1 - 0.50)}{\left( \frac{110 + 95}{2} \right)} = \frac{(12 + 1.5)(0.50)}{102.5} = 0.0658 \text{ or } 6.58\%$$

Answer as per other method 7.31%

**ii) Cost of Preference Capital ( $K_p$ )**

$$\frac{14 + \left( \frac{100 - 92}{12} \right)}{\left( \frac{100 + 92}{2} \right)} = \frac{14 + 0.67}{96} = 0.1528 = 15.28\%$$

**Q. 7. (I.C.W.A. Final Dec. 2000)** Calculate the approximate cost of companies Debenture Capital, when it decides to issue 10,000 Nos. of 14% non-convertible debenture, each of face value `100, at par. The debentures are redeemable at a premium of 10% after 10 years. The average realization is expected to be `92 per debenture and the tax rate applicable to the company is 40%.

**Ans. Calculation cost of Debenture ( $K_D$ )**

$$= \frac{\left[ 14 + \left( \frac{110 - 92}{10} \right) \right] (1 - 0.40)}{\left( \frac{110 + 92}{2} \right)} = \frac{(14 + 1.80)(0.60)}{101} = 0.0939 \text{ or } 9.39\%$$

Answer as per other method 10.09%

### Cost of preference

Cost of Preference Share Capital

Cost of preference shares ( $K_p$ ):

The rules for computation of  $K_p$  are similar to the rules for computation of  $K_d$ , with an exception that preference shares are not tax deductible expense.

Irredeemable Preference shares:  $K_p = \frac{D}{NP}$

Where,

D = amount of preference dividend

P = Net proceeds

Redeemable Preference shares:



$$K_p = \frac{D + \frac{RV - NP}{2}}{\frac{RV + NP}{2}} \quad RV = \text{Redeemable value,} \quad MV = \text{matured value}$$

**Q. 8.** XYZ Ltd. has issued 15% preference shares of the face value of ₹100 each to be redeemed after 10 years flotation cost is expected to be 4 percent.

- determine the cost of preference share
- determine cost of preference share if it is irredeemable
- If it is redeemable of a premium of 10%.

**Ans.** (a) 15.7% (b) 15.26% (c) 15.92%

**Q. 9.** Delhi Ltd. issued ₹100 lakhs 15% preference shares of ₹100 each. Redeemable at par after 5 years. Calculate the cost of preference shares in each of the following cases. (Assume dividend tax rate being 10%).

- If preference shares are issued at par with no flotation cost.
- If preference shares are issued at par with a flotation cost of 5% of issue price.
- If preference shares are issued at 10% premium with a flotation cost of 4% on issue price.
- If preference shares are issued at 5% discount with a flotation cost of 2% on issue price.

**Ans.** (a)  $K_p = \frac{D(1 + DDT)}{NP} = \frac{15(1 + 0.10)}{100} = 16.50$

$$(b) \quad K_p = \frac{15(1 + 0.10)}{95} = 17.37$$

$$(c) \quad K_p = \frac{15(1 + 0.10)}{105.60} = 15.63\%$$

$$(d) \quad K_p = \frac{15(1 + 0.10)}{93.10} = 17.72\%$$

**Solve the questions as per redeemable**

**Q.10.** Balance Ltd. issues preference shares of face value 100 each carrying 14% dividend and realizes ₹92 per share. The shares are repayable after 20 years at par.

$$\begin{aligned} \text{Ans.} \quad K_p &= \frac{D + (RV - NP) / n}{(RV + NP) / 2} \\ &= \frac{14 + (100 - 92) / 20}{(100 + 92) / 2} = 15\% \end{aligned}$$

### **Cost of Equity:-**

Unlike debt and preference share capital, equity shares do not carry a fixed cost however, the risk of equity shareholders is the maximum, hence, the  $K_e$  is the cost source. However, as the expectation of equity shareholders is not fixed, hence there is no single model used for computing  $K_e$ . There are 6 models used for computing  $K_e$ , there are:

- Dividends price model
- Earnings price model
- Dividends growth model
- Earnings growth model
- Capital assets pricing model
- Capital assets pricing model
- Realized yield model

#### **1. Dividend price model/ dividends yield model.**

Assumptions

That the dividend per share (DPS) & market price per share (MPS) remain constant forever

$$K_e = \frac{DPS}{NP/MPS}$$

**2. Earning price/ Earnings yield model:**

This model assume that the equity except a return of entire earnings and not just dividends in relation to the market value of equity share.

$$K_e = \frac{\text{EPS}}{\text{NP/MPS}}$$

**3. Dividends growth model/ Gordon Model:**

Myron Gordon developed a model to determine the desired return of equity shareholders. The models states that the equity shareholders expect to received dividends each year. Further if a company retains a part of the earnings, there will be growth in assets of the company & earnings of the company, thereby resulting in shareholders expectation to receive higher dividends every year & capital growth or growth in market value.

$$K_e = \frac{D_1}{P_0} + g$$

**Assumptions:**

1. That the firm has infinite life
2. That there are no extend sources of finance available for making new investment in future only. Internally generated funds or retained earnings can finance the fresh investments.
3. That the business risk complexion of the firm remains constant. In other words, rate of return on equity ® & cost of equity (equity capitalization rate =  $K_e$ ) remain constant.
4. That the shareholder expect to received dividends each year or cost of equity is more than the growth rate ( $K_e/g$ ).
5. That the growth rate is product retention ratio & rate of return on equity ( $r$ ) {ie.  $g = b \times r$ }

**4. Earnings- Growth Model (CAPM)**

CAPM was developed by William Sharpe, Jan Mossin & John Lintner individually, however the main credit of developing this theory goes to William Sharpe.

William Sharpe even received a Nobel Price award in 1990 which be shared with Merton Miller & Harry Markowitz.

Accounting to CAPM, the required rate of return of an investor in capital assets (an equity)shares or business) depends upon the level of risk exposure. Higher the risk, higher the expectation of return of investors. CAPM categorized risk into two types:

1. Systematic risk/ Market relate risk
2. Unsystematic Risk/ Company specific risk.

**1. Systematic Risk/ Market Related Risk**

The whole of the risk market is expected to this risk Every Capital Assets & business is affected by the change in the economic condition of the market change in interest rates, change in inflation rates, but at the different degree. The systematic or deviation of an assets return in relation to deviation in the market return rate is measured through a statistical measure called beta ( $\beta$ ).

**2. Unsystematic Risk/ Company specific risk.**

It is the firm specific risk. The whole of the stock is not expose to this risk, but only the firm under consideration is expected to this risk. The unsystematic risk can be avoided through diversification. CAPM advocate that unsystematic risk should be ignored while determining the required rate of return. E.g. Fire in factory of the firm. Ill health of key personnel, strike & lockouts.

The required rate of return can be determined for an asset as follows:

$$K_e = R_f + \beta[ER(m) - R_f]$$

$R_f$  = Risk free Rate of return

$ER(m)$  = Expected Return of market

$\beta$  = Beta coefficient// Market Sensitivity/ Market related risk of an asset

$ER(m)$  = Expected return of market

$ER(m) - R_f$  = Market risk premium

**Q.11.** Dividend per share is expected to be ₹1.20 at the end of year and is expected to grow at 6 per cent per year perpetually. Determine cost of equity capital if market price is ₹24 per share.

**Ans.** 11%

**Q.12.** Mr. X has purchased equity shares of a company, which paid a dividend of ₹5.00 per share last year. The dividend are expected to grow at 6 per cent for ever. Find cost of equity capital of the company if Mr. X purchased shares at the rate of ₹83.3 per share.

**Ans.**  $0.123625 = 12.36\%$

**Q.13.** A company is contemplating an issue of new equity shares. The current market price is ₹125 per share. The dividend per share for last five years, has been as follows:

1981	₹10.70
1982	₹11.30
1983	₹12.50
1984	₹13.20
1985	₹14.03

The floating costs are expected to be 5 per cent of issue price which is ₹125.

Determine (a) growth rate in dividends, (b) cost of equity capital assuming growth rate calculated by you, (c) cost of equity capital (new shares).

### **Problem & solution**

**Q.14.** XYZ & Co. has 20,000 equity shares of ₹10 each fully paid. The current market price per share is ₹20. Earnings available to the shareholders at the end of the period under consideration are ₹60,000. Calculate cost of equity share capital using earning/price ratio.

**Ans.** Earnings per share =  $\frac{60,000}{20,000} = ₹3$

Current market price per share = ₹20

Cost of equity capital =  $\frac{3}{20} \times 100 = 15\%$

**Q.15.** The current market price of an equity share of ₹10 is ₹20. The next expected dividend per share is 20%. The dividends are expected to grow at a rate of 5%. Calculate the cost of equity based on dividend growth model.

**Ans.** Next expected Dividend per share ( $D_1$ ) = 20% of ₹10 = ₹2

Market price ( $P_0$ ) = ₹20

Growth rate in dividend ( $g$ ) = 5%

$K_e = \frac{D_1}{P_0} + g = \frac{2}{20} + 0.05 = 0.10 + 0.05$

**Q.16.** A company's shares are quoted at ₹250. The dividend just paid was ₹50. Face value per share ₹100. No growth in dividend is expected. Compute  $K_e$ .

- Presume in the above **Question** the anticipated growth rate in dividends is 10% p.a. compute  $K_e$ .
- Persume in the above question the anticipated growth rate in dividends is 10% pa compute  $k_e$ .
- Presume in part (a), investors in the company have a required rate of return of 15%. Current dividends of ₹30 per share have just been paid. No increase in growth. Estimate the share price today.
- Presume in part (c) dividends are expected to grow @5% p.a. estimated share price today.

**Ans.** (a)  $P_0 = ₹250$

$$D_0 = ₹50$$

$$g = 0$$

$$D_1 = D_0 (1 + g)$$

$$D_1 = 50 (1 + 0)$$

$$D_1 = 50$$

$$K_e = \frac{D_1 + g}{P_0} = \frac{50}{250} = 20\%$$

$$K_e = \frac{55 + 10\%}{250} = 32\%$$

- (b)  $g = 10\%$

$$D_1 = D_0 (1 + g) = 50 (1 + 0.10) = 55$$

$$K_e = \frac{55 + 10\%}{250} = 32\%$$

- (c)  $K_e = 15\%$

$$D_0 = ₹30$$

$$D_1 = ₹30 (1 + 0) = ₹30$$

$$g = 0$$

$$P_0 = \frac{D_1}{K_e - g} = \frac{30}{0.15} = ₹200$$

- (d)  $g = 5\%$

$$D_1 = ₹30 (1.05) = ₹31.5$$

$$P_0 = \frac{D_1}{K_e - g} = \frac{31.5}{0.15 - 0.05} = ₹315$$

**Q.17.** A Company's share is quoted in market at ₹40 currently. A company pays a dividend of ₹2 per share and investors expect a growth rate of 10% per year, compute:

- The company's cost of equity capital.
- If anticipated growth rate is 11% p.a. calculate the indicated market price per share.
- If the company's cost of capital is 16% and anticipated growth rate is 10% p.a. calculate the market price if dividend of ₹2 per share is to be maintained.

**Ans.** (a)  $K_e = \frac{D_1 + g}{P_0} = \frac{2 + 0.10}{40} = 15\%$

$$(b) P_0 = \frac{D_1}{K_e - g} = \frac{2}{0.15 - 0.11} = \text{Rs.}50$$

$$(c) P_0 = \frac{D_1}{K_e - g} = \frac{2}{0.16 - 0.10} = \text{Rs.}33.33$$

**Q.18.** From the under mentioned facts determine the cost of equity shares of company X:

- (i) Current market price of a share = `150
- (ii) Cost of floatation per share on new shares, `3
- (iii) Dividend paid on the outstanding shares over the past five years:

Year	Dividend Per Share
1	`10.50
2	11.02
3	11.58
4	12.16
5	12.76
6	13.40

- (iv) Assume a fixed dividend payout ratio.
- (v) Expected dividend on the new shares at the end of the current year is `14.10 per share.

**Ans.** As a first step, we have to estimate the growth rate in dividends.

$$D_6 = D_0 (1 + g)^5$$

$$13.40 = 10.50(1 + g)^5 = 1.276$$

Using compounded value of `1 table (table C) in year 5, we get growth rate 5%.

$$K_e = \frac{\text{Rs.}14.10}{\text{Rs.}147(\text{Rs.}150 - \text{Rs.}3)} + 5\% = 14.6\%$$

**Q.19.** Naveda has issued 10,000 ordinary shares of `100 each. Details of the company's dividend per share during the past 4 years are as follows:-

Year	Dividend Per Share (`)
20X1	26
20X4	30

The current market value of each ordinary share of Naveda is `235 cum-dividend. The 20X4 dividend of `30 per share has just been paid. You are required to estimate the cost of capital for Naveda ordinary share capital.

**Ans.** In order to find out the cost of equity capital the growth rate,  $g$ , may be ascertained as follows:

$$D_1 (1 + g)^3 = D_4$$

$$26 (1 + g)^3 = 30$$

$$g = 4.9\%$$

The current market price i.e. `235 is cum-dividend and is inclusive of dividend of `30.

The ex-dividend price of the share is therefore,  $\text{`}235 - 30 = \text{`}205$ . The cost of equity capital, now, is

$$K_e = \frac{D_1}{P_0} + g = \frac{30(1 + 0.049)}{205} + 0.049 = 20.25\%$$

**Q.20.** On January 1, 2006, Canon Copy Machines (CMM), one of the favorites of the stock market, was priced at ₹300 per share. This price was based on an expected dividend at the end of the year of ₹3 per share and an expected annual growth rate in dividends of 20 percent into the future. By January, 2007, economic indicators have turned down, and investors have revised their estimate for future dividend growth of CMM downward to 15 percent. What should be the price of the firm's common stock in January 2007? Assume the following:

**A** A constant dividend growth valuation model is a reasonable representation of the way the market values CMM.

**B** The firm does not change the risk complexion of its assets nor its financial leverage.

**C** The expected dividend at the end of 20X7 is ₹3.45 per share.

**Ans.**  $P_0 = 300$

$D_1 = 3$

$g = 20\%$

$$K_e = \frac{D_1}{P_0} + g = \frac{3}{300} + 20\% = 21\%$$

$g = 15\%$

$D_1 = 3.45$

$K_e = 21\%$

$$P_0 = \frac{D_1}{K_e - g} = \frac{3.45}{21\% - 15\%} = \text{Rs. } 57.50$$

**Q.21.** A company has issued equity share capital having a face value of ₹10 at a premium of 10%, incurring 5% of the issue price as cost of issue. The expected rate of dividend is 20%. (i) What is the cost of equity capital? (ii) What is the cost of retained earnings if the market value of equity share is ₹15.

**Ans.** (i) Face Value / Nominal Value of Equity share = ₹10

Issue @ 10% premium

Issue price of the equity share = ₹10 (1 + 0.1) = ₹11

NP = ₹11 (1 - 0.05) = ₹10.45

$D_1 = 20\%$  of nominal value =  $0.20 \times ₹10 = ₹2$

$K_e = D_1 / P_0 = 2 / 15 = 0.1333 = 13.33\%$

**Q.22:** Y Ltd. retains ₹7,50,000 out of its current earnings. The expected rate of return to the shareholders, if they had invested the funds elsewhere is 10%. The brokerage is 3% and the shareholders come in 30% tax bracket. Calculate the cost of retained earnings.

**Ans.**  $K_{re} = K_e (1 - T_p) (1 - B)$

$K_{re} = 10\% (1 - 0.30) (1 - 0.03)$

$= 10\% (0.70) \times (0.97) = 6.79\%$

**Q.23.** Calculate the cost of retained earnings from the following information:

Current market price of a share ₹140

Cost of brokerage per share 3%

Growth in expected dividend 5%

Expected dividend per share on new shares ₹14

Shareholders marginal/personal income tax 22%

**Ans.**  $K_{re} = (D_1 / P_0 + g) (1 - T_p) (1 - B)$   
 $= (₹14 / ₹140 + 5\%) (1 - .22) (1 - .03)$   
 $= (10\% + 5\%) (.78) (.97)$   
 $= 15\% \times 0.78 \times 0.97 = 11.35\%$

**Cost of equity using capital assets pricing model**

**Q.24.** Modern Ltd's share beta factor is 1.40, the risk free rate of interest on a government security is 9%. The expected rate of return on market is 16%. Calculate cost of equity capital based on capital asset pricing model.

**Q.25.** Calculate the expected return on investment for Equity shareholders from the following data:

Risk-free return	10%
Market Return	12.5%
Beta	1.5

**Ans.** Return on investment = Risk free return +  $\beta$  (Market return – Risk free return)  
 $= 10\% + 1.5 (12.5\% - 10\%) = 13.75\%$

**Q.26.** You are given the following facts about a firm:

- (i) Risk-free rate of return is 11%.
- (ii) Beta co-efficient,  $\beta$  of the firm is 1.25

Compute the cost of equity capital using Capital Asset Pricing Model (CAPM) assuming a market return of 15% next year. What would be the cost of equity if  $\beta$  rises to 1.75.

**Ans.** (i)  $K_e = \text{Risk free return} + \beta (\text{Market return} - \text{Risk free return})$   
 $= 11\% + 1.25 (15\% - 11\%) = 16\%$   
(ii)  $K_e = 11\% + 1.75 (15\% - 11\%) = 18\%$

**Q.27.** Unlever Ltd. is an equity based firm with project undertaken viz. Project A, B and C with  $R_f$  8%,  $R_m$  12%

Project	Beta	Weight
A	1.3	0.5
B	1.0	0.3
C	0.8	0.2

**Compute Cost of Capital**

**Ans.** (i)  $ER(M) = 18\%$   
 $RF = 11\%$   
 $K_e = RF + \beta [ER(M) - RF]$   
 $= 11\% + 0.9 (18\% - 11\%) = 17.3\%$   
(ii)  $K_e = 21.6\%$   
 $21.6\% = 11\% + \beta (18\% - 11\%)$   
 $\beta = 1.514$

**(CA PE II Nov.2004)**

**Q28.** You are analyzing the beta for ABC Computers Ltd. and have divided the company into four broad business groups, with market values and betas for each group.

Business Group	Market value of Equity (₹ Billion)	Unleveraged Beta
Main frames	100	1.10
Personal computers	100	1.50
Software	50	2.00
Printers	150	1.00

ABC Computers Ltd. had ₹50 billion in debt outstanding:

**Required:**

- (i) Estimate the beta for ABC Computers Ltd. as a Company. Is this beta going to be equal to the beta estimated by regressing past returns on ABC Computers stock against a market index. Why or why not?
- (ii) If the treasury bond rate is 7.5%, estimate the cost of equity for ABC Computers Ltd. Estimate the cost of equity for each division. Which cost of equity would you use to value the printer division? The average market risk premium is 8.5%.

**Q.29.** (i) Beta of ABC computers =  $1.10 \times 0.25 + 1.50 \times 0.25 + 2 \times 0.125 + 1 \times 0.375 = 1.275$

(ii) Cost of equity =  $R_f + \beta \times \text{Mkt risk premium} = 7.5\% + 1.275 \times 8.5\% = 18.34\%$

Main frame  $K_e = 7.5\% + 1.10 \times 8.5\% = 16.85\%$

Personal Computers  $K_e = 7.5\% + 1.5 \times 8.5\% = 20.25\%$

Software  $K_e = 7.5\% + 2 \times 8.5\% = 24.5\%$

Printers  $K_e = 7.5\% + 1 \times 8.5\% = 16\%$

To value printer division, the use of 16%  $K_e$  is recommended.

### **Weighted average cost of capital (WACC)/ overall cost of capital ( $K_0$ )**

Once funds have been raised from various sources, then the investment will be made out of the pool of funds, hence there is a need of computing overall or WACC.

An overall cost of capital is the sum product of specific cost of capital of each source with its weight/proportion to total funds.

#### **Steps to computing WACC**

1. Compute objective cost of capital of each source (ie. Compute  $K_d$ ,  $K_p$ ,  $K_e$ , &  $K_{re}$ ).
2. Determine weights in accordance with the amount of capital raised from each source.

### **Cost of retained earnings ( $K_{re}$ ):-**

An equity shareholder expects to earn the same rate of return on retained earnings as on equity shares. However, equity shares usually cost the co. more as the co. receives lesser net proceeds than the MPS. The computation of  $K_{re}$  is also done with help of same models as  $K_e$  with an exception that net proceeds are ignored.

### **Choice of weights in computing $K_0$ of an existing company:-**

Two types of weights are used in computing  $K_0$  of an existing company, namely.

1. Book value weights,
  2. Market value weights
1. **Book value weights:** The balance sheet values are the values. In case of an unlisted public co. or a Pvt. Ltd. co. market values are not available, hence only book value weights can be used.
  2. **Market value weights:** The market values are the prevailing market price, in case of listed companies if market value or all shares are available, then it is preferred to use market value weights for computing values are either unavailable for all sources or unreliable.

### **Practical problems & their solution: Use of Market value weights:-**

1. Term loans from banks/ financial institution etc. do not have any market value as these loans are not traded in the market.  
Sop<sup>n</sup> :- Take the book value of term of term loan as market value
2. If  $K_e$  &  $K_{re}$  differ than separate market value are required to be computed for equity shares and retained earnings however, retained earnings are not traded separately in the market a person who purchases the equity shares of a company by paying market value becomes the owner of paid-up equity share capital & reserves.  
Sop<sup>n</sup>: the market value of equity shares & reserves (i.e. No. of equity shares  $\times$  MPS) should be ascertained in the proportion of book value of Ede & retained earnings.

**Q.30.** The capital structure of Lotus & Co. comprising of 12% debentures, 9% preference shares and equity shares of ₹100 each is in the proportion of 3:2:5. The company is contemplating to introduce further capital to meet the expansion needs by seeking 14% term loan from financial institution. As a result, of this proposal, the proportion of



debentures, preference shares and equity would get reduced by 1/10, 1/15 and 1/6 respectively. In the light of above proposal calculate the impact of weighted average cost of capital. Assuming 50% tax rate, expected dividend of ₹9 per share at the end of the year and growth rate of dividends 5%. No change in the dividend growth rate and market price of share is expected after available the proposed term loan.

**Q.31.** The capital structure of Fardeen Khan Ltd. is of the following order as on 31<sup>st</sup> Dec, 1999.

Equity Shares (6,50,000 of ₹10)	65,00,000
10% Preference Shares (15000 of ₹100)	15,00,000
13% Non – convertible debentures (20,000 of ₹10 each)	<u>20,00,000</u>
	<u>1,00,00,00</u>

The equity shares of the company are presently selling at ₹18 per share. The company is expected to pay a dividend of ₹3 per share in 1996 and this is likely to grow at 8% per year for infinity. The corporation tax may be assumed to be 45%. You are required to

- (a) Calculate the weighted average cost of capital on the basis of the existing capitalization scheme.  
 (b) Calculate there revised overall cost of capital, if the management decides to rise on additional amount of ₹25,00,000 from the IDBI at 15%.

The new investment is expected to raise the dividend to ₹4 per share without affecting the growth rate.

But the increased financial leverage is likely to reduce the market price of share of ₹16.

- (i) Calculate the overall cost of capital; (ii) above, of the growth rate in the dividend increased to 10% as a result of additional investment.

### Problem & solution

**Q.32. (I.C.W.A. Final June 2000)** AB Ltd. estimates the cost of equity and debt components of its capital for different levels of debt; equity mix as follows:

Debt as % of total capital	Cost of equity %	Cost of debt % (before tax)
0	16	12
20	16	12
40	20	16
60	24	20

Suggest the best debt: equity mix for the company. Tax rate applicable to the company is 50%. Show workings.

**Ans. Calculation of WACC**

% of debt to total capital	Cost of equity %	After tax cost of debt %	Weighted average cost of capital %
0	16	6	$16 \times 1.00 + \text{Nil} = 16$
20	16	6	$16 \times 0.80 + 6 \times 0.20 = 14$
40	20	8	$20 \times 0.60 + 8 \times 0.40 = 15.2$
60	24	10	$24 \times 0.40 + 10 \times 0.60 = 15.6$

Weighted Average Cost of Capital is lowest when debt is 20% of total capital.

**Q.33. (I.C.W.A. Final June 2001)** A company is considering the following to raise additional capital for its expansion schemes:

Equity (% of total capital)	Debt (% of total capital)	Cost of equity %	Cost of debt (pretax)%
75	25	16	12

50	50	18	14
25	75	24	18

Tax rate is 50%. Which option would you recommend? Show workings.

**Ans.** WACC is worked out for each option as follows:

Option I =  $(16 \times 0.75) + (6 \times 0.25) = 12 + 1.5 = 13.5\%$

Option II =  $(18 \times 0.50) + (7 \times 0.50) = 9 + 3.5 = 12.5\%$

Option III =  $(24 \times 0.25) + (9 \times 0.75) = 6 + 6.75 = 12.75\%$

Thus, option III is best as the WACC in this option is lowest.

**Q.34. (I.C.W.A. Final June 2000) (C.A. Final May 1992)**

The following are the extracts from the financial statements of ABC Ltd:

	(` Lakhs)
Operating profit	105
Less: Interest on debenture	<u>33</u>
Earning before tax	72
Less: Income-tax	<u>36</u>
Net profit	36
Equity share capital (share of `10 each)	200
Reserves and surplus	100
15% Non-convertible debentures	<u>220</u>
	520

The market price per equity share is `12 and per debenture is `93.75

(a) What is the earning per share?

(b) What is the percentage of cost of capital to the company for the debenture fund and the equity?

**Ans.** (a) Calculation of Earning Per Share =  $\frac{\text{Profit after tax}}{\text{No. of equity shares}} = \frac{`36,00,000}{20,00,000} = `1.80$

(b) Calculation of Cost of Capital

i) Cost of Debenture Fund  $K_d = \frac{I(1-t)}{D}$

$K_d$  (at book value =  $\frac{33,00,000(1-0.50)}{2,20,00,000} = 0.075$  or 7.5%

$K_d$  (at market value =  $\frac{33,00,000(1-0.50)}{2,06,25,000} = 0.08$  or 8%

ii) Cost of equity Capital

$K_e = \frac{E}{P_0} = \frac{`1.80}{`12} = 0.15$  or 15%

**Q.35. (C.A. Final May 1993)** Aries Limited wishes to raise additional finance of `10 lakhs for meeting its investment plans. It has `2,10,000 in the form of retained earnings available for investment purposes. The following are the further details:

Debt/Equity Mix	30%/70%
Cost of Debt	
upto `1,80,000	10%(before tax)
beyond `1,80,000	16% (before tax)
Earnings per share	`4
Dividend payout	50% of earnings
Expected growth rate in dividend	10%
Current market price per share	`44
Tax rate	50%
You are required:	

- To determine the pattern for raising the additional finance.
- To determine the post-tax average cost of additional debt.
- To determine the cost of retained earnings and cost of equity, and
- Compute the overall weighted average after tax cost of additional finance.

**Ans.** (a) Pattern of Raising Additional Finance

$$\text{Equity} = 10,00,000 \times 70/100 = ₹7,00,000$$

$$\text{Debt} = 10,00,000 \times 30/100 = ₹3,00,000$$

Capital Structure After Raising Additional Finance (₹)

Shareholders funds – Equity capital (7,00,000 – 2,10,000) = 4,90,000

Retained earnings 2,10,000

Debt (Interest at 10% p.a.) 1,80,000

(Interest at 16% p.a.) (3,00,000 – 1,80,000) 1,20,000

Total funds 10,00,000

- (b) Determination of Post-tax Average Cost of Additional Debt

$$K_d = I(1 - t)$$

$$\text{on } ₹1,80,000 = 10\% (1 - 0.5) = 5\% \text{ or } 0.05$$

$$\text{on } ₹1,20,000 = 16\% (1 - 0.5) = 8\% \text{ or } 0.08$$

$$\text{Average Cost of Debt} = \frac{(1,80,000 \times 0.05) + (1,20,000 \times 0.08)}{3,00,000} \times 100 = 6.2\%$$

- (c) Determination of Cost of retained Earnings and Cost of Equity applying Dividend Growth Model

$$K_e = \frac{D_1}{P_0} + g \quad \text{or} \quad \frac{D_0(1+g)}{P_0} + g$$

Then,

$$K_e = \frac{2(1.1)}{44} + 0.10 = \frac{22}{44} + 0.10 = 0.15 \quad \text{or} \quad 15\%$$

- (d) Computation of overall weighted average after tax cost of Additional finance

Particulars		₹	Weights	Cost of funds
Equity	Including retained earnings	7,00,000	0.70	15%
Debt		3,00,000	0.30	6.2%

$$\begin{aligned} \text{WACC} &= (\text{Cost of Equity} \times \% \text{ Equity}) + (\text{Cost of Debt} \times \% \text{ Debt}) \\ &= (15\% \times 0.70) + (6.2 \times 0.30) = 10.5\% + 1.86\% = 12.36\% \end{aligned}$$

**Q.36.** JKL Ltd. has the following book-value capital structure as on March 31, 2006.

	₹
Equity share capital (2,00,000 shares)	40,00,000
11.5% preference shares	10,00,000
10% debentures	30,00,000
	<u>80,00,000</u>

The equity share of the company sells for ₹20. It is expected that the company will pay next year a dividend of ₹2 per equity share, which is expected to grow at 5% p.a. forever. Assume a 35% corporate tax rate.

**Required :**

- (i) Compute weighted average cost of capital (WACC) of the company based on the existing book value capital structure.

- (ii) Compute the revised WACC, if the company raise an additional `20 lakhs debt by issuing 12% debentures. This would result in increasing the expected equity dividend to `2.40 and leave the growth rate un-changed, but the price of equity share will fall to `16 per share.

**Ans.** (i) WACC based Existing Capital Structure

$$(a) \text{ Cost of Equity Capital} = \frac{D_1}{P_0} + g = \frac{2}{20} + 5\% = 15\%$$

$$(b) \text{ Cost of Preference Shares (Kp)} = \frac{D}{P} = \frac{11.5}{100} = 11.5\%$$

$$(c) \text{ Cost of Debentures } K_d = I(1 - t) = 10\%(1 - 0.35) = 6.5\%$$

WACC (based on book values)

Capital Structure	Book values (`)	Weight	Post – Tax cost %	Weighted cost %
Equity Share Capital	40,00,000	0.500	15%	7.50%
11.5% Preference Shares	10,00,000	0.125	11.5%	1.44%
10% Debentures	30,00,000	0.375	6.5%	2.44%
	<b>80,00,000</b>	<b>1.000</b>		<b>11.38%</b>

(ii) WACC (based revised capital structure)

$$(a) \text{ Cost of Equity Capital } K_e = \frac{2.40}{16} + 0.05 = 0.20 \text{ or } 20\%$$

$$(b) \text{ Cost of Preference Shares } K_p = \frac{D}{NP} = \frac{11.5}{100} = 11.5\%$$

$$(c) \text{ Cost of 10% Debentures } K_d = I(1 - t) = 10\%(1 - 0.35) = 6.5\%$$

$$(d) \text{ Cost of 12% Debentures } K_d = I(1 - t) = 12\%(1 - 0.35) = 7.8\%$$

WACC (based on book values, after raising additional finance by issue of 12% debentures)

Source of Finance	Book values (`)	Weight	Post – Tax cost %	Weighted cost %
Equity Share Capital	40,00,000	0.4	15	8.00
11.5% Preference Shares	10,00,000	0.1	11.5	1.15
10% Debentures	30,00,000	0.3	6.5	1.95
12% Debentures	20,00,000	0.2	7.8	1.56
	<b>1,00,00,000</b>	<b>1.0</b>		<b>WACC = 12.66%</b>

**Q.37. (I.C.W.A. Final June 1995)** The following information has been extracted from the balance sheet of Fashions Ltd. as on 31-3-2006:

**`In lakh**

Equity	400
12% Debentures	400
Term loan (interest @ 18%)	<u>1,200</u>
	<b>2,000</b>

- a) Determine the weighted average cost of capital of the company. It had been paying dividends at a consistent rate of 20% p.a.
- b) What difference will it make if the current price of the `100 share is `160?
- c) Determine the effect of Income-tax on the cost of capital under both premises.

**Ans.** Cost of Equity Capital Based on Market Price of Equity Share =  $\frac{20}{160} \times 100 = 12.5\%$  p.a.

- (a) WACC (based on book values and before consideration of tax shield on interest)

Source of Capital	Amount (` Lakhs)	Weight	pre-tax cost %	Weighted cost %
Equity	400	0.20	12.5	2.5
12% Debentures	400	0.20	12.0	2.4
Term loan 18%	<u>1200</u>	<u>0.60</u>	18.0	<u>10.8</u>
	2000	1.00		WACC = 15.7%

(b) WACC (based on market price but before considering tax shield on interest)

Source of Capital	Amount (` Lakhs)	Weight	pre-tax cost %	Weighted cost %
Equity	640	0.286	12.5	3.57
12% Debentures	400	0.178	12.0	2.14
Term loan 18%	<u>1200</u>	<u>0.536</u>	18.0	<u>9.65</u>
	2,240	1.00		WACC = 15.36%

(c) W

ACC (based on book values and after considering tax shields, assumed tax rate @ 50%)

Source of Capital	Amount (` Lakhs)	Weight	Post-tax cost %	Weighted cost %
Equity	400	0.20	12.5	2.5
12% Debentures	400	0.20	6.0	1.2
Term loan 18%	<u>1200</u>	<u>0.60</u>	9.0	<u>5.4</u>
	2000	1.00		WACC = 9.1%

WACC (based on market price of equity shares and after considering tax shields - assumed tax rate @ 50%)

**Q38.** Following are the details regarding the capital structure of a company:

Type of capital	Book Value	Market Value	Specific Cost
Debentures	40,000	38,000	5%
Preference capital	10,000	11,000	8%
Equity capital	60,000	1,20,000	13%
Retained earnings	20,000	-----	9%
	1,30,000	1,69,000	

You are required to determine the weighted average cost of capital (using (i) book value as weights; (ii) market value as weights. Do you think, there can be situation where weighted average cost of capital would be the same irrespective of the weights used.

**Ans.** Book Value

**Q39.** ZEE Limited is presently financed entirely by equity shares. The current market value is ` 6,00,000. A dividend ` 1,20,000 has just been paid. This level of dividends is expected to be paid indefinitely. The company is thinking of investing in a new project involving a outlay of ` 5,00,000 now and is expected to generate net cash receipts of ` 1,05,000 per annum indefinitely. The project would be financed by issuing ` 5,00,000 debentures at the market interest rate of 18%.

Ignoring tax consideration:

- (1) Calculate the value of equity shares and the gain made by the shareholders if the cost of equity rises to 21.6%.
- (2) Prove that weighted average cost of capital is not affected by gearing.

**Ans.**

( )

Cash inflow from project		1,05,000
Less: Debenture interest	(5,00,000 × 18/100)	<u>90,000</u>
Amount available for dividends		15,000
Original dividend		<u>1,20,000</u>
		<u>1,35,000</u>
Value of Equity	(1,35,000 × 100/21.6)	6,25,000
Original value		<u>6,00,000</u>
Gain to Equity Shareholders		25,000

Source of capital	Market value (₹)	Weight	Post-tax cost %	Weighted cost %
Equity capital	6,25,000	0.556	21.6	12
Debentures	<u>5,00,000</u>	<u>0.444</u>	18.0	<u>8</u>
	11,25,000	1.0		WACC = 20%

$$K_e(\text{existing}) = \frac{\text{Original Dividend}}{\text{Original value of equity capital}} \times 100 = \frac{1,20,000}{6,00,000} \times 100 = 20\%$$

**Q.40. (C.A. Final Nov. 1995)** Three companies A, B & C are in the same type of business and hence have similar operating risks. However, the capital structure of each of them is different and the following are the details: (₹)

Particulars	A	B	C
Equity share capital (face value ₹10 per share)	4,00,000	2,50,000	5,00,000
Market value per share	15	20	12
Dividend per share	2.70	4	2.88
Debentures (face value per debenture ₹100)	Nil	1,00,000	2,50,000
Market value per debenture	-	125	80
Interest rate	-	10%	8%

Assume that the current levels of dividends are generally expected to continue indefinitely and the income-tax rate at 50%. You are required to compute the weighted average cost of capital of each company.

Name of company	Equity		Debt	
	₹	%	₹	%
A	6,00,000	100	-	-
B	5,00,000	80	1,25,000	20
C	6,00,000	75	2,00,000	25

$$K_o (\text{at market values}) = (\text{Cost of Equity} \times \% \text{ of Equity}) + (\text{Cost of Debt} \times \% \text{ of Debt})$$

$$A = (18\% \times 1.00) = 18\%$$

$$B = (20\% \times 0.80) + (4\% \times 0.20) = 16.8\%$$

$$C = (24\% \times 0.75) + (5\% \times 0.25) = 19.25\%$$

**Q.41. (I.C.W.A. Final Dec. 1995)** XYZ Co. has a capital structure of 30% debt and 70% of equity. The company is considering various investment proposals costing less than ₹30 lakhs. The company does not want to disturb its present capital structure. The cost of raising the debt and equity are as follows:

Project cost	Cost of debt	Cost of equity
i). Upto ₹5 lakhs	9	13
ii). Above ₹5 lakhs and upto ₹20 lakhs	10	14
iii). Above ₹20 lakhs and upto ₹40 lakhs	11	15
	12	15.5

iv). Above `40 lakhs and up to `1 crore		
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Assuming the tax rate is 50%, compute the cost of capital of two projects ABC and XYZ whose fund requirements are `8lakhs and `21lakhs respectively and if a project is expected to yield after tax return of 11%, determine under what conditions it would be acceptable.

**Ans.** Calculation of Cost of Capital

Project	Financing	Weight	Pre-tax Cost %	Post-tax Cost %	Weighted Cost %
(1)	(2)	(3)	(4)	(5)	(6)
Upto `5 lakhs	Debt	0.30	9.00	4.50	1.35
	Equity	0.70	13.00	13.00	<u>9.10</u>
Above `5 lakhs & upto 20 lakhs	Debt	0.30	10.00	5.00	1.50
	Equity	0.70	14.00	14.00	<u>9.80</u>
Above `20 lakhs & upto 40 lakhs	Debt	0.30	11.00	5.50	1.65
	Equity	0.70	15.00	15.00	<u>10.50</u>
Above `40 lakhs & upto 1 crore	Debt	0.30	12.00	6.00	1.80
	Equity	0.70	15.50	15.50	<u>10.85</u>

Analysis- The funds requirement of Project ABC is `8 lakhs and it is coming under the category of investment above `5 lakhs and upto `20 lakhs and its concerned WACC is 11.30%. As regards Project XYZ, it requires total funds of `21 lakhs falling under the category, above `20 lakhs upto `40 lakhs and its WACC is 12.15%. If a project is expected to yield after tax return of 11%, then the company cannot undertake both projects, since the WACC of both the projects exceeds the expected rate of return on investments.

**Q.42. (C.S. Final Dec. 1996)** You are required to determine the weighted average cost of capital ( $K_o$ ) of the K.C. Ltd. using (i) book value weights; and (ii) market value weights. The following information is available for your perusal. The K.C. Ltd.'s present book value capital structure is: ( ` )

Debentures	( `100 per debenture)	8,00,000
Preference shares	( `100 per share)	2,00,000
Equity shares	( `10 per share)	<u>10,00,000</u>
		20,00,000

All these securities are traded in the capital markets. Recent prices are debentures @ `110,

preference shares @ `120 and equity shares @ `22. Anticipated external financing opportunities are:

- `100 per debenture redeemable at par: 20-year maturity, 8% coupon rate, 4% flotation costs, sale price `100.
- `100 preference share redeemable at par : 15 year maturity, 10% dividend rate, 5% flotation costs, sale price `100.
- Equity shares `2 per share flotation costs, sale price `22.

In addition, the dividend expected on the equity share at the end of the year `2 per share, the anticipated growth rate in dividends is 5% and the company has the practice of paying all its earning in the form of dividends. The corporate tax rate is 50%.

**Ans.** (i) Cost of Equity Capital ( $K_e$ ) =  $\frac{D_1}{P_0} + g = \frac{2}{20} + 0.05 = 0.15$  or 15%

(ii) Cost of Debentures ( $K_d$ ) =  $\frac{\left[8 + \left(\frac{100-96}{20}\right)\right](1-0.50)}{\left(\frac{100+96}{2}\right)} = \frac{(8.20)(0.50)}{98} = 0.0418$  or 4.18%

(iii) Cost of Preference Shares ( $K_p$ ) =  $\frac{8 + \left(\frac{100-95}{15}\right)}{\left(\frac{100+95}{2}\right)} = \frac{(10+0.33)}{97.5} = 0.1059$  or 10.59%

1. WACC (based on book values)

Source of capital	Book value `	Weight	Cost of capital %	Weighted cost %
Equity capital	10,00,000	0.50	15.00	7.50
Preference capital	2,00,000	0.10	10.59	1.06
Debentures	8,00,000	0.40	4.18	1.67
	20,00,000	1.00		WACC=10.23%

2. WACC (based on market values)

Source of capital	Book value `	Proportion	Cost of capital %	Weighted cost %
Equity capital	22,00,000	0.6626	15.00	9.94
Preference share capital	2,40,000	0.723	10.59	0.77
Debentures	8,80,000	0.2651	4.18	1.11
	33,20,000	1.00		WACC=11.82%

**Q.43. (C.A. Final Nov. 1999)** The following is the capital structure of Simons Company Ltd. as on 31-03-2006:

	(`)
Equity shares: 10,000 shares (of `100 each)	10,00,000
10% Preference shares (of `100 each)	4,00,000
12% Debentures	6,00,000
	20,00,000

The market price of the company's share is `110 and it is expected that a dividend of `10 per share would be declared for the year 2005-06. The dividend growth rate is 6%:

- If the company is in the 50% tax bracket, compute the weighted average cost of capital.
- Assuming that in order to finance an expansion plan, the company intends to borrow a fund of `10 lakhs bearing 14% rate of interest, what will be the company's revised weighted average cost of capital? This financing decision is expected to increase dividend from `10 to `12 per share. However, the market price of equity share is expected to decline from `110 to `105 per share.

**Ans.** (i) Current Finance Scheme

Cost of Equity Shares ( $K_e$ )  $\frac{D_1}{P_0} + g = \frac{10}{110} + 0.06 = 0.1509$  or 15.09%



Source of Finance	Amount `	Weight	Post-tax cost %	Weighted cost %
Equity shares 10%	10,00,000	0.333	17.42	5.80
Preference suppliers	4,00,000	0.134	10.00	1.34
12% Debentures	6,00,000	0.200	6.00	1.20
14% loan	<u>10,00,000</u>	<u>0.333</u>	7.00	<u>2.33</u>
	30,00,000	1.000		Revised WACC = 10.67%

Source of Finance	Amount `	Weight	Post-tax cost %	Weighted cost %
Equity shares	10,00,000	0.50	15.09	7.54
10% preference shares	4,00,000	0.20	10.00	2.00
12% Debentures	<u>6,00,000</u>	<u>0.30</u>	6.00	<u>1.80</u>
	20,00,000	1.00		WACC=11.34%

**Revised Finance scheme**

**Q.44. (C.A. Final Nov. 2000)** XYZ Ltd., has the following book value capital structure:

(` crores)

Equity capital (in shares of `10 each, fully paid-up at par)	15
11% Preference capital (in shares of `100 each, fully paid-up at par)	1
Retained earnings	20
13.5% Debentures (of `100 each)	10
15% Term loans	12.5

The next expected dividend on equity shares per share is `3.60 and the dividend per share is expected to grow at the rate of 7%. The market price per share is `40. Preference stock, redeemable after ten years, is currently selling at `75 per share. Debentures, redeemable after six years, are selling at `80 per debenture. The Income-tax rate for the company is 40%.

- i) Required to calculate the weighted average cost of capital using:
  - a) book value proportions
  - b) market value proportions
- ii) Define the weighted marginal cost of capital schedule for the company, if it raises `10 crores next year, given the following information:
  - a. the amount will be raised by equity and debt in equal proportions.
  - b. the company expects to retain `1.5 crores earnings next year.
  - c. the additional issue of equity shares will result in the net price per share being fixed at `32.
  - d. the debt capital raised by way of term loans will cost 15% for the first `2.5 crores and 16% for the next 2.5 crores.

**Ans.** 1. Cost of Equity Capital ( $K_e$ ) and Cost of Retained Earnings ( $K_r$ )

$$K_e = \frac{D_1}{P_0} + g = \frac{3.60}{40} + 0.07 = 0.16 \text{ or } 16\%$$

2. Cost of Preference Share Capital ( $K_p$ )

$$= \frac{11 + \left( \frac{100 - 75}{10} \right)}{\left( \frac{100 + 75}{2} \right)} = \frac{11 + 0.33}{87.5} = 0.1543 \text{ or } 15.43\%$$

$$3. \text{ Cost of Debentures (K}_d\text{)} = \frac{\left[13.5 + \left(\frac{100-80}{6}\right)\right](1-0.40)}{\left(\frac{100+80}{2}\right)} = (13.5 + 3.33)(0.60)$$

$$= 0.1122 = 11.22\%$$

$$\text{Or alternative method} = \frac{13.5(1-0.40) + \left(\frac{100-80}{6}\right)}{\left(\frac{100+80}{2}\right)} = 12.7\%$$

$$4. \text{ Cost of Term Loans (K}_t\text{)} K_t = I(1-t) = 0.15(1-0.40) = 0.09 \text{ or } 9\%$$

$$5. \text{ Cost of Fresh Equity Shares (K}_e\text{)} K_e = \frac{D_1}{P_0} + g = \frac{3.60}{32} + 0.07 = 0.1825 \text{ or } 18.25\%$$

$$6. \text{ Cost of Term Loans (K}_t\text{)} K_t = 1(1-t)$$

$$\text{On first `2.5 crores Term Loan} = 0.15(1-0.40) = 9\%$$

$$\text{On next `2.5 crores Term Loan} = 0.16(1-0.40) = 9.6\%$$

(i) (a) Calculation of WACC (using book value proportions)

Source of capital	Book value (`Crores)	Weight	Post-tax cost	Weighted cost
Equity capital	15.0	0.256	0.1600	0.04096
11% Preference capital	1.0	0.017	0.1543	0.00262
Retained earnings	20.0	0.342	0.1600	0.05472
13.5% Debentures	10.0	0.171	0.1122	0.01919
15% Term loan	12.5	0.214	0.0900	0.01926
	58.5	1.000		WACC = 0.13675

$$\text{WACC} = 13.67\%$$

(b) Calculation of WACC (using market value proportions)

Source of finance	Market value (`crores)	Weight	Post-tax cost	Weighted cost
Equity capital	60.0	0.739	0.1600	0.11824
(1.5 crores shares x `40 each)	0.75	0.009	0.1543	0.00139
11% Preference capital	8.00	0.098	0.1122	0.01099
(1 lakh shares x `75)				
13.5% debentures	12.50	0.154	0.0900	0.01386
(10 lakh Debenture x `80)	81.25			WACC =
15% Term loan				0.14448

$$\text{WACC} = 14.45\%$$

Note - Retained earnings is considered [or calculation of WACC since it does not have any market value separately. The market value of equity shares reflects the value of retained earnings also.]

(ii) Calculation of WACC of XYZ Ltd. if it raises `10 crores next year

Source of finance	Amount (`crores)	Weight	Cost of capital	Weighted cost of capital %
Retained earnings	1.5	0.5	0.160	0.080

Debt	1.5	0.5	0.090	<u>0.045</u>	or 12.5%
Equity shares	1.0	0.5	0.183	<u>0.125</u>	
Debt	1.0	0.5	0.090	<u>0.045</u>	or 13.6%
Equity shares	2.5	0.5	0.183	<u>0.136</u>	
Debt	2.5	0.5	0.096	<u>0.048</u>	or 13.9%
				<u>0.139</u>	

**Q.45. (CA. Final May 2002)** A Ltd. is an all equity financed company. The current market price of share is `180. It has just paid a dividend of `15 per share and expected future growth in dividend is 12%. Currently, it is evaluating a proposal requiring funds of `20 lakhs, with annual inflows of `10 lakhs for 3 years. Find out the net present value of the proposal. if (i) It is financed from retained earnings, and (ii) It is financed by issuing fresh equity at market price with a flotation cost of 5% of issue price.

**Ans.** (i) Calculation of NPV if Financed from Retained Earnings

$$\text{Cost of equity} = \frac{D_0(1+g)}{P_0} + g = \frac{15(1+0.12)}{180} + 0.12 = 0.2133 \text{ or } 21.23\%$$

Year	Cash flow	Discount factor @ 21.33%	Present value
0	(20,00,000)	1.0000	(20,00,000)
1	10,00,000	0.8242	8,24,200
2	10,00,000	0.6793	6,79,300
3	10,00,000	0.5599	<u>5,59,900</u>
			NPV = 63,400

(ii) Calculation of NPV if Financed through Issue of Fresh Equity

$$\begin{aligned} \text{Cost of equity} &= \frac{D_0(1+g)}{P_0(1 - \text{Flotation cost})} + g \\ &= \frac{15(1+0.12)}{180(1-0.05)} + 0.12 = 0.2182 \text{ or } 21.82\% \end{aligned}$$

Year	Cash flow	Discount factor @ 21.82%	Present value
0	(20,00,000)	1.0000	(20,00,000)
1	10,00,000	0.8209	8,20,900
2	10,00,000	0.6738	6,73,800
3	10,00,000	0.5532	<u>5,53,200</u>
			NPV = 47,900

**Q.46.** Z Ltd.'s operating income (before interest and tax) is `9,00,000. The firm's cost of debt is 10 per cent and currently firm employees `30,00,000 of debt. The overall cost of capital of firm is 12 percent. Required: calculate cost of equity.

**Ans.** Value of Firm (V) =  $\frac{\text{EBIT}}{\text{Overall cost of capital (K}_0\text{)}} = \frac{`9,00,000}{0.12} = `75,00,000$

Market value of Equity (S) = V – Debt

$$= `75,00,000 - `30,00,000 = `45,00,000$$

Market value of Debt (D) = `30,00,000

$$K_e (\text{Cost of Equity}) = K_0 \left( \frac{V}{S} \right) - K_d \left( \frac{D}{S} \right)$$

$$= 0.12 \left( \frac{75,00,000}{45,00,000} \right) - 0.10 \left( \frac{30,00,000}{45,00,000} \right)$$

$$= 0.20 - 0.067 = 0.133 \times 100$$

$$K_e = 13.33\%$$

**C.A. Final Nov. 1991**

**Q.47.** A company is considering raising of funds of about `100 lakhs by one of two alternative methods. viz, 14% institutional term loan and 13% non-convertible debentures. The term loan option would attract no major incidental cost. The debentures would to be issued at a discount of 2.5 and would involve cost of issue of `1 Lakh.

Advise the company as to the better option based on the effective cost of capital in each case. Assume a tax rate of 50%.

**Ans.** Evaluation of raising `100 lakhs Based on effective Cost of capital (₹Lakhs)

Particular		Option 1 14% Term loan	Option 2 13% NCD
Face value of amount		100.00	100.00
Less: Discount		—	<u>2.50</u>
		100.00	97.50
Less: Cost of issue		—	<u>1.00</u>
Net effective amount raised	(i)	<u>100.00</u>	<u>96.50</u>
Interest charges p.a. on face value		14.00	13.00
Less: Saving in tax @ 50%		<u>7.00</u>	<u>6.50</u>
Net interest cost	(ii)	<u>7.00</u>	<u>6.50</u>
Effective cost of capital	(ii)/(i) x 100	7%	<u>6.74%</u>

Recommendation: The cost of capital to the company is lower i.e. 6.74% if the company raises 13% non-convertible debentures (NCDs) and hence it is suggested to raise funds by issue of NCDs.

**Q48. (ICWA Final Dec 2002)** The present capital structure of a company is as follows:

	( <u>₹</u> million)
Equity shares (face value `10)	240
Reserves	360
11% preference shares (face value `10)	120
12% debentures	120
14% Term loan	<u>360</u>
	1,200

Additionally the following information are available:

Company's equity beta	1.06
Yield on long-term treasury bonds	10%
Stock market risk premium	6%
Current ex-dividend equity share price	`15
Current ex-dividend preference share price	`12
Current ex-interest debenture market value	`102
Corporate tax rate	40%

The debentures are redeemable after 3 years and interest is paid annually. Ignoring flotation costs, calculate the company's weighted average cost of capital (WACC).

- Ans.** (1) Cost of Equity Share Capital  
Capital Asset Pricing Model  
 $K_e = R_f + \beta (R_m - R_f) = 0.10 + 1.06 (0.06)$   
 $= 0.1636$  or 16.36%

- (2) Cost of Preference Share Capital ( $K_p$ )

$$K_p = \frac{D_p}{P_0} = \frac{1.10}{12} = 0.0917 \text{ or } 9.17\%$$

- (3) Cost of Redeemable Debentures ( $K_d$ )

The debenture are redeemable after 3 years and interest is paid annually. The current ex-interest debenture market value is ₹102.50, which represents present value of stream of future cash flows in the form of interest. Therefore, pre-tax cost of debentures is:

$$102.50 = \frac{12}{(1 + K_d)} + \frac{12}{(1 + K_d)^2} + \frac{12 + 100}{(1 + K_d)^3}$$

$$K_d = 11\%$$

- (4) Cost of Term Loan ( $K_t$ )  $K_t = I(1 - t) = 14\%(1 - 0.40) = 8.4\%$   
Calculation of market value

		(` Million)
Equity share capital	(`240million/`10)x`15	360
11% Preference share capital	(`120million/`10)x`12	144
12% debentures	(`240million/`10)x`102.50	123
Term loan		<u>360</u>
Market value of total capital		<u>987</u>

Source	Market Values (` million)	Weight	Pre-tax cost (%)	Cost (%)	Weighed cost
Equity Shares	360	0.365	16.36	16.36	5.97
Preference share	144	0.146	9.17	9.17	1.34
Debentures	123	0.124	11.00	6.60	0.82
Term loan	360	0.365	14.00	8.40	3.07
					WACC = 11.20%

**Q.49. (CA PE II May 2004)** ABC Limited has the following book value capital structure:

	(` million)
Equity share capital (150 million shares `10 par)	1,500
Reserves and surplus	2,250
10.5% preference shares capital (1 million share `100 par)	100
9.5% debentures (1.5 million debentures `1000 par)	1,500
8.5% Term loan from financial institution	500

The debentures of ABC Ltd. are redeemable after three years and are quoting at ₹981.05 per debenture. The applicable income tax rate for the company is 35%.

The current market price per equity share is ₹60. The prevailing default-risk free interest rate on 10 year GOI Treasury Bonds is 5.5%. The average market risk premium is 8%. The beta of the company is 1.1875.

The preference stock of the company is redeemable after 5 years is currently selling at ₹8.15 per preference share.

**Required:**

- (i) Calculate weighted average cost of capital of the company using market value weights.
- (ii) Define the marginal cost of capital schedule for the firm if it raised ₹750 million for a new project. The firm plans to have a target debt to value ratio of 20%. The beta of new project is 1.4375. The debt capital will be raised through term loans. It will carry interest rate of 9.65% for the first million and 10% for the next ₹50 million.

**Ans.** Cost of equity ( $K_e$ )

$K_e = \text{Risk free interest rate} + (\text{Beta} \times \text{Avg. Market Risk Premium})$

$$= 5.5\% + (1.1875 \times 8\%) = 15\%$$

Yield to Maturity on Preference Shares and Cost of Preference Shares

$$98.5 = \frac{10.5}{(1 + \text{YTM})^1} + \frac{10.5}{(1 + \text{YTM})^2} + \frac{10.5}{(1 + \text{YTM})^3} + \frac{10.5}{(1 + \text{YTM})^4} + \frac{10.5 + 100}{(1 + \text{YTM})^5}$$

YTM = 11% (approx).

$$K_p = 11\%$$

Yield to Maturity on debentures and Cost of Debentures

$$981.05 = \frac{95}{(1 + \text{YTM})^1} + \frac{95}{(1 + \text{YTM})^2} + \frac{95 + 1000}{(1 + \text{YTM})^3}$$

YTM = 10% (approx).

$$K_d = \text{YTM} (1 - T)$$

$$= 10\%(1 - 0.35) = 6.5\%$$

Cost of Term Loans ( $K_t$ )

$$K_t = I(1 - t)$$

$$= 8.5\%(1 - 0.35) = 5.525\%$$

Calculation of WACC (on market value basis)

Source	Market Value	Proportion	Cost of capital average	Weighted Capital
Equity Share capital	9,000.00	0.813	15%	12.195
10.5% Preference share capital	981.50	0.009	11%	0.099
9.5% debenture	1471.575	0.133	6.5%	0.865
8.5% term loans	500.00	0.045	5.525%	0.249
	11069.725	1.000		WACC = 13.408

- (ii) Marginal Cost of Capital Schedule for the firm if it raises ₹750 million for the firm if

it raises ₹750 million for a new project:

$$K_e \text{ of new project} = 5.5\% + (8\% \times 1.4375) = 17\%$$

$K_d$  of new project

$$\text{On first 100 million} = 9.5\% + (1 - 0.35) = 6.175\%$$

$$\text{For next 50 million} = 10\% (1 - 0.35) = 6.5\%$$

Marginal Cost of Capital

$$17\% \times \frac{600}{750} + 6.175\% \times \frac{100}{750} + 6.5\% \times \frac{50}{750}$$

$$= 13.6\% + 0.82\% + 0.43\% = 14.85\%$$

**Q.50. (ICWA Final Dec 2002)** A textile company is contemplating to diversify into cement business. It has decided to set up a cement plant at a total cost of ₹200 crore. The project cost is to be financed as below:

Equity

₹75 crore

12% debt

₹125 crore

The Managing Director of the company has asked the Director (finance) to estimate the net present value of the cement business using discounted cash flow (DCF) method. The Director (finance) was facing Q. No in estimating cost of equity for the cement business. He collected the following information with respect to a comparable cement company:

Long-term debt ₹115 crore

Paid-up share capital ₹85 crore

Reserves and Surplus ₹155 crore

Equity beta 0.90

Help the Director (finance) to estimate the cost of equity and hence the weighted average cost of capital for the cement business. The tax rate for the companies is 35%. Use a risk-free rate of 7.5% and expected risk premium of 8%

**Ans.** Equity to Value Ratio of Comparable Firm =  $(85+155)/355 = 0.68$

Equity Beta of the Comparable Firm (given) =  $0.90 \times 0.68 = 0.61$ Proposed Equity to value of Cement Business =  $75/200 = 0.38$ Equity Beta of Cement Business =  $0.61/0.38 = 1.62$ 

Since the Cement Business of the Textile company would be highly levered as compared to the comparable layer player, the Equity beta of the cement business is substantially high.

Estimation of WACC of Cement Business:

$$(1) \text{ Cost of Equity (ke)} = R_f + \beta_i(R_m - R_f) \\ = 7.5\% + 1.62(8\%) = 20.46\%$$

$$(2) \text{ Cost of Debt (Kd)} = I(1 - t) \\ = 12(1 - 0.35) = 7.8\%$$

$$\text{WACC} = (\text{Cost of Equity} \times \% \text{ of Equity}) + (\text{Cost of debt} \times \% \text{ of debt})$$

$$= \left( 20.40 \times \frac{75}{200} \right) + \left( 7.8 \times \frac{125}{200} \right)$$

$$= 7.67 + 4.88 = 12.55\%$$

**Q.51. (CA PE May 2005)** The R & G Company has the following capital structure at 31<sup>st</sup> March, 2004 which is considered to be optimum.

13% Debenture	3,60,000
11% Preference Share Capital	1,20,000
Equity share capital (2,00,000 shares)	19,20,000

The company's share has a current market price of ₹27.75 per share.

The expected dividend per share in next year is 50% of the 2004 EPS.

The EPS of last 10 years is as follows. The past trends are expected to continue.

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
EPS (₹)	1.00	1.120	1.254	1.405	1.574	1.762	1.974	2.211	2.476	2.773

The company can issue 14% debenture. The company's debenture is currently selling at ₹98. The new preference issue can be sold at a net price of ₹9.80, paying a dividend of ₹1.20 per share. The company's marginal tax rate is 50%.

- Calculate the after tax cost (a) of a new debts and new preference share capital, (b) of ordinary equity, assuming new equity comes from retained earnings.
- Calculate the marginal cost of capital.

- (iii) How much can be spent for capital investment before new ordinary share must be sold? Assuming that retained earning available for next year's investment are 50% of 2004 earnings.
- (iv) What will be marginal cost of capital (cost of fund raised in excess of the amount calculated in part (iii) if the company can sell new ordinary shares to net `20 per share? The cost of debt and of preference capital is constant.

**Ans.** (i) Calculation of After Tax Cost

After tax cost of New Debt (Kd)

$$K_d = \frac{14}{98} = (1 - 0.5) = 0.07$$

After tax cost of New Preference (Kp)

$$K_p = \frac{1.20}{9.80} = 0.12$$

After tax cost of New Debt (Kd)

$$K_e = \frac{1.3865}{27.75} + 0.12 = 0.17$$

- (ii) Calculation of Marginal Cost of Capital

Capital Structure	Amount (₹)	Proportion	Cost of Capital	Product
Equity capital	19,20,000	0.80	0.17	0.136
11% Preference capital	1,20,000	0.05	0.12	0.006
13% debentures	3,60,000	0.15	0.07	0.011
	24,00,000	1.00		0.153

Marginal cost of capital at existing capital structure is 15.3%

- (iii) Computation of amount that can be spent for capital investment before sale of new ordinary shares

$$\begin{aligned} \text{Retained earnings} &= 2,00,000 \text{ shares} \times `1.3865 \\ &= `2,77,300. \end{aligned}$$

The ordinary equity (retained earnings) is 80% of total capital

$$\begin{aligned} \text{Investment before issuing equity} &= `2,77,300 \times 100/80 \\ &= `3,46,625 \end{aligned}$$

- (iv) Computation of Marginal Cost of capital if the company spends more than `3,46,625.

$$K_e = \frac{1.3865}{20} + 0.12 = 0.1893$$

Capital Structure	Proportion	Cost of Capital	Product
Equity (new)	0.80	0.1893	0.1514
Preference capital	0.05	0.1224	0.0061
Debt	0.15	0.0714	0.0107
			0.1682

Marginal cost of capital at existing capital structure is 16.82%.

**Q.52. (CS Final June 2001)** H Ltd. and Z Ltd. have the same levels of business risk and their market values and earnings are summarized below:

Particulars	H Ltd.	Z Ltd.
Market values:		



Equity	6,00,000	3,00,000
Debt		<u>2,50,000</u>
	<u>6,00,000</u>	<u>5,50,000</u>
Earnings	90,000	90,000
Less : interest	-----	22,000
	90,000	68,000

Calculate the post-tax cost of equity, cost of debt and weighted average cost of capital of both the companies. Assume that the income-tax rate on the company is 35% and the additional tax on dividend distribution is 20%.

Ans.

(C)

Particulars	H Ltd.	Z Ltd.
Earnings	90,000	68,000
Less : taxes @ 35%	31,500	23,800
	58,500	44,200
Less: Additional tax on dividend (20/120)	9,750	7,367
Net earnings	48,750	36,833
(a) Cost of Equity	H Ltd.	Z Ltd.
Net earnings $K_e = \frac{\text{Net earnings}}{\text{Market value}}$	$\frac{48,750}{6,00,000} = 8.125\%$	$\frac{36,833}{3,00,000} = 12.28\%$
(b) Cost of debt $K_d = \frac{\text{Interest (1-t)}}{\text{Debt}} = \frac{22,000(1-0.35)}{2,50,000} = 5.72\%$		
(c) Weighted Average Cost of Capital		
H Ltd. = 8.125%		
Z Ltd. = $\left(0.1228 \times \frac{30}{55}\right) + \left(0.0572 \times \frac{25}{55}\right)$		
= 0.067 + 0.026 = 0.093 or 9.3%		

## MARGINAL COST OF CAPITAL MARKET

### Problem & solution

**Q.53.** An entity has `50,00,000 existing funds financed `20,00,000 from equity share capital , `15,00,000 from retained earnings and `15,00,000 from 12% debentures. It requires additional funds of `20, 00,000. These can be financed `10,00,000 from 14% debentures and `10,00,000 from new issue of equity shares. Tax rate applicable to the company is 35%. The company is expecting to pay `4 per share at the end of the year. The company's growth rate of dividends is expected to be 8% perpetually. Market price per share is `40 per share. Issue price of the new equity shares is expected to be `35 per share. Flotation cost to the issue is `3 per share. Compute weighted marginal cost of capital.

Ans.  $K_d = \frac{I(1-t)}{NP} = \frac{14(1-0.35)}{100} = 9.1\%$

$K_e = \frac{D_1}{P_0} + g = \frac{4}{32} + 0.08 = 20.5\%$

Capital Source	Book Value	Weights	Cost of Capital	WACC
Equity Share Capital	10,00,000	0.5	20.5%	10.2%
14% Debentures	10,00,000	0.5	9.1%	4.55%
	20,00,000	1.00		Ko = 14.80%

**Q.54.** Pacific utilities company has present capital structure of 50% long term debt, 10% preferred stock, and 40% common equity. For the coming year the company has determined that its optimal capital budget (₹125 million) can be externally financed work with ₹70 million of 10% first mortgage bonds sold at par and ₹14 million of preferred stock costing the company 11%. The remained of the capital budget will be financed with retained earnings. The company's common stock is presently selling at ₹25 a share, and next year's common dividend,  $D_1$  is expected to be ₹2 a share. The company's past annual growth rate in dividends has been 6%. However, a company's tax rate is 40%. Calculate cost of capital for proposed capital budget

**Ans.** Next Year Capital budget = ₹125 million

Financed by:

₹70 million = 10% first mortgage bond

₹14 million = 11% preference share

₹41 million = retained earnings

Cost of retained earnings = Cost of equity ( $K_e$ )

$$K_e = \frac{D_1}{P_0} + g = \frac{2}{25} + 0.06 = 14\%$$

Cost of preference share = 11%

Cost of Debt = Interest Rate  $\times$  (1 – Tax rate) = 10% (1 – 0.4) = 6%

WACC of optimal budget of coming year =

$$(K_d \times 70/125) + (K_p \times 14/125) + (K_e \times 41/125) \\ 6\% \times 70/125 + 11\% \times 14/125 + 14\% \times 41/125 = 9.182\%$$

**Q.55.** ABC Ltd. wishes to raise additional finance of ₹20 lakhs for meeting its investment plans.

The company has ₹4,00,000 in the form of retained earnings available for investment purposes. The following are the further details:

☞ Debt equity ratio 25 : 75.

☞ Cost of debt at the rate of 10 percent (before tax) upto ₹2,00,000 and 13% (before tax) beyond that.

☞ Earning per share, ₹12.

☞ Dividend payout 50% of earnings.

☞ Expected growth rate in dividend 10%

☞ Current market price per share, ₹60.

☞ Company's tax rate is 30% and shareholder's personal tax rate is 20%.

Required:

(i) Calculate the post tax average cost of additional debt.

(ii) Calculate the cost of retained earnings and cost of equity.

(iii) Calculate the overall weighted average (after tax) cost of additional finance.

**Ans.**

(a) Pattern of raising capital	=	0.25 $\times$ 20,00,000
Debt	=	5,00,000
Equity	=	15,00,000
Equity Funds:		
Retaining Earnings	=	₹4,00,000

Equity (additional)	=	<u>`11,00,000</u>
Total	=	<u>`15,00,000</u>
Debt funds:		
10% debt	=	<u>`2,00,000</u>
13% debt	=	<u>`3,00,000</u>
Total	=	<u>`5,00,000</u>
(i)	$K_d = \frac{\text{total interest (1-t)}}{\text{total debt}} = \frac{[20,000 + 39,000](1-0.3)}{5,00,000} = 8.26\%$	
(ii)	$K_e = K_e = \frac{12 \times 50\%}{60} + 10\% = 10\% + 10\% = 20\%$	
	$K_{re} = K_e (1 - t_p) = 20\% (1 - 0.2) = 16\%$	

**Q.56.** On January 1, 2005 the total market value of the Powell Company was `60 million. During the year, the company plans to raise and invest `30 million in new projects. The firm's present market value capital structure, shown below, is considered to be optimal. Assume that there is no short-term debt.

Debt	<u>`30,000,000</u>
Common equity	<u>30,000,000</u>
Total Capital	<u>`60,000,000</u>

New bonds will have an 8 percent coupon rate, and they will be sold at par. Common Stock, currently selling at `30 a share, can be sold to net the company `27 a share. Stockholders required rate of return is estimated to be 12 percent, consisting of a dividend yield of 4 percent / and an expected constant growth rate of 8 percent. (The next expected dividend is `1.20, so `1.20/30 = 4%) Retained earnings for the year are estimated to be `3 million. The marginal corporate tax rate is 40 percent.

- To maintain the present capital structure, how much of the new investment must be financed by common equity?
- How much of the needed new common equity funds must be generated internally?
- Calculate the cost of each of the common equity components?
- At what level of capital expenditures will the firm's WACC increase?
- Calculate the firm's WACC using (1) the cost of retained earnings (first breaking point) and (2) the cost of new equity (second breaking point). (3) WACC of additional funds `30 million.

**Ans.** (a) Total amount of investment = `30 million

Debt Equity = 1 : 1

Financed by Common equity = `30 million  $\times \frac{1}{2}$  = `15 million

(b) `3 million Retained earnings

(c) Calculation of Cost of common equity

$$K_e = K_e = \frac{D_1}{NP} + g = \frac{1.20}{27} + 0.08 = 12.44\%$$

$$K_{re} = K_e = \frac{D_1}{P_0} + g = \frac{1.20}{30} + 0.08 = 12\%$$

(d) Determination of Breaking Points

(I) Exhaustion of Retained Earnings

$$= \frac{\text{Amount of Retained Earnings}}{\text{Weights}} = \frac{\text{₹ 3 million}}{0.5} = \text{₹ 6 million}$$

Beyond ₹ 6 million, the Powell Company's WACC will increase.

(e) (i) **Computation of WMCC at Exhaustion of Retained Earnings (₹ 6 million)**

	Amount	Weights	Cost	WACC
Debt	3	0.5	4.8%	2.4
Equity Retained	3	0.5	12%	6.0
	6 million	1.0		8.4%

Beyond ₹ 6 million, the Powell Company's WACC will increase.

(ii) **Computation of WAMC for Balance Funds**

	Amount	Weights	Cost	WACC
Equity Share Capital	12	0.5	12.44%	6.22%
8% Debt	12	0.5	4.8%	2.4%
	24 million			8.62%

**Computation of WMACC [overall]**

Breaking Point	Amount	Weights	Cost	WACC
I	6	0.2	8.4%	1.68
II	24	0.8	8.62%	6.896
	30 million	1.0		8.576

**Schedule of Marginal cost of capital:**

A company may not require funds as single installment, in such a case, it may raise original funds piece by piece (slowly & steadily) the funds will be raised in accordance with the desired target debt equity & preference ratio or target capital structure in a manner that does not cost more or from the segment which cost less.

e.g. If debt funds have cost of 5% & 8%, first the debt costing 5% will be arranged, thereafter when it is exhausted, then 8% debt funds will be raised.

Similarly retained earnings will be used first and then fresh issue of equity shares will be made later.

The cost of additional fund to be raised termed as marginal cost of capital. In order to compute marginal cost of capital, existing cost & its average cost has no role to play. The cost of additional fund to be raised will be averaged in the proportion of target weights desired for marginal funds.

**Economic value Added (E.V.A)**

EVA is a concept developed by the Accountant of Stern & Stewart co. (USA). EVA is a true measure of corporate surplus. If a company's Loans Net Operating Profits after Tax (NOPAT) more than the capital charge, then it is said to have generated a value addition.

$$\text{EVA} = \text{NOPAT} - \text{Capital Charge}$$

$$\text{NOPAT} = \text{EBIT} (1-t)$$

$$\text{Capital Charge} = (K_0 \times \text{Capital employed})$$

**Q.57.** A company has 12.5 % Debt Capital of ₹ 2,000 crores (redeemable in 10 years)

.Equity Capital of ₹ 500 crores .Reserve and surplus of ₹ 7,500 crores The return on tax free

Government Bonds is 11% .Beta is 1.06 market rate is 18% and corporate tax rate is 30%

.Net Operating profit After Tax of the company is ₹ 2,000 crores Compute EVA.

**Q.58.** Consider a firm that was existing assets in which it has capital invested of ₹ 100 crores.

The after tax operating income on assets-in place is ₹ 15 crore .The return on capital

employed at 15 crores. The return on capital employed at 15% is expected to be sustained in perpetuity, and company has a cost of capital of 10% Estimate the present value of economic value added (EVA) of the firm from its assets-in-place.

**Q.59. (CA Final Nov 2004)** Calculate economic value added (EVA) with the help of the following information of Hypothetical Ltd.

Financial leverage	: 1.4 times
Capital structure	: Equity capital `170 lakhs
	Reserve and surplus `130 lakh
	10% Debentures `400 lakh
Cost of equity	: 17.5%
Income tax rate	: 30%

### CS Scanner Question

**Q.60. [2008 – June]** The prevailing risk-free rate of interest in 10-Year GOI Treasury Bonds is 5.5%. The average risk premium is 8%. The beta of the company is 1.1875. The company now wants to take up a project requiring an investment of 75 Crore with a debt-equity ratio of 20%. The beta of this project is 1.4375. The debt can be raised at an interest rate of 9.5% upto first 10 crore and @ 10% for the rest of the amount. Find out the marginal cost of capital, if the tax rate is 35%.

**Q.61. [2010 – June]** Priyanka Ltd., has the following capital structure as on 31st March, 2009:

Equity shares: 20,000 Shares of? 100 each	20,00,000
10% Preference Shares (of? 100 each)	8,00,000
12% Debentures (of? 1,000 each)	<u>12,00,000</u>
	<u>40,00,000</u>

The company's shares are sold in the market at? 110 each and it is expected that a dividend of? 10 per share would be declared for the year 2009. The dividend growth rate is likely to remain at 6%.

- You are required to calculate the weighted average cost of capital, if the company comes in the tax bracket of 30%.
- The company is planning to diversify its production activities and intends to borrow a sum of 20 lakh at the rate of 15% per annum. This financing decision is expected to increase dividend from 10 to Z 12 per share, however, the market price of the equity share is likely to decrease from 110 to 105. What will be the company's revised weighted average cost of capital?
- Priyanka Ltd., has the following investment opportunities that are typical average risk projects for the company:

Projects	Cost (in Lakhs) (t=0)	Rate of Return (%)
A	10	17.4
B	20	16.0
C	10	14.2
D	20	13.7
E	10	10.0

Which project(s) should Priyanka Ltd. accept? Why?

**Q.62. [2010- Dec]** Sushant Ltd. has the following capital structure:

Equity shares	50,00,000
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10% Preference shares	10,00,000
14% Debentures	<u>20,00,000</u>
	<u>80,00,000</u>

Equity shares of the company are sold at 25 per share in the market. It is expected that the company will pay next year a dividend of ₹ 4 per share which will grow at 8% forever. Assume a tax-rate of 30%.

- Compute weighted average cost of capital based on the existing capital structure.
- Compute the new weighted average cost of capital, if the company raises an additional ₹ 20,00,000 debt by issuing 15% debentures. This would increase the expected dividend to ₹ 5 per share with dividend growth rate unchanged, but the price of share will fall to ₹ 20 per share.

**Q.63. [2011 – June]** Indigo Ltd. has the following capital structure:

	₹ in Lakhs
Ordinary shares of 1 each	1,000
Retained earnings	160
8% Debentures	<u>440</u>
	<u>1,600</u>

In order to undertake a programme of expansion, the company requires to raise additional capital of 400 lakh and three alternative financing schemes are under consideration:

- A rights issue, at nominal value, of an additional 400 lakh ordinary shares; or
- Issue, at nominal value, 400 lakh, 10% preference shares of ₹ 1; or
- Issue an additional ₹ 400 lakh of 8% debentures.

Without the expansion programme, Indigo Ltd.'s estimated annual profit before interest and tax in the foreseeable future is 200 lakh. If the programme proceeds, this will rise to ₹ 280 lakh.

At present, the market values of the company's securities are:

Ordinary shares	₹ 5.40 (ex-dividend) per share
Debentures	₹ 110 per ₹ 100 nominal

and the last ordinary dividend was 20 paise per share. If expansion does not take place, ordinary dividends are expected to grow at a constant rate of 2.5% per annum. After some initial fluctuations, the anticipated effect of expansion on dividends and market values is expected to stabilize as follows:

	Expansion Financed by		
	Rights Issue	Preference Shares	Debentures
Market value of an ordinary share	₹ 5.60	₹ 5.80	₹ 6.00
Market value of debentures per ₹ 100 nominal	₹ 110	₹ 110	₹ 108
Market value of a preference share	NA	₹ 1.14	NA
Annual growth rate in ordinary shares	3.5%	4.0%	5.0%

The company's profit is subject to corporation tax at 35% and this rate is unlikely to change.

You are required to calculate for each alternative financing scheme:

- the gearing ratio
- the profit available per ordinary share
- Weighted average cost of capital based on market value.

Calculations may be restricted to two decimal places. (14 marks)

- Q.64. [2011 – June]** Rani has invested in a share whose dividend is expected to grow at 15% for 5 years and thereafter at 5% till life of the company. Find out value of the share, if current dividend is Z 4 and investor's required rate of return is 6%.
- Q.65. (CS Final Dec.2012)** The capital structure of Supreme Ltd. is as under :

2,000, 6% Debentures of `100 each (I issue)	2,00,000
1,000, 7% debentures of `100 each (II issue)	1,00,000
2,000, 8% Cumulative preference shares of `100 each	2,00,000
4,000, Equity shares of `100 each	4,00,000
Retained earnings	1,00,000

Earnings per share of the company in the past many years has been `15. Shares of the company are sold in the market at book value. The company's tax rate is 30% and shareholder's personal tax liability is 10%  
Find out weighted average cost of capital of the company.

**FINANCIAL DECISION****LEVERAGE ANALYSIS**

- (a) The leverage in general, refers to advantage gained for any purpose.
- (b) In financial analysis, Leverage is used by business firms to quantify the risk – return relationship of different alternative capital structures.
- (c) Study of leverage is essential to define the risk undertaken by the shareholders. Earnings available to shareholders fluctuate on account of two risks.
- **Variability of EBIT** – Operating Risk: arises due to variability of sales and variability of expenses.
  - **Variability of EPS or ROE** – Financial Risk: arises due to the impact of interest charges.
- (d) There are three commonly used measures of leverage in financial analysis. These are:
- Operating Leverage
  - Financial Leverage
  - Combined Leverage

**Operating Leverage**

- (a) **Definition:** - Operating leverage is defined as the “firm’s ability to use fixed operating costs to magnify effects of changes in sales on its earnings before interest and taxes.”
- (b) **Explanation:** - A change in sales will lead to a change in Profit i.e. Earnings before Interest and Taxes (EBIT). The effect of change in sales on EBIT is measured by operating leverage. Since fixed costs remain the same irrespective of level of output, percentage increase in EBIT will be higher than increase in sales.
- (c) **Measurement:** - The degree of Operating leverage (DOL) is measured as under: (expressed in times)

$$\frac{\% \text{ Change in EBIT}}{\% \text{ Change in Sales}} \quad \text{or} \quad \frac{\text{Contribution}}{\text{EBIT}}$$

- (d) **Significance:**
- **Effect on EBIT:** DOL measures the impact of change in sales on operating income. Suppose DOL of a firm is 1.67 times, it implies that 1% change in sales will lead to 1.67% change in EBIT. Hence, if sales increases by 20%, EBIT increases by 20% X 1.67% = 33%. Also, if sales decreases by say 40%, EBIT falls by 67%.
  - **Impact of Fixed Costs:** DOL depends on fixed costs. If fixed costs are higher, DOL is higher and vice – versa.
  - **Effect of high DOL:** If DOL is high, it implies that fixed costs are high. Hence the Break even point (no point – no loss situation) would be reached at a higher level of sales. Due to the high Break Even Point, the Margin of Safety and profits would be low. This means that the operating risks are higher. Hence, a low DOL is preferred –
  - A high DOL means that profits (EBIT) may be wiped off, even for a marginal reduction in sales. Hence, it is preferred to operate sufficiently above break – even point to avoid the danger of fluctuation in sales and profits.



Financial Leverage

- (a) **Meaning:** Financial leverage is defined as the ability of a firm to use fixed financial charges (interest) to magnify the effects of changes in E.B.I.T. / Operating Profits, on the firm's Earning Per Share (EPS).
- (b) **Explanation:** Financial leverage occurs when a Company has debt content in its capital structure and fixed financial charges e.g. interest on debentures. These fixed financial charges do not vary with the EBIT. They are fixed and are to be paid irrespective of level of EBIT. Hence an increase in EBIT will lead to a higher percentage increase in Earnings Per Share (EPS). This is measured by the Financial Leverage.
- (c) **Measurement:** The degree of Financial Leverage (DFL) is measured as under: (expressed in times)

$$\frac{\% \text{ Change in EPS}}{\% \text{ Change in EBIT}} \quad \text{or} \quad \frac{\text{EBIT}}{\text{EBT}}$$

- (d) **Significance:** Effect on EPS: DFL measures the impact of change in EBIT (Operating Income) on EPS (earnings per share). Suppose DFL of a firm is 4 times, it implies that 1% change in EBIT will lead to 4% change in EPS. Hence, if EBIT increases by 10%, EPS increases by  $10\% \times 4 = 40\%$ . Also, if EBIT decreases by say 5%, EPS falls by 20%.
- **Impact of Fixed Financial Charges:** DFL depends on the magnitude of interest and fixed financial charges. If these costs are higher, DFL is higher and vice – versa.
  - **Effect of High DFL:** If DFL is high, it implies that fixed interest charges are high. This means that the financial risks are higher. The DFL is considered to be favourable or advantageous to the firm, when it earns more on its total investments than what it pays towards debt capital. In other words, DFL is advantageous only if Return on Capital Employed (ROCE) is greater than Rate of Interest on Debt.

**Q. 1.** When is a firm said to be financially favourably leveraged or should Degree of Financial Leverage be high or low?

**Ans.** For determining whether the DFL, is favourable or not, the Return on Capital Employed (ROCE) should be compared with Rate of Interest on Debt.

(A) **When ROCE is greater than Interest Rate:** DFL is considered to be favourable or advantageous to the firm, when it earns more on its total investment than what it pays towards debt capital. In other words, DFL is advantageous only if Return on Capital Employed (ROCE) is greater than Rate of Interest of Debt.

This is because shareholders gain in a situation where the company earns a high rate of return and pays a lower rate of return to the supplier of long-term debt funds. Financial leverage in such cases is therefore also called “Trading on Equity”. The difference between the return (EBIT) and the cost of debt funds would enhance the earnings of shareholders. Further, in case of debt funds the interest cost is also tax deductible. Hence, gain from DFL arises due to:

- Excess of return on investment over effective cost (cost after considering taxation effect) of debt funds.
- Reduction in the number of shares issued due to the use of debt funds.

(B) **When ROCE is less than Interest Rate:** Where the rate of return on investment falls below the rate of interest, the shareholders suffer, because their earnings fall more sharply than the fall in the return on investment. This is because fixed interest costs have to be met, irrespective of the level of EBIT.

In such cases, a high DFL is disadvantageous. Further, the use of debt funds involving fixed commitment of interest payment and principal repayment, is not justified.

(C) **Conclusion:** DFL should be high when Return on Capital Employed (ROCE) is greater than Interest Rate on Debt. If ROCE is less than Interest Rate on Debt, DFL should be maintained low.

**Q. 2.** Outline the significance of combined leverage.

**Ans.** (a) **Meaning:** Combined Leverage is used to measure the total Risk or a firm = Operating Risk + Financial Risk.

(b) **Explanation:** Effect of Fixed Operating Costs (i.e. Operating Risks) is measured by Operating Leverage (DOL). Effect of Fixed interest Charges (i.e. Financial Risks) is measured by Financial Leverage (DFL). The combined effect of these is measured by Combined Leverage (DCL).

(c) **Measurement:** The degree of Combined Leverage (DCL) is measured as  $DOL \times DFL$ . Therefore,  $DCL = Contribution / EBT$ .

(d) **Significance:** DOL measures impact of change in Sales on EBIT. DFL measures the impact of change in EBIT on EPS. DCL measures the combined impact, i.e. effect of change in Sales on EPS. If DCL is 2 times, it implies that a 10% increase in Sales will lead to 20% increase in EPS.

**Q. 3.** What is the ideal combination for Combined Leverage?

**Ans.** Combined Leverage is analysed by reference to the combination of DOL and DFL, as under.

DOL	DFL	Effect	Reason and Significance
High	High	RISKY	High DOL → High Operating Risk → High Fixed Costs & BEP High DFL → Small fall in EBIT to greater fall in EBT
High	Low	CAREFUL	High DOL's impact is sought to be set off with Low Financial Risk. Hence Equity Shareholders interest is safeguarded.
Low	Low	CAUTIOUS & CONSERVATIVE	Low DOL → Low Operating Risks → Low Fixed Costs & BEP but Equity Shareholders' gains are not maximized since DFL is low.
Low	High	PREFERABLE	Low DOL → Low Operating Risks → Low Fixed Costs & BEP due to high DFL, small rise in EBIT leads to greater rise in EBT and EPS. Hence Equity Shareholders' gains are maximized.

**Q. 4.** Should increase in activity levels (Sales) be supported by increase in capital Employed?

**Ans.** (1) Increase in Sales leads to increase in EBIT, EBT and ROI Hence, a firm may be tempted to try to raise its Capital Turnover Ratio (Sales divided by Capital Employed) without restraint.

(2) However, as Capital Turnover Ratio increases, Working Capital Ratio deteriorates.

(3) As sales increases; both Current Assets and Current Liabilities also increase but not in proportion to the current ratio, with the same amount of funds employed. Hence Current Ratio registers a fall and affects the liquidity position of the firm adversely.

(4) Hence, rise in capital turnover must be supported by an adequate capital base and increase in the amount of funds employed, more particularly in Working Capital.

#### Disadvantages of Operating Leverage

- ❖ The reliability of operating ratio rests to a large extent on the correctness of the fixed costs identified with a product. Faulty apportionment would distort the usefulness of the ratio.
- ❖ The published accounts does not give details of the fixed cost incurred and the contribution from each product and for an outsider it is difficult to calculate the firm's operating leverage. Firm's cost structure and nature of the firm's business affect operating leverage. It is interesting to note that a degree of change in sales volume results in a more than proportionate changes in operating profit (or loss) can be observed by the use of operating leverage.

**Q. 5.** Distinguish between Business Risk V/s Financial Risk.

**Ans.** **Business Risk:** which is sometimes called operating risk, is the risk associated with the normal day to day operations of the firm. An entity carrying on a business may in order to carry its day to day operations burden itself with some operating fixed costs which will be incurred irrespective of the fact whether the entity makes any sales or not. Examples of such operating fixed costs are: Rentals, Salaries, Electricity and Telephone Expenses etc.

**Financial Risk:** is created by the use of fixed – cost securities (that is, debt and preference shares). An entity may in order to finance its business burden itself with some financial fixed costs which will be incurred irrespective of the fact whether the entity makes any profits or not. Examples of such financial fixed costs are: interest on debt, preference dividends. Looking at the two categories in a sources and uses context, business risk represents the chance of loss and variability of return created by a firm's uses of funds. Financial risk is the chance of loss and variability of the owners return created by a firm's sources of funds.

**Q. 6.** Write a short note on Trading on Equity.

**Ans.** Financial Leverage can be defined as “the use of fixed charge securities in the capitalization of a company. The use of fixed charges securities such as debt along with the owner's equity in the capitalization of a company is described as Financial Leverage or Trading on Equity. Financial Leverage and Trading on Equity are synonymously used by financial experts. However, Hunt has distinguished between the two and stated that Financial Leverage explains the impact on Earnings per share (EPS) whereas Trading on Equity (TOE) explains the impact on Return on Equity (ROE). As the debt funds are less risk bearing and have prior claims on income and assets of a firm over the equity shareholders, their rates of return should be less than that of total assets. So, they trade off and the debt funds are raised on the strength of Net Worth. This phenomenon along with the tax deductibility of interest payable leads to the magnification of rate of return on equity capital. This is termed as “Trading on Equity”.

As already stated, if a firm obtains the fixed charges securities at a cost higher than the rate of return on the Company's investments, EPS or ROE will fall and vice – versa. For example, if rate of return on capital employed is 18% and interest payable on debt is 12%, the return to equity shareholder will be higher than the return on capital employed. In the reverse situation, i.e. if interest payable is 18% and return on capital employed is 10%, trading on equity is not recommended. Therefore, “trading on equity” is recommended, when return on capital employed exceeds the interest of debts.

### Previous year Scanner question

**Q. 7.** [ Dec 2009] Write a short note on ‘Optimal Capital Structure’

**Ans.**

- 1) One of the basic objectives of financial management is to maximize the value or wealth of the firm.
- 2) Capital Structure is optimum when the firm has a combination of equity and debt so that the wealth of the firm is maximum.
- 3) At this level, cost of capital is minimum and market price per share is maximum.
- 4) In theory, one can speak of an optimum capital structure; but in practice, appropriate capital structure is a more realistic term than the former.
- 5) The following are the major features of an appropriate capital structure:-
  - Profitability  
It should minimize the cost of financing and maximize earning per equity share.
  - Flexibility  
The capital structure should be such that company can raise funds whenever needed.

- Conservation  
The debt content should not exceed the maximum which the company can bear.
- Solvency  
The capital structure should be such that the firm does not run the risk of becoming insolvent.
- Control  
There should be minimum risk of loss or dilution of control of the company.

**Q. 8. [Dec 2008]** Describe various kinds of capital structure.

**Ans.** Capital structure can be of various kinds as described below:-

1) Horizontal Capital Structure

- In a Horizontal capital structure, the firm has zero debt components in the structure mix.
- The structure is quite stable.
- Expansion of the firm takes in a lateral manner, i.e. through equity or retained earning only.
- The absence of debt results in the lack of finance leverage.
- Probability of disturbance is remote.

2) Vertical Capital Structure

- In a vertical structure, the base of the structure is formed by a small amount of equity share capital.
- This base serves as the foundation on which the super structure of preference share capital and debt is built.
- The incremental addition in the capital structure is almost entirely in the form of debt.
- Quantum of retained earnings is low and the dividend pay-out ratio is quite high.
- In such a structure, the cost of equity capital is usually higher than the cost of debt.
- The high component of debt in the capital structure increases the financial risk of the firm and renders the structure unstable.
- The firm, because of the relatively lesser component of equity capital, is vulnerable to hostile takeovers.

3) Pyramid shaped Capital structure

- A pyramid shaped capital structure has a large proportion consisting of equity capital and retained earnings which have been ploughed back into the firm over a considerably large period of time.
- The cost of share capital and the retained earnings of the firm are usually lower than the cost of debt.
- This structure is indicative of risk averse conservative firms.

4) Inverted Pyramid shaped Capital Structure

- Such a capital structure has a small component of equity capital, reasonable level of retained earnings but an ever increasing component of debt.
- All the increases in the capital structure in the recent past have been made through debt only.
- Chances are that the retained earnings of the firm are shrinking due to accumulating losses.
- Such a capital structure is highly vulnerable to collapse.

**Q. 9. [ June 2010]** While deciding upon the capital structure, the firm has to consider the different life cycle stages.

**Ans.** While deciding upon the capital structure the firm has to consider the different life cycle stages which are:-

- The pioneering stage
- The expansion stage
- The stagnation/stabilization stage

**The pioneering stage** is one of rapid increase in demand for the products/services at the starting stage of the life cycle of the company and the efficient companies are the one to survive.

The financial cost of borrowing is very high at this stage, due to risk perception about the company.

**The expansion stage** is the next stage, during which the strong companies survive the competition struggle and aim to expand their market share and volumes.

During this stage, huge investments are made to expand production/service capacity.

**Stabilization/Stagnation stage** is the last and final stage.

A dynamic management will always be on the lookout for expansion/diversification into new projects.

Usually a recession in economy opens up a vast number of such opportunities which cash rich companies can take advantage of.

**Q.10. [Dec 2006/2007, June 2009]** Distinguish between ‘Financial structure’ and ‘capital structure’.

**Ans.**

- Capital, structure relates to deployment of funds for creation of long term asset where as financial structure involves creation of both long term and short term assets.
- Capital structure is the main source of financial structure. Capital structure refers to the funds for the long term. Where the firm has no current liabilities, then the capital structure of the firm is equal to the financial structure.
- Capital structure can be considered as one of the major component of financial structure. So capital structure is narrower in sense as compared to financial structure which is broader and includes current liabilities also.
- The financial structure of a firm is considered to be a balanced one in case the amount of current liabilities is less than the capital structure net of outside debt.
- Capital structure & its component can be deployed in acquisition of fixed assets as well as current assets but the current liabilities should not be used to finance acquisition of fixed asset. This would result in an asset liability mismatch.

**Q.11. [ June 2004]** “A high EPS may not always maximize the stock price.” Do you agree? Discuss.

**Ans.** The statement is true due to following reasons:-

- EPS may be high due to profit maximization, which itself is not a sure shot for a high stock price.
- High EPS may be due to financial leverage effect, which increases a firm’s risk prospects of growth rate.
- If the business prospectus of a company is not good the stock price may not go up in spite of high EPS.
- The nature of business and the industry in which the company operates also affects the stock price and not the EPS alone.

**Q.12. [ Dec 2006]** “The choice of an appropriate debt policy involves a trade-off between tax benefits and the cost of financial distress.” Comment.

**Ans.**

- While deciding about the capital structure, the debt proportion needs to be appropriate.
- Since interest is a charge, it results in tax benefit.
- However, higher amount of debt may result in higher operating risk.
- High debt may even cause financial distress and bankruptcy
- Thus, management has to strikeout a proper balance between owned funds and debt.

**Q.13.** What is the significance of capital structure?

**Ans.** 1. Reflects the firm's strategy

- The capital structure reflects the overall strategy of the firm.
- In case the firm wants to grow at a faster pace, it would be required to incorporate debt in its capital structure to a greater extent.

2. Indicator of the risk profile of the firm

- If the debt component in the capital structure is predominant, the fixed interest cost of the firm increased thereby increasing its risk.

3. Acts as a tax management tool

- The interest on borrowings is tax deductible; a firm having healthy growth in operating profits would find it worthwhile to incorporate debt in the capital structure in a greater measure.

4. Helps to brighten the image of the firm

- A firm can build on the retained earnings.
- Such an act has two benefits. On the one hand, it helps the firm to improve its image in the eyes of the investors. At the same time, it reduces chances of hostile take-over of the firm.

**Q.14.** What are factors influencing capital structure.

**Ans.** In deciding the capital structure of a firm, following points need to be considered.

1) Corporate Strategy

- The most appropriate capital structure will be the one, which most closely supports the strategic direction of the business with the least cost and at a reasonable acceptable risk level.

2) Nature of the Industry

- The nature of the industry plays an important role in capital structure decisions.
- If the firm is capital intensive, it would rely more on debt than equity.

3) Current and past capital structure

- Current capital structure of a firm is determined largely by past decisions.
- Investment decision of the past, acquisition, takeovers financing policy, dividends etc. go into forming the current capital structure which is difficult to change overnight.

**Q.15.** What are the attributes of a well planned Capital Structure./

Write a short note on 'Designing a Capital Structure'./

Describe the process of planning and designing of capital structure.

**Ans.** Attributes of a well planned Capital Structure

1) Long Tenure

- The plan should be for a fairly long tenure and should cover the working of at least five to seven years of the project.
- Expansion of the capacity, addition of product lines etc. should be accounted for in the plan.

2) Consistency

- The planned capital structure should be consistent with the overall financing philosophy of the firm.
- If the firm has a risk averse philosophy, then the plan should have minimum component of debt.

3) Feasibility

- The planned capital structure should have feasibility, i.e. it should not be impractical.
- Feasibility also means that it should be workable within the amount of share capital, debt and retained earnings expected to be available to the firm.

Designing a Capital Structure

After planning the capital structure, we are faced with the issue of its design.

While designing a capital structure, following points need to be kept in view.

1) Design should be functional

- The design should create synergy with the long term strategy of the firm and should not be dysfunctional.
- It should facilitate the day to day working of the firm rather than create systematic bottlenecks.

2) Design should be flexible

- The capital structure should be designed to incorporate a reasonable amount of flexibility in order to allow for temporary expansion or contraction of the share of each component.

3) Design should be conforming statutory guidelines

- The design should conform to the statutory guidelines, if any, regarding the proportion and amount of each component.
- The limits imposed by lenders regarding the minimum level of owners' equity required in the firm should be complied with.

**Q.16.** Write a short note on 'Determinants of capital structure.'

**Ans.**

1) Minimization of risk

- The capital structure should aim at minimization of risk of the firm.

2) Maximization of profit

- The capital structure is formulated with a view to achieve the goal of maximization of firm's profits.

3) Nature of the project

- Formulation of the structure is also determined by the nature of the investment project.
- If the project is a capital intensive, long gestation project then it should be financed by debt of matching maturity.

4) Control of the firm

- This aspect of the firm also plays apart in the determination of the capital structure.
- Since the key to control of the firm is ownership of the equity capital, the promoters would like to part with only that proportion of equity capital as is necessary for execution of the project.

**Q.17. [2010 – Dec.]** Distinguish between 'Return on capital employed' and 'return on net worth'.

**Ans.**

Basis	Return on capital employed (ROCE)	Return on net worth
Meaning	It expresses the relationship between EBIT and capital employed	It reflects the relation between profit available for equity shareholders and equity shareholder's funds.
Objective	It helps us to analyse the overall profitability of the firm	It is a tool which examines the profitability from the point of view of share holders
Formula	$\text{ROCE} = \frac{\text{EBIT}}{\text{Capital employed}} \times 100$	$= \frac{\text{Profits available for equity shares}}{\text{Equityshareholders fund}} \times 10\%$

**Q.18. [2011–Dec.]** Distinguish between ‘Net income approach to capital structure’ and ‘net operating income approach to capital structure’.

**Ans.**

<b>Net operating Income (NOI) Approach</b>	<b>Net Income (NI) Approach</b>
As per this approach the capital structure decision is not relevant and in change in debt will not affect the total value of the firm.	Net income Approach states that change in capital structure directly affects the value of the firm as increase in debt reduces cost of capital and increases value of firm.
Thus, in this NOI approach, cost of capital is independent of degree of leverage	In NI approach the cost of capital & consequently capital structure is dependent on degree of leverage.

**Q.19. [2003–Dec.]** “Retained earnings have no cost”. “Do you agree? Give reasons for your answer.

**Ans.** It is wrong to consider that retained earning have no cost.

Retained earning has also its own cost.

- Retained earnings are the funds accumulated by the company over the year.
- Retained earning are the funds which belong to the equity shareholders of the company because if these funds would not have retained they would have been distributed to the shareholders in the form of dividend.
- The company has deprived the equity holders of this portion of earnings by retaining the portion of profit with it.
- Therefore, the cost of retained earning may be considered as equivalent to the earning forgone by the shareholders.
- Thus the cost of retained earning is simply the opportunity cost which is equal to the income that they would otherwise earned by placing these funds in alternate investment.
- The cost of retained earning is always less than the cost of equity as there is no flotation cost involved in case of retained earning.

**Q.20. [2004–June]** If the use of financial leverage magnifies the earnings per share under the favourable economic conditions, why do companies not employ very large amount of debt in their capital structure?

**Ans.**

- Though debt funds provide the gearing effect and enable the company to magnify its EPS yet they accompany with them the threat of financial distress & commercial insolvency.
- Thus under favourable economic conditions a company may employ high debt i.e. take advantage of financial leverage to increase EPS & consequently the market price & wealth of the shareholders.
- However, in the case the earnings of the company is negative or inadequate that the cost of debt funds e. interest is not covered it can create an adverse impact & may even lead of financial distress & insolvency.
- Therefore, companies generally do not prefer high debt proportion in the capital structure.

**Q.21. [2005 June]** “To keep the risk within manageable limits, a firm which has high degree of operating leverage should have low financial leverage and vice-versa.” Comment.

**Ans.**

- Operating risk is risk associated with fixed operating expenses whereas financial leverage is the one related to financial expenses.
- The operating leverage is measured by the percentage change in EBIT due to percentage change in sales whereas financial leverage is measured by the percentage change in EPS due to percentage change in EBIT.



- The two leverages combined to form combined leverages.
- If a firm is experiencing high level of operating leverage, it should bring down its financial leverage by financing with equity to keep the risk at optimum level.
- So to balance the risk there should be balance between operating & financial leverage.

**Q.22. [2006 Dec.]** “The choice of an appropriate debt policy involves a trade off between tax benefits and the cost of financial distress.” Comment.

**Ans.**

- While deciding about the capital structure, the debt proportion needs to be appropriate.
- Since interest is a charge, it results in tax benefit.
- However, higher amount of debt may result in higher operating risk.
- High debt may even cause financial distress and bankruptcy
- Thus, management has to strikeout a proper balance between owned funds and debt.

**Q.23. [2008 June]** “Financial leverage is a fair weather friend.” Discuss.

**Ans.**

- Financial leverage expresses the relationship between EBIT (Earning Before Interest and Tax) and EBT (Earning Before Tax)
- It measures the ability of the organization to meet the financial risk.
- It helps in ascertaining the ability to honour its fixed financial charges like interest and preference share dividend.
- High financial leverage may result in high EPS.
- High financial leverage also denotes the ability to cover fixed charges.

**Q.24. [2008 Dec.]** Comment on the total risk is the risk associated with combined leverage.

**Ans.**

- Operating leverage measures the ability of the company to meet its commitment to high level of fixed costs other than interest payments i.e. operating cost.
- Financial leverage is concerned with the ability to bear financial risk. It ascertains the organization’s ability to cover fixed financial costs relating to interest.
- Combined leverage can be obtained by finding the product of operating leverage and that of financial leverage.
- Thus, combined leverage takes into account both operating risk as well as financial risk faced by the company.
- To conclude, we can say that combined leverage measures the total risk associated with the company. In other words, total risk is the risk associated with combined leverage.

## Practical question

### OPERATING LEVERAGE

**Q. 1.** From the following selected operating data, determine the degree of operating leverage. Which company has the greater amount the business risk ? Why ?

	A Ltd.	B Ltd.
Sales	`25,00,000	`30,00,000
Fixed Costs	7,50,000	15,00,000
Variable expenses as a percentage of sales are 50 per cent for firm A and 25 per cent for firm B.		

**Ans.** A=2.5, B=3, B,

- Q. 2.** Royal Industries Ltd., a well-established firm in plastics, is considering the purchase of one of the following information about the two companies. Both companies have total assets of `15,00,000.

	<b>X Ltd.</b>	<b>Y Ltd.</b>
Sales Revenue	`30,00,000	`30,00,000
<i>Less:</i> Cost of goods sold	22,50,000	22,50,000
Selling expenses	2,40,000	2,40,000
Administrative expenses	90,000	1,50,000
Depreciation	<u>1,20,000</u>	<u>90,000</u>
EBIT	<u>3,00,000</u>	<u>2,70,000</u>
Cost break – ups		
<i>Variable costs:</i>		
Cost of goods sold	9,00,000	18,00,000
Selling expenses	<u>1,50,000</u>	<u>1,50,000</u>
Total	<u>10,50,000</u>	<u>19,50,000</u>

- (i) Prepare operating statements for both the companies, assuming that sales increase by 20 per cent. The total fixed costs are likely to remain unchanged and the variable costs are a linear function of sales.
- (ii) Calculate the degree of operating leverage.
- (iii) If Royal Industries Ltd. wishes to buy a company which has a lower degree of business risk, which company would be purchased by it ?

**Ans.** (ii)  $X=6.5$ ,  $Y=3.88$ , (iii) Royal

### **FINANCIAL LEVERAGE**

- Q. 3.** (i) Find out operating leverage from the following data:

Sales: ` 50,000

Variable costs: 60 per cent

Fixed costs: ` 12,000

**Ans.** 2.5

- (ii) Compute the financial leverage from the following data:

Net worth = ` 25,00,000

Debt / equity = 3:1

Interest rate = 12 per cent

Operating Profit = ` 20,00,000

**Ans.**  $Dol = 2.5$        $Dof = 1.82$

### **COMBINED LEVERAGE**

- Q. 4.** XYZ Ltd. has an average selling price of ` 10 per unit. Its variable unit costs are ` 7, and fixed costs amount to ` 1,70,000. It finances all its assets by equity funds. It pays 35 per cent tax on its income.

ABC Ltd. is identical to XYZ Ltd, except in the pattern of financing. The latter finances its assets 50 per cent by equity and 50 per cent by debt, the interest on which amounts to ` 20,000.

Determine the degree of operating, financial and combined leverage at ` 7,00,000 sales for both the firms, and interpret the results.

- Q. 5.** From the following financial data of companies, X Ltd. and Y Ltd., prepare their income statements.

	<b>X Ltd.</b>	<b>Y Ltd.</b>
Variable cost as percentage of sales	50	60

Interest expense	₹ 20,000	6,000
DOL	3 – 1	5 – 1
DFL	2 – 1	3 – 1
Income tax rate	0.35	0.35

**Ans.** 4.33, 4.14, 4.9

**Q. 6.** The operating income of Hypothetical Ltd. amounts to ₹ 1,86,000. It pays 35 per cent tax on its income. Its capital structure consists of the following:

14% Debentures	₹ 5,00,000
15% Preference Shares	1,00,000
Equity shares (₹ 100 each)	4,00,000

- Determine the firm's EPS.
- Determine the percentage change in EPS associated with 30 per cent change (both increase and decrease) in EBIT.
- Determine the degree of financial leverage at the current level of EBIT.
- What additional data do you need to compute operating as well as combined leverage.

**Ans.** (i) 15.1 (ii) 60.05% (iii) 2 (iv) Contribution

**Q. 7.** The operating profit (EBIT) of ABC Ltd. is ₹ 1,60,000. Its capital structure consists of the following:

10% Debentures	₹ 5,00,000
12% Preference shares	1,00,000
Equity shares of ₹ 100 each	4,00,000

The company is in the 35 per cent tax bracket. The withholding tax on preference dividend is 10 per cent.

- Determine the firm's EPS.
- Determine the percentage change in EPS associated with 30 per cent increase in EBIT.
- Determine the degree of financial leverage.
- Assuming DOL, 2, determine the DCL.

**Ans.** (i) 14.58 (ii) 54.1 (iii) 1.78 (iv) 3.56

**Q. 8.** Calculate degree of operating leverage; degree of financial leverage and combined leverage from the following data:

Sales 1,00,000 units @ ₹ 2 per unit = ₹ 2,00,000

Variable cost per unit @ Re. 0.70

Fixed costs: ₹ 1,00,000

Interest charges: ₹ 3,668.

**Q. 9.** The balance sheet of Golden Company is as follows:

Liabilities	Assets
Equity capital	Net fixed assets
(₹ 10 per share)	1,50,000
60,000	
10% long term debt	80,000

Retained earnings	20,000	Current assets	50,000
Current liabilities	<u>40,000</u>		
	<u>2,00,000</u>		<u>2,00,000</u>

The company's total assets turnover ratio is 3.0, its fixed operating costs are ₹ 1,00,000 and its variable operating cost ratio is 40%. The income – tax rate is 50%.

- (i) Calculate for the company the different types of leverages.  
(ii) Determine the likely level of EBIT if EPS is (a) ₹ 1; (b) ₹ 3; (c) ₹ 0.

**Ans.** 1.38, 1.03, 1.42, Edit 20000/44000/8000

**Q.10.** The following figures relate to two companies:

	<b>P Ltd.</b>	<b>Q Ltd.</b> (in ₹ lakhs)
Sales	500	1,000
Variable costs	<u>200</u>	<u>300</u>
Contribution	300	700
Fixed costs	<u>150</u>	<u>400</u>
	150	300
Interest	<u>50</u>	<u>100</u>
Profit before tax	<u>100</u>	<u>200</u>

You are required to:

- (i) Calculate the operating, financial and combined leverages for the two companies; and  
(ii) Comment on the relative risk position of them.

**Ans.** (i) 2/2.33, (ii) 1.5/1.5 (iii) 3/3.5

**Q.11.** Calculate operating leverage and financial leverage under situation A, B & C and financial plans I, II & III respectively from the following information relating to the operation and capital structure of XYZ Company for producing additionally 800 units. Also find out the combination of operating and financial leverages, which give the highest value and least value. How are these calculations useful to the finance manager of a company?

	Selling price per unit	=	30
	Variable cost per unit	=	20
<b>Fixed cost:</b>			
	Situation A	=	2,000
	Situation B	=	4,000
	Situation C	=	6,000

#### Capital Structure

#### Financial Plan

	<b>I</b>	<b>II</b>	<b>III</b>
Equity	10,000	15,000	5,000
Debt	10,000	5,000	15,000

Cost of debt is 12%.

**Q.12.** A firm has sales of ₹ 10,00,000 variable cost of ₹ 7,00,000 and fixed costs of ₹ 2,00,000 and debt of ₹ 5,00,000 at 10% rate of interest. What are the operating financial and

combined leverages ? If the firm, wants to double up its Earnings before interest and Tax (EBIT), how much of a rise in sales would be needed on a percentage basis ?

**Q.13.** A firm has sales of ` 75,00,000 variable cost of ` 42,00,000 and fixed cost of ` 6,00,000.

It has a debt of ` 45,00,000 at 9% and equity of ` 55,00,000.

- (i) What is the firm's ROI ?
- (ii) Does it have favourable financial leverage ?
- (iii) If the firm belongs to an industry whose asset turnover is 3, does it have a high or low asset leverage ?
- (iv) What are the operating, financial and combined leverages of the firm ?
- (v) If the sales drop to ` 50,00,000 what will be the new EBIT ?
- (vi) At what level the EBIT of the firm will be equal to zero ?

## EPS – EBIT ANALYSIS

### INTRODUCTION

**Q.32.** X Ltd. is considering three different plans to finance its total project cost of ` 100 lakh: A, B and C.

	Plan A	Plan B	Plan C
Equity share ( ` 100 per share)	50	34	25
10% Debenture	<u>50</u>	<u>66</u>	<u>75</u>
	<u>100</u>	<u>100</u>	<u>100</u>

Sales for the first 3 years of operations are estimated at ` 100 lakh, ` 125 lakh and ` 150 lakh respectively and a 10 per cent profit before interest and taxes is forecast. The tax is to be taken at 35 per cent.

Compute EPS in each of the 3 alternative financing plans.

**Ans.** Year – 1 A - 6.5, 6.5, 6.5; Year – 2 A – 9.25, 1/28, 13; Year – 3 A - 13, 16.06, 1903

**Q.33.** A company's capital structure consists of the following:

	` (in lakhs)
Equity shares of ` 100 each	20
Retained earnings	10
9% Preference shares	12
7% Debentures shares	<u>8</u>
Total	<u>50</u>

The company's earning before interest and tax (EBIT) is at the rate of 12% on its capital employed, which is likely to remain unchanged after expansion. The expansion involves additional finances of ` 25 lakhs for which following alternatives are available to it:

- (i) Issue of 20,000 equity shares at a premium of ` 25 per share.
- (ii) Issue of 10% preference shares.
- (iii) Issue of 8% debentures.

It is estimated that P/E ratio in the case of equity shares, preference shares and debentures financing would be 21.4, 17 and 15.7 respectively. Which of these alternatives of financing would you recommend and why ? The income tax rate is 50%.

**Ans.** EPS 7.85/3.2/10.7                      MPS 167.99/54.4/167.9899

**Q.34.** Company needs ` 12,00,000 for the installation of a new factory, which would yield an annual EBIT of ` 2,00,000. The company has the objective of maximizing the earnings

per share. It is considering the possibility of issuing equity shares plus raising a debt of ₹ 2,00,000, ₹ 6,00,000 or ₹ 10,00,000. The current market price per share is ₹ 40, which is expected to drop ₹ 25 per share if the market borrowings were to exceed ₹ 7,50,000. Cost of borrowings are indicated as under:

Upto ₹ 2,50,000	-	10% p.a.
Between ₹ 2,50,001 and ₹ 6,25,000	-	14% p.a.
Between ₹ 6,25,001 and ₹ 10,00,000	-	16% p.a.

Assuming the tax rate to be 50%, work out the EPS and the scheme, which would meet the objective of the management.

**Ans.** EPS 3.60/4.20/3.91

**Q.35.** The following figures of Sunny Ltd. are presented to you:

Earnings before interest and tax		23,00,000
Less: Debenture interest @ 8%	80,000	
Long term loan interest @ 11%	<u>2,20,000</u>	<u>3,00,000</u>
		20,00,000
Less: Income tax		<u>10,00,000</u>
Earnings after tax		10,00,000
No. of equity shares of ₹ 10 each		5,00,000
EPS		₹ 2
Market price at share		₹ 20
P/E ratio		10

The company has undisturbed reserves and surplus of ₹ 20 lakhs. It is in need of ₹ 30 lakhs to pay off debentures and modernize its plants. It seeks your advise on the following alternative modes of raising finance:

Alternative 1 – Raising entire amount as term loan from banks @ 12%.

Alternative 2 – Raising part of the funds by issue of 1,00,000 shares of ₹ 20 each and the rest by term loan at 12%.

The company expects to improve its rate of return by 2% as a result of modernization, but P/E ratio is likely to go down to 8 if the entire amount is raised as term loan.

(i) Advise the company on the financial plan to be selected.

(ii) If it is assumed that there will be no change in the P/E ratio if either of the two alternatives are adopted, would your advise still hold good ?

**Ans.** 19.36/22.17

**Q.36.** Anand Manufactures Ltd. has equity share capital of ₹ 5,00,000 (face value ₹ 100). To meet the expenditure of an expansion programme, the company wishes to raise ₹ 3,00,000 and is having following four alternative sources to raise funds.

**Plan A:** To have full money from equity shares.

**Plan B:** To have ₹ 1 lakh from equity and ₹ 2 lakhs from borrowing from the financial institutions @ 10% per annum.

**Plan C:** Full money from borrowing @ 10% per annum.

**Plan D:** ` 1 lakhs in equity and ` 2 lakhs from preference shares @ 8% per annum dividend.

The company is having present earnings of ` 1,50,000. The corporate tax is 50%. Suggest a suitable plan of the above four plans to raise the required funds.

**Ans.** 9.377/10.83/12/9.83

**Q.37.** A Ltd. has agreed to buy net assets of B Ltd. for ` 18,00,000. In order to finance the purchase the directors of A Ltd. are considering the following proposals:

- (i) To issue ` 18,00,000 5% 20 years sinking fund debentures.
- (ii) To issue ` 18,00,000 5½ % cumulative preference shares.
- (iii) To issue 60,000 equity shares at a premium of ` 10.

Summarized balance sheets as on 31<sup>st</sup> December, 1990 and profits and loss accounts for the year ended for each company are as follows:

<b>Liabilities</b>	<b>A Ltd.</b>	<b>B Ltd.</b>
Equity shares issued:		
25,000 shares fully paid	5,00,000	-----
50,000 shares fully paid	-----	2,00,000
Profit and loss account		
Balance and general reserve	19,00,000	2,00,000
5% debentures	10,00,000	-----
Current liabilities	<u>16,00,000</u>	<u>4,00,000</u>
	<u>50,00,000</u>	<u>8,00,000</u>
<b>Assets</b>		
Fixed Assets	20,00,000	4,00,000
Current Assets	<u>30,00,000</u>	<u>4,00,000</u>
	<u>50,00,000</u>	<u>8,00,000</u>

Profit and loss accounts for the year ended 31<sup>st</sup> December, 1990

	<b>A Ltd.</b>	<b>B Ltd.</b>
	(`)	(`)
Sales	<u>28,00,000</u>	<u>60,00,000</u>
	<u>15,10,000</u>	<u>2,80,000</u>
Depreciation	2,60,000	50,000
Interest to debentures	50,000	-----
Income tax	<u>6,00,000</u>	<u>1,15,000</u>
	<u>9,10,000</u>	<u>1,65,000</u>
Net profit	6,00,000	1,15,000
Dividends	<u>1,25,000</u>	<u>50,000</u>
	<u>4,75,000</u>	<u>65,000</u>

**You are required to:**

- (a) Calculate the consolidated net profit per equity share outstanding which would result under each of the above three proposals assuming the profits before debentures interest and income tax of the combined operation will remain constant.
- (b) Calculate the additional net annual cash outlay during the next year under each of the above three proposals assuming the rate of dividend on equity shares will be same as in 1990; and
- (c) Discuss the advantages and disadvantages of each of the above three proposals.

Ans. 23.20/24.64/8.41

**Q.38.** Ess Kay Corporation has plans for expansion, which calls for 50% increase in assets. The alternatives before the corporation are issue of equity share of debt at 14% its balance sheet and profit and loss accounts are as given below:

**Balance Sheet as at 31<sup>st</sup> December, 1999**

Liabilities	(in lakhs)	Assets	(in lakhs)
12% Debentures	25	Total Assets	200
Ordinary shares –			
10 lakh shares of ₹ 10 each	100		
General Reserve	<u>75</u>		
	<u>200</u>		<u>200</u>

**Profit and loss account for the year ending 31<sup>st</sup> December, 1999**

	(in lakhs)
Sales	750
Total cost excluding interest	<u>675</u>
EBIT	75
Interest on debentures	<u>3</u>
EBIT	72
Taxes	<u>36</u>
EAT	<u>36</u>

$$\text{Earnings per share (EPS)} = \frac{36,00,000}{10,00,000} = 3.60$$

$$\text{P/E ratio} = 5 \text{ times}$$

$$\text{Market price} = ₹ 18.00$$

If the corporation finances the expansion with debt, the incremental financing charges will be at 14% and P/E ratio is expected to be at 4 times. If the expansion is through equity, the P/E ratio will remain at 5 times. The company expects that its new issued will be subscribed to at a premium of 25%.

With above information determine the following:

- (i) If the EBIT is 10% of sales, calculate EPS at sales levels of ₹ 4 crores, 8 crores and 10 crores.
- (ii) After expansion determine at what level of EBIT, EPS would remain the same whether new funds are raised by equity or debt.
- (iii) Using P/E ratios calculate the market value per share at each sales level for both debt and equity financing.

**Ans.** EPS 1.03/1.15, 2.14/3.15, 2.69/4.15, M PS = 5.15/4.60, 10.70/12.60, 13.45/16.60 EBIT = 34.5 Lacs

**Q.39.** X Company Ltd. is considering three different plans to finance its total project cost ₹ 100 lakhs. These are:

	Plan A ₹ lakh	Plan B ₹ lakh	Plan C ₹ Lakh
Equity (₹ 100 per share)	50	34	25
Debt – 8% Debenture	<u>50</u>	<u>66</u>	<u>75</u>
	100	100	100

Sales for the first three years of operations are estimated at ₹ 100 lakhs, ₹ 125 lakhs and ₹ 150 lakhs and 10% profit before interest and taxes is forecast to be achieved. Corporate



taxation to be taken at 50%. Compute earnings per share in each of the alternative plans of financing for the three years.

**Q.40.** AB Limited provides you with following figures: -

Profit	3,00,000
Less interest on Debentures @ 12%	<u>60,000</u>
	2,40,000
Income – tax @ 50%	<u>1,20,000</u>
	<u>1,20,000</u>
Number of Equity Shares ( ` 10 each)	40,000
E.P.S. (Earning per share)	3
Ruling price in market	30
PE ratio (price / EPS)	10

The Company has undistributed reserves of ` 6,00,000. The company needs ` 2,00,000 for expansion.

This amount will earn at the same rate as funds already employed. You are informed that

a debt equity ration  $\frac{\text{Debt higher than}}{\text{Debt} + \text{Equity}}$

35% will push the P/E ratio down to 8 and raise the interest rate on additional amount borrowed to 14%. You are required to ascertain the probable price of the share: -

- If the additional funds are raised as debt; and
- If the amount is raised by issuing equity shares.

**Ans.** 25.20/30

#### **Break Even EBIT/ Indifference level of EBIT**

**Q.41. [June 2009]** Time Limited is considering three financing plans. The key information is as follows: -

- Total investment to be raised ` 2,00,000
- Plans of Financing Proportion

Plans	Equity	Debt	Preference Shares
A	100%	----	-----
B	50%	50%	-----
C	50%	-----	50%

- Cost of debt 8%
- Cost of preference shares 8%
- Tax rate 50%
- Equity shares of the face value of ` 10, each will be issued at a premium of ` 10 per share.
- Expected PBIT is ` 80,000.

*Determine for each plan:*

- Earnings per share (EPS) and
- The financial break even point.
- Indicate if any of the plans dominate and compute the PBIT range among the plans for indifference.

**Ans.** (i) 4/7.2/6.4, (ii) No, 8000, 16000 (iii) 16000/32000/No Indifference bet B & C

**Q.42 .** Key information pertaining to the proposed new financing plans of Hypothetical Ltd. is given below:

**Sources of funds**  
1

**Financing plans**  
2

Equity 15,000 shares of 100 each	30,000 shares of ` 100 each
Preference shares 12%, 25,000 shares of ` 100	-----
Debentures ` 5,00,000 at a coupon rate of 0.10	15,00,000, coupon rate of 0.11

Assuming 35 per cent tax rate,

- Determine the two EBIT – EPS coordinates for each financial plan.
- Determine the (a) indifference point, and (b) financial break – even point for each financing plan.
- Which plan has more financial risk and why ?
- Indicate over what EBIT range, if any, one plan is better than the other.
- If the firm is fairly certain that its EBIT will be ` 12,50,000, which plan would you recommend, and why ?

**Ans.** (a) 858077 (b) 511538, 165000 (v) Plan I

**Q.43.** Determine the indifference point and financial break even point for each financing plan for the facts in above question assuming the firm is required to pay 10 per cent tax on payment of preference dividend. Also, prepare verification table pertaining to indifference point.

**Ans.** 950385, Plan – I 557692, Plan II 165000

**Q.44.** Alloys Company has recently reorganized in order to specialize in electronics business. The company requires ` 24,00,000 to enter the business. The company presented two financing plan for consideration:

**Plan (A):** 2,00,000 Equity shares to be sold at ` 4 per share and ` 16,00,000 debt at a 12% rate of interest.

**Plan (B):** 4,00,000 equity shares to be sold at ` 4 per share and ` 8,00,000 in loan at an 11%.

The company currently has 1,00,000 shares outstanding and ` 4,00,000 loan at 11% rate of interest.

*The following estimates have been prepared by the marketing department:*

Sate of the Economy	Probability	EBIT
Poor	0.2	` 12,00,000
Average	0.6	` 14,00,000
Good	0.2	` 15,00,000

Tax rate is 50%.

*You are required to:*

- Calculate EPS under the two different plans at the expected level of EBIT.
- Recommend the best plan for the company at the expected level of EBIT.
- Calculate EPS if the probability of good economy change to 0.9 and probability of average change to 0.05. As a company finance director of company would you change you change your earlier recommendations ?

**Ans.** (i) EBIT = 1380000 EPS = 1.91/1.25 EBIT = 1480000 EPS 2.07/1.35

**Q.45.** A new project under consideration requires a capital outlay of ` 300 lakhs. The required funds can be raised either fully be equity shares of ` 100 each or by equity shares of the value of ` 200 lakhs and by loan of ` 100 lakhs at 15% interest. Assuming a tax rate of 50%, calculate the figure of profit, before tax that would keep the equity investors indifferent to the two options. Verify your answer by calculating the EPS.

**Ans.** EBIT = ₹ 45,00,000 EPS = 7.5

**Q.46.** Raj Tools Ltd. is considering an expansion programme, which is expected to cost ₹ 20,00,000. The company can finance pattern is as given below:

Equity capital (1,00,000 shares of ₹ 10 each)	10,00,000
Reserves & surplus	4,00,000
Debt (10%)	6,00,000
	<u>20,00,000</u>

The latest income statement reveals the following information:

Sales	1,28,00,000
Less: Total costs	1,18,00,000
EBIT	<u>10,00,000</u>
Less: interest	60,000
EBT	<u>9,40,000</u>
Less: Income – tax @ 50%	4,70,000
EAT	<u>4,70,000</u>

The expansion programme is expected to generate additional sales of ₹ 32,00,000 with a return of 15% on sale, before interest and taxes. If the expansion is financed through debt, the rate of new debt will be 12% and the price-earning ratio will be 4 times. If the expansion programme is financed through equity shares i.e. the new shares can be sold at a price of ₹ 40 and the price to earning ratio will be 5 times. Which form of financing should the company choose if the objective of financial management in the company is maximization of shareholders wealth ?

**Ans.** EPS 5.90/4.73 MPS = 23.60/23.65

**Q.47.** Sooraj Ltd. has developed a financing plan for the next three years based on the following estimates.

	Year 1	Year 2	Year 3
Sales (₹ in lakhs)	1,200	1,440	1,800
Fixed assets (₹ in lakhs)	960	1,140	1,320

*The following assumptions have been made for the purpose of planning:*

Gross Profit	-----	30%
Return on sales – (net of taxes)	-----	10%
Dividend payout ratio	-----	50%

*Ratios based on year and figures:*

Cash and debtors to sales	-----	4 times
Inventory (to cost of goods sold)	-----	3 times
Required current ratio	-----	2 : 1
Required ratio of long term debt of equity	-----	1 : 2

At the beginning of the year 1, the firm expects to have equity of ₹ 720 lakhs and long-term debt of ₹ 360 lakhs.

You are required to determine how much additional equity capital the firm will have to raise each year based on the above ratios and assumptions.

**Ans.** Equity 1 Year 2300, 2 Year 563, Year - III 762  
Debt 1 Year 1180, 2 Year 304, Year – III 426

**Q.48.** Pearl Ltd. has developed a financing plan for the next three years based on following estimates:

	Year 1	Year 2	Year 3
Sales (₹ in lakhs)	600	720	900
Fixed assets (₹ in lakhs)	480	570	660
<i>The following assumptions have been made for the purpose of planning:</i>			
Gross Profit		-----	30%
Return on sales – (net of taxes)		-----	10%
Dividend payout ratio		-----	50%
<i>Ratios based on year and figures:</i>			
Cash and debtors to sales		-----	4 times
Inventory (to cost of goods sold)		-----	3 times
Required current ratio		-----	2 : 1
Required ratio of long term debt of equity		-----	1 : 2

At the beginning of the year 1, the firm expects to have equity of ₹ 360 lakhs and long-term debt of ₹ 180 lakhs.

Determine how much additional equity capital the firm will have to raise each year based on above ratios and assumptions.

Assume that the company is not seeking separate finance from bank for additional working capital needs.

**Q.49.** The financial advisor of Winners Ltd. is confronted with two alternative financing plans for raising ₹ 10 lakh that is needed for plant expansion and modernization. One choice is 12% debt issue. The other is to issue 8,000 equity shares at the current market price of ₹ 125 per share. The modernization and expansion programme is expected to increase the firm's operating profits (EBIT) by ₹ 2,00,000 annually.

The firm's condensed financial statements for current year are given below:

**BALANCE SHEET AS ON 31<sup>ST</sup> MARCH, 2000**

<b>Liabilities</b>		<b>Assets</b>	
Current liabilities	5,00,000	Current Assets	16,00,000
10% long-term loan	15,00,000	Plant and Equipment (net)	34,00,000
Reserves and Surplus	10,00,000		
Equity capital			
(shares of ₹ 100 each)	<u>20,00,000</u>		
	<u>50,00,000</u>		<u>50,00,000</u>

**INCOME STATEMENT FOR THE YEAR ENDED ON 31<sup>ST</sup> MARCH, 2000**

Operating profits	-----	8,00,000
Less: interest expenses (0.10 X ₹ 15,00,000)	-----	<u>1,50,000</u>
Income before taxes	-----	6,50,000
Less: taxes (0.35)	-----	<u>2,27,000</u>
Net income		<u>4,22,500</u>
Earning per share	-----	21.12
Dividend per share	-----	10.56

However, the financial advisor is concerned about the effect that issuing debt might have on the firm. The average debt ratio (based on total debt) for firms in industry is 45%. He believes that if this ratio is exceeded, the P/E ratio will fall to 7 because of the potentially

greater risk. If the firm increases its equity capital, he expects the P/E ratio to increase to 8.5. He also wonders as to what will happen to the dividend yield under each plan. The firm follows the practice of paying dividends equal to 50% of net income.

- (i) Determine the debt ratio, under each financing plan, after the securities are issued;
- (ii) Determine the expected net income in the next year, expected EPS and the expected market price of the equity shares; and
- (iii) Which form of financing should be employed by the company, if the company is to follow a policy of maximizing market value of its shares?

	Debt	Equity
<b>Ans.</b> D:E Ratio	45.45	27.27
M.P.S	166.075	167.71

**Q.50.** Calculate the P/E ratio from the following: -

Equity Share Capital (₹ 20 each)	50,00,000
Reserves and Surplus	5,00,000
Secured Loans at 15%	25,00,000
Unsecured Loans at 12.5%	10,00,000
Fixed Assets	30,00,000
Investments	5,00,000
Operating Profit	25,00,000
Income – tax Rate	50%
Market Price / Share	₹ 50

**Ans.** 12.5

**Q.51.** Beatle Company is contemplating conversion of 500, 14% convertible bonds of ₹ 1,000 each. Market price of the bond is ₹ 1,080. Bond indenture provides that one bond will be exchanged for 10 shares. Price earning ratio before redemption is 20 : 1 and anticipating price – earning ratio after redemption is 25 : 1 Number of shares outstanding prior to redemption are 10,000. EBIT amounts to ₹ 2,00,000. The company is in the 35% tax bracket. Should the company convert bond into shares ? Give reasons.

**Ans.** 160, 167

**Q.52.** Saraju Ltd. produces electronic components with a selling price per unit of ₹ 100. Fixed cost amount to ₹ 2,00,000. 5,000 units are produced and sold each year. Annual profits amount to ₹ 50,000. The company's all equity-financed assets are ₹ 5,00,000. The company proposes to change its production process, adding ₹ 4,00,000 to investment and ₹ 50,000 to fixed operational costs. The consequences of such a proposal are:

- i). Reduction in variable cost per unit by ₹ 10
- ii). Increase in output by 2,000 units
- iii). Reduction in selling price per unit to ₹ 95

Assuming an average cost of capital 10%, examine the above proposal and advise whether or not the company should make the change. Also measure the degree of operating leverage and break-even point.

(I.C.W.A. Final Dec. 1998)

**Ans.** Profitability Statement

(₹)

Production and sales (units)	Present 5,000	Proposal 7,000
------------------------------	------------------	-------------------

Sales @ ` 100; @ ` 95	5,00,000	6,65,000
	<u>2,50,000</u>	<u>2,80,000</u>
Less: Variable cost @ ` 50; @ ` 40	2,50,000	3,85,000
Contribution	2,00,000	2,00,000
Less: Fixed cost	—	<u>50,000</u>
Additional fixed cost	50,000	1,35,000
Operating profit	—	<u>40,000</u>
Less: Interest on additional investment (4,00,000 × 10/100)	50,000	95,000
Net profit		

$$\text{Break-even Point} = \frac{\text{Fixed Cost}}{\text{Contribution p.u.}} = \frac{2,00,000}{50} = 4,000 \quad \frac{2,50,000 + 40,000}{55} = 5,273$$

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{Earnings before interest}} = \frac{2,50,000}{50,000} = 5 \quad \frac{3,85,000}{1,35,000} = 2.85$$

1 % change in sales will have 5% change in operating profit in existing situation and 2.85% change in proposed situation.

- Q.53.** Bee Hive Company is contemplating conversion of 8% convertible debentures of ` 1,000 each. At present it has 500 such debentures outstanding. The market price of the debentures is ` 1,080. The debenture indenture provides that one debenture will be converted for 10 shares. The price earning ratio before redemption is 20 : 1 and anticipated price earning ratio after redemption is 25 : 1. The number of shares outstanding prior to redemption was 10,000. Earning before interest and taxes amounted to ` 2,00,000. The company is in the 50% tax bracket. Should the company convert its debentures into shares?

#### Capital Structure

The EBIT is divided among three main claimants

- (i) The debt holders who receive their share in the form of interest.
- (ii) The Govt. which receives its share in the form of taxes &
- (iii) The shareholders who receive the residual,

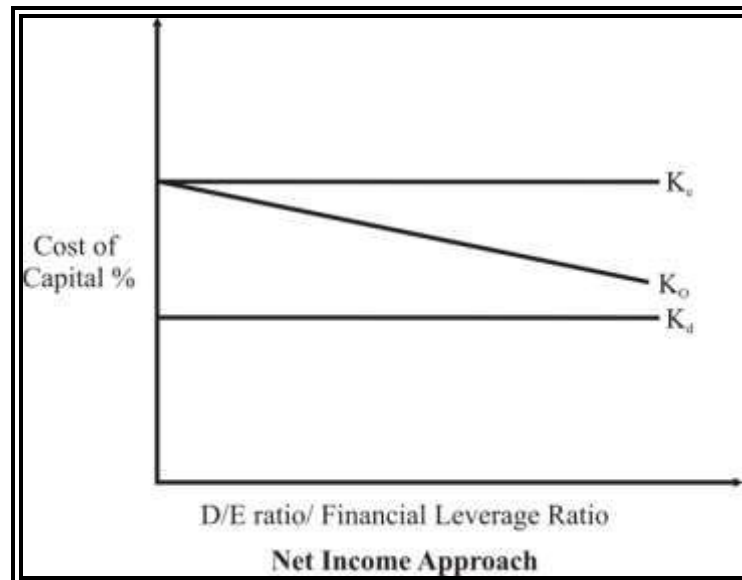
So, the EBIT is a pool which is to be divided among the three claimants.

1. One financing mix or capital structure is represented by on WACC which may change whenever there is change in financing mix. So a firm can change its WACC by changing the financing mix & can thus affect the value of the firm. It may be noted that the cost of capital & the value of the firm are inversely related. For a given level of earning & lower the cost of capital, the higher would be the value of the firm.

#### NET INCOME APPROACH

As per Net Income Approach (NI) there is relationship between capital structure & value of the firm & therefore the firm can affect its value by increasing or decreasing the debt proportion in the overall financing mix. The NI approach makes the following additional assumptions:

1. The total capital requirement of the firm are given & remain constant.
2.  $K_d$  is less than  $K_e$ .
3. Both  $K_d$  &  $K_e$  remain constant & increase in financial leverage i.e. use of more & more debt financing in the capital structure doesn't effect the risk perception of the investors.

**Example**

The expected EBIT of a firm is ₹ 2,00,000 it has issued equity share capital  $k_e$  @ 10% & 6%. Debt of ₹ 5,00,000 find out the value of the firm & the overall cost of capital (WACC)

EBIT	₹ 2,00,000
Interest 6% of ₹ 5,00,000	<u>30,000</u>
Net profit	1,70,000
$k_e$	10%
Value of equity $170000/0.10$	17,00,000
Value of debt	<u>5,00,000</u>
Total value of the firm	22,00,000

$$\text{EBIT} = \frac{\text{WACC}}{V} = \frac{2,00,000}{22,00,000} = 0.09 = 9\%$$

The WACC can also be calculated as follows

$$\text{WACC} = \frac{D}{D+E} k_d + \frac{E}{D+E} k_e$$

$$\frac{5}{5+17} 0.06 + \frac{17}{17+5} 0.1 = 0.09$$

Now if the firm has issued 6% Debt of ₹ 7,00,000 instead of ₹ 5,00,000 the position have been as follows:

EBIT	2,00,000
6% of 7,00,000	42,000
EBT	1,58,000
$k_e$	10%
Value of equity $\frac{1,58,000}{0.1} =$	15,80,000
Value of debt	<u>7,00,000</u>
Total value of the firm	22,80,000
WACC $= \frac{2,00,000}{22,80,000} = 0.087$	<u>8.7%</u>

So, 6% debt is increased from 5,00,000 to ` 7,00,000 the value of the firm increases from ` 22,00,000 to ` 22,80,000 & WACC decreases from 9% to 8.7%. Now say the firm has issued 6% debt of ` 2,00,000 only instead of ` 5,00,000 the position would be as follows:

EBIT	` 2,00,000
Interest 6% of ` 2,00,000	<u>12,000</u>
Net profit	1,88,000
Ke	10%
Value of ke 1,88,000/0.10	18,80,000
Value of equity	18,80,000
Value of debt	<u>2,00,000</u>
Total value of the firm	<u>20,80,000</u>

$$WACC = \frac{D}{E + D} k_d + \frac{E}{E + D} k_e$$

$$WACC = \left[ \frac{2,00,000}{20,80,000} \right] 0.06 + \left[ \frac{18,80,000}{20,80,000} \right] 10\% = 9.6\%$$

So, when the proportion of 6% debt is reduced to ` 2,00,000 only, the value of the firm reduces to ` 20,80,000.

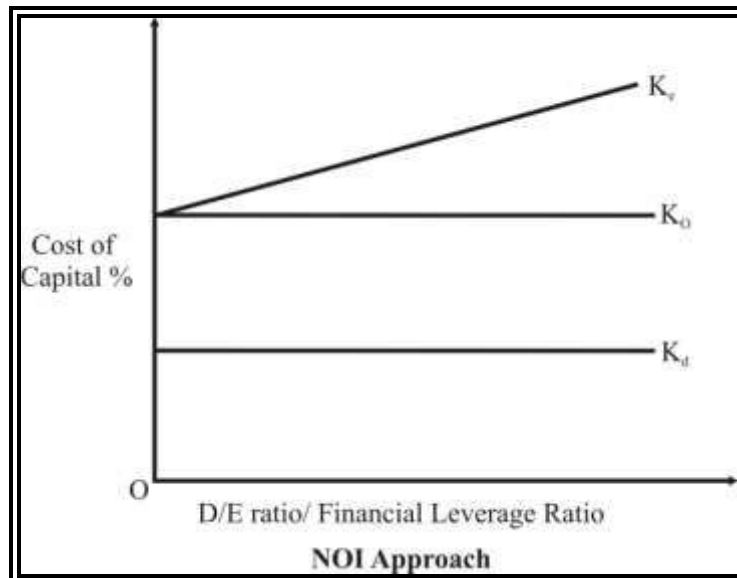
Thus, as per Net Income Approach a firm is also to increase its value & to decrease its WACC by increasing the debt proportion of the capital structure.

### **Net Operating Income Approach**

The Net Operating Income (NOI) Approach is opposite to the NI approach. According to NOI approach. According to NOI approach the market value of the firm depends upon the net operating profit or EBIT & overall cost of capital, WACC. The financing mix or the capital structure is irrelevant & does not affect the value of the firm. The NOI approach makes the following assumptions:

- (1) The investors see the firm as a whole & thus capitalizes the total earnings of the firm to find the value of the firm as a whole.
- (2) The overall cost of capital,  $k_o$ , of the firm is constant & depends upon the business risk, which also is assumed to be unchanged.
- (3) The cost of debt,  $k_d$ , is also taken as constant.
- (4) The use of more & more debt in the capital structure increases the risk of the shareholder & thus results in the increase in the cost of equity capital. i.e.  $k_e$ . The increase in  $k_e$  is such as to completely off set the benefits of employing cheaper debt, &
- (5) That there is no tax.





$$V = \frac{\text{EBIT}}{K_o} \quad E = V - D \quad \rightarrow \quad V = E + D$$

$$k_e = \frac{\text{EBIT} - \text{Interest}}{V - D}$$

**Example:** A firm has an EBIT of ` 2,00,000 & belongs to a risk class of 10%. What is the value of equity capital if employees 6% debt to the extent of 30%, 40% or 50% of the capital fund of ` 10,00,000.

**Ans.** The effect of charging debt proportion on the cost of equity capital can be analyzed as follows:

	30% debt	40% debt	50% debt
EBIT	2,00,000	2,00,000	2,00,000
$k_o$	10%	10%	10%
Value of the firm V	20,00,000	20,00,000	20,00,000
Value of 6% Debt D	3,00,000	4,00,000	5,00,000
Value of Equity (E) = V-D	17,00,000	16,00,000	15,00,000
Interest to debt	18,000	24,000	30,000
Net profit for equity	1,82,000	1,76,000	1,70,000
$k_e = \text{NP}/E$	10.7%	11%	11.33%

The  $k_e$  of 10.7%, 11% & 11.33%, can be verified for different proportion of debt by calculating WACC as follows:

For 30% debt

$$k_o = \frac{D}{E+D} k_d + \frac{E}{E+D} k_e$$

$$k_o = \frac{3}{3+17} 0.06 + \frac{17}{3+17} 0.107 = 10\%$$

For 40% debt

$$k_o = \frac{4}{4+16} 0.06 + \frac{16}{4+16} 0.107 = 10\%$$

For 50% debt

$$k_o = \frac{5}{5+15} 0.06 + \frac{15}{5+15} 0.107 = 10\%$$

These calculations of WACC testify that the benefit of employment of more & more debt in the capital structure is off set by the increase in equity capitalization rate  $k_e$ .

**Traditional Approach → A Practical View Point**

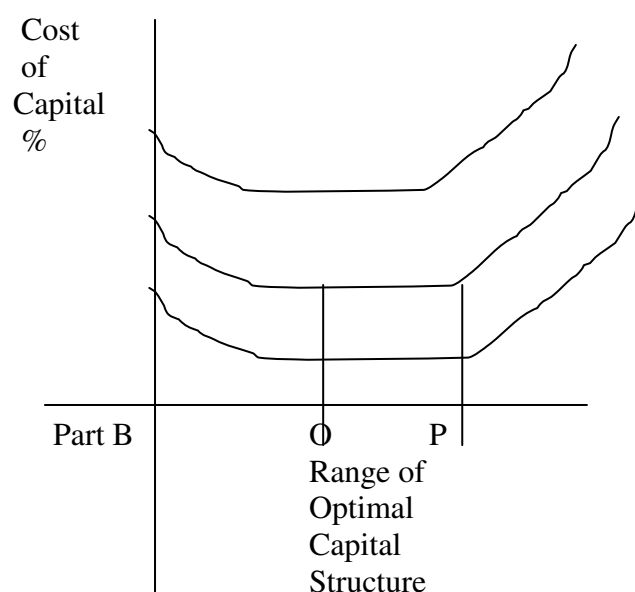
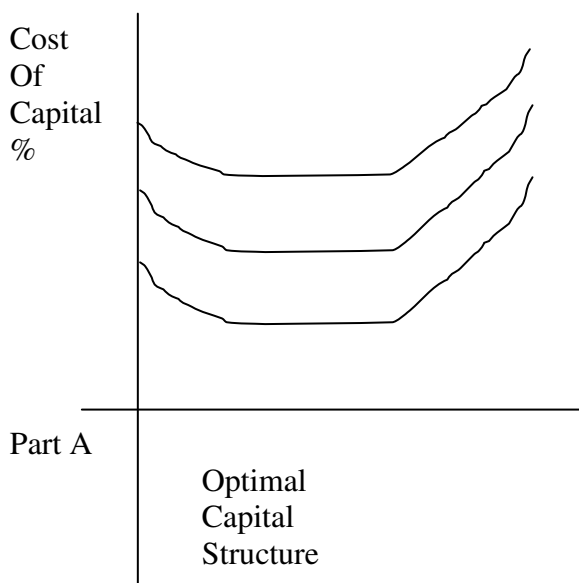
As per the traditional approach a firm should make a judicious use of both the debt & the equity to achieve a capital structure which may be called the optimal capital structure. At this capital structure, the overall cost of capital, WACC of the firm will be Minimum & the value of the firm Maximum. The traditional view point states that the value of the firm increases with increase in financial leverage but up to certain limit only. Beyond this limit, the increase in financial leverage will increase its WACC also & the value of the firm will decline.

**Example:** ABC Ltd. having an EBIT of ` 1,50,000 is contemplating to redeem a part of capital by introducing the debt financing.

Presently, it is a 100% equity firm with equity capitalization rate  $k_e$  of 16%. The firm is to redeem the capital by introducing debt financing upto ` 3,00,000 i.e. 30% of total funds or upto ` 5,00,000 i.e. 50% of total funds. It is expected that for the debt financing upto 30%, the rate of interest will be 10% & the  $k_e$  will increase to 17%. However, if the firm opts for 50% debt financing, then interest will be payable at the rate of 12% &  $k_e$  will be 20%, find out the value of the firm & its WACC under different level of debt financing.

	0% debt	30% debt	50% debt
Total debt	-----	3,00,000	5,00,000
Rate of interest	-----	10%	12%
EBIT (`) 1,50,000	1,50,000	1,50,000	
Less interest	-----	<u>30,000</u>	<u>60,000</u>
Profit before tax	1,50,000	1,20,000	90,000
Equity capital rate $k_e$	0.16	0.17	0.20
Value of equity	9,37,500	7,05,882	4,50,000
Total value	9,37,500	10,05,882	9,50,000
WACC = EBIT/Total value	0.16	0.149	0.158

The traditional view point has been shown in figure

**Modigliani – Miller Model: Extension of the NOI Approach**

The MM Model argues that if two firms are alike in all respect except that they differ in respect of their financing pattern to their market value, then the investors will develop a tendency to sell the shares of the over valued firm (creating a selling pressure) & to buy the shares of the under valued firm (creating a demand pressure). This buying & selling pressure & will continue till the firms have same market values.

Let's consider an example

	10% debt of 30,00,000	
	Lev & Co	U Lev & Co
EBIT	10,00,000	10,00,000
Less interest	<u>3,00,000</u>	<u>-----</u>
Net profit	7,00,000	10,00,000
Equity capitalization rate	0.20	0.20
Value of equity	35,00,000	50,00,000
Value of debt	30,00,000	<u>-----</u>
Total value (V)	65,00,000	50,00,000
WACC (ko) = EBIT/V	15.38%	20%
	↓ Operative Firm	↓ Under value firm

### The Arbitrage Process: -

Here selling 10% equity share of lev & co receiving 3,50,000 & buying 10% shares of Ulev & Co. in ` 5,00,000.

To purchase artificial debt is taken @ 10% amount equal to ` 3,00,000

Total funds requirement to funds =	5,00,000
Total available funds =	<u>6,50,000</u>
Extra funds which is used to earn extra	1,50,000

Earning of U leve & Co.	1,00,000
less interest paid 10% of 3,00,000	<u>30,000</u>
Balance Amount	70,000

Which is equal to 10% earning of levered firm but extra available funds 1,50,000 by which extra can earn.

MM Model argues that this opportunity to earn extra income through arbitrage process will attract. So many investors. The gradual increase in sales of the shares of the levered firm, IEV & Co, will push its prices down & the tendency to purchase the shares of the unlevered firm, Ule & Co., will drive its prices UP. These selling & purchasing pressure will continue until the market value of the two firms are equal. At this stage, the value of the levered & unlevered firm & so their cost of capital are same; & thus the overall cost of capital, ko is independent of the financial leverage.

$$V_o = \frac{EBIT(1 - T)}{K_o}$$

$$V_L = V_o + \text{PV of Interest tax shield}$$

$$V_L = V_o + \text{Debt} \times t$$

$$V_L = \text{Value of the levered firm}$$

$$V_o = \text{Value of the unlevered firm}$$

$$\text{Debt} = \text{Total debt raised by levered firm}$$

$$t = \text{tax rate}$$

There are three major decisions are taken by financial manger. (i) Investment Decision (ii) Financing Decision (iii) Dividend Decision. The central issue in the dividend decision is to take a call on how much of the profits are to be retained for future investments and how much are to be distributed. Also crucial is whether this would affect the value of the firm.

**Factors determining the dividend policy:**

Dividend policy means how the decision relating to the dividend be taken whether there should be a stable pattern of dividends over the years or whether the dividend decision is taken every year irrespective of previous year's decision. The factors affecting the dividend policy of a company are as follows:

- (i) **Liquidity:** In order to pay dividends, a company will require access to cash. Even very profitable companies might sometimes have difficulty in paying dividends if resources are tied up in other forms of assets.
- (ii) **Opportunities for Reinvestment and Growth:** If a company has a high growth potential for itself and, requires a large amount of funds for financing growth should declare lower dividends to conserve resources and maintain its debt equity ratio at a proper level. High dividend may be declared if the company has no growth potential planning in hand.
- (iii) **Control:** The use of retained earnings to finance new projects preserves the company's ownership and control. This can be advantageous in firms where the present disposition of shareholding is of importance.
- (iv) **Legal considerations:** The legal provision lays down boundaries within which a company can declare dividends. They describe how the dividend be declared, what should be reserve transfer before the declaration, what should be maximum dividend in case of losses and time period in which the distribution of dividend takes place.
- (v) **Effect on Market prices:** The market price of the share is the function of many factors like mass psychology, economies and financial management, etc. And dividend is one of them. Walter has tried to put a relationship between the market price of the share and present dividend decision and the internal profitability of retained earnings. In theory, the market price is considered to be the present value of the dividend. So while deciding the dividend, the effect of the decision on the market price is also considered.
- (vi) **Effect of Inflation:** The dividend is declared after making the provision for the depreciation and depreciation is charged on the historical cost of assets. In the inflationary condition, the traditional rate of the depreciation does not provide sufficient fund for replacing the assets. So rate of the inflation is watched so that adequate provision for the depreciation may be made and dividend is declared after the provision.
- (vii) **Tax considerations:** So the tax status of the major shareholders also affects the dividend decision sometimes. Such shareholders may be interested in taking their return from the investment in the form of capital gains rather than in the form of dividends.
- (viii) **Others** such as dividend policies adopted by units similarly placed in the industry, management attitude on dilution of existing control over the shares, fear of being branded as incompetent or inefficient, conservative policy vs non – aggressive one.

**Q. 1. [ June 2006]** What are the main considerations/determinants/factors of dividend policy in a corporate enterprise?

**Ans.** Considerations/determinants/factors affecting the dividend policy are as follows:-

- 1) Legal Considerations

- Section 205 of the Companies Act, 1956 deals with the provisions relating to dividend.
- Due consideration to dividend tax liability also needs to be kept in mind.
- 2) Opportunities available for utilization of funds
  - The decisions regarding dividend payout ratio and retention ratio depends upon the opportunities available at the disposal of company.
  - If it has some projects where such financial sources can be deployed which can consequently fetch high return it will declare low dividend.
  - However, if a company has no immediate requirement for funds, it may decide to declare high dividends.
- 3) Quantum of cash available
  - Before declaring dividend cash availability needs to be ensured.
  - Since declaration and payment of dividend leads to outflow of cash, liquidity position needs to be well analyzed.
- 4) Stability of earning
  - A company with stable income/earning can have high dividend payout ratio while an organization with instable earnings cannot do so.
  - Thus, stability of earnings is directly proportional to the dividend payout ratio and consequently with dividend also.
- 5) Impact on market price
  - Dividend decision has a direct impact on the market price on the shares market price as the latter is nothing else but the present value of future dividend.

**Q. 2. [June 2001]** For each of the companies described below, would you expect it to have a medium, high or low dividend payout ratio? Explain why./

1. A company with a large proportion of inside ownership, all of whom are high-income individuals; /
2. A growth company with an abundance of good investment opportunities; /
3. A company experiencing ordinary growth that has high liquidity and much unused borrowing capacity; and
4. A company with volatile earnings and high business risk.

**Ans.**

1. Low dividend payout ratio since big shareholders & institutional investors are interested in realizing c returns through capital gains.
2. Low dividend payout ratio since it can invest surplus funds in those projects where there are good opportunities.
3. High dividend payout ratio since there exist surplus funds.
4. Low dividend payout ratio since there is volatility & uncertainty in the business.

**Q. 3. [ June 2002]** What is 'stable dividend policy'? Do you recommend a stable dividend policy? Explain the reasons for your answer.

**Ans.**

- Stable means something which lacks fluctuation.
- Fluctuations i.e. abruptly increase or decrease in price may cause adverse effect.
- Efforts should be made to have a stable dividend policy.
  - Stable payout ratio (say 60% payout)
  - Stable amount of dividend (say Rs. 2/- share or 20%)
  - Stable low dividend + an extra premium in case of high profits.
- A stable dividend policy is the one most recommended.
- It is liked by investors since it lack fluctuations.
- It is a reliable policy and generates trust in the company.
- It boosts the confidence of the investor as it does away with the element of uncertainty and unreliability.
- Abruptly low or high payment of dividend on the other hand ushers the confidence of the investors.

**Q. 4. [ June 2007]** “Large shareholders are not interested in dividends.” Comment.

**Ans.**

- Shareholders can be classified as:-
  - Large scale or Institutional investors.
  - Small scale investors or retail investors.
- Small investors are the one who invest less amount of money and are interested in dividend.
- Large investors on the other hand are not much concerned or interested in dividends.
- The concern of large investors in capital appreciation.
- They show keen interest in growth the company.
- Growth in company leads to increase in wealth of such shareholder.
- Their interest is in capital appreciation and not dividend also because of the fact that cash dividend leads to increase in levy of taxes.

**Q. 5. [CS June 2007]** “In an uncertain world in which verbal statements can be ignored or misinterpreted, dividend action does provide a clear-cut means of ‘making a statement’ that speaks louder than thousand words.” Explain.

**Ans.**

- It is true to say that in an uncertain world in which verbal statements can be ignored or misinterpreted, dividend action does provide a clear out means of making a statement that speaks louder than thousand words.
- Section 205 of the Companies Act 1956 provides that dividend need to be paid within a period of 30 days from that of declaration.
- Thus, it becomes binding on the company to pay it within a period of 30 days, even though oral announcement has taken place.
- Also the above lines reveal the fact that performance of the company gets depicted through its dividend action.

**Q. 6.** “Dividend policy is strictly a financing decision and payment of cash dividend is a passive residual.” Comment.

**Ans.**

- As per the Residual theory of Dividend policy, dividend policy is strictly a financing decision and payment of cash dividend is a passive residual.
- Dividend decision constitutes one the important decisions which a finance manager has to take.
- Dividend payout ratio and retention ratio are determined keeping in mind the investment avenues available and expected profitability is such projects.
- If good investment opportunities exist; the dividend payout will be low, whereas if no such avenues exist, high dividend payout will be there.

**Q. 7.** “Stability in payment of dividends has a marked bearing on the market price of the shares of a “corporate firm.” Explain the statement.

**Ans.**

- The dividend policy determines the division of earnings between the dividend distribution and reinvestment in the firm.
- The distribution of earnings between the two depends upon the need of funds internally for reinvestment purposes and expectations of the shareholders.
- An increase in the dividend leads to a stock price increase while a decreased in dividend results into a stock price decline.
- An increase in dividend payout is considered by the investors as permanent or long term increase in firm’s expected earnings and considered as good news resulting in an increase in stock price.
- Fluctuating dividend policy will not create the desired impact over the stock price.
- Hence, it is said that stability in payment of dividends has a marked bearing on the market price of the shares of a corporate firm.

**Q. 8. [2008 Dec.]** Comment on the inspite of many advantages, the stable dividend policy suffers from certain limitations.

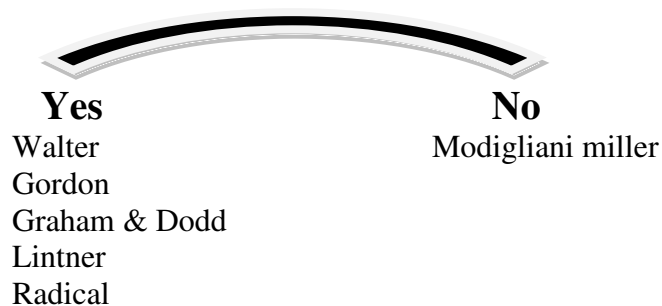
**Ans.**

- However, stable dividend policy may prove out a hindrance in case of loss or insufficient profit or stringent cash availability.
- Also, in case of high earning following the redundant but stable rate of dividend may prove further dangerous since in such a cash company may not cope with the expectation of the investors.

### Date of Dividend

- (i) The date when dividend is announced is called the declaration date.
- (ii) The date on which the register of members is closed to find out the names of the members who will be eligible to receive dividends is called the record date. The company fixes this date.
- (iii) The date upto which shares can be bought in the stock market and be eligible to receive dividend is called the last cum-dividend date. This date is fixed by the stock exchange.
- (iv) The date from which shares can be bought in the stock market without being eligible for dividend is called the ex-dividend date. On the ex-dividend date, the market price of the share will fall by the amount of dividend per share. The ex-dividend date is ahead of the record date fixed by the company in order to give the buyer the time to register his share with the company so as to be eligible for dividend.
- (v) The date on which dividend is actually paid out is called the payment date.

### Relevance of Dividend



#### 1. WALTER'S MODEL:

The Walter Model propounded in 1963 by James E Walter champions the cause of relevance and bases its arguments on the following assumptions.

#### Assumptions

- (a) The firm is an all equity firm
- (b) The firm will use only retained earnings to finance its investments
- (c) The rate of return on investment is constant and so for is the cost of equity. This means that with every additional investment, business risk remains unaltered.
- (d) All earnings are either distributed or retained internally
- (e) The firm ha an infinite life
- (f) Earnings and dividends don't change

#### Postulation

Walter argues that the market price of a share is the sum of the present value of the following two cash flow streams:

- Infinite stream of constant future dividends
- Infinite stream of capital gains (Retained earnings)

The logical build up to the formula runs thus:

- The present value of infinite stream of constant dividends is the present value of a perpetuity and is hence  $D/K_e$ .

- When a firm retains a perpetual sum of (EPS-DPS) and invests it at “r” rate of return, it earns  $r \times (E-D)$ . Its present value will be  $r/K_e \times (E-D)$ . If the retained earnings occur every year, we would have an infinite number of such retentions. The present value of an infinite number of such retentions will be equal to  $[r/K_e \times (E-D)]/K_e$ . Thus the value of a share is the present value of all dividends plus the present value of all retentions (*a k a* capital gains).

$$P_0 = \frac{D}{K_e} + \frac{\frac{r}{K_e}(E-D)}{K_e}$$

Where

$P_0$  = Current market price

$D$  = Dividend per Share

$E$  = Earnings per Share

$r$  = Rate of Return

$K_e$  = Cost of Equity

Walter classified all the firms into **three categories:-**

- Growth Firm
- Declining Firm.
- Normal or Constant Firm

#### **Growth Firm**

If  $r > K_e$ , Higher the Retention Ratio [i.e. zero Dividend Pay-out Ratio] Higher the Market Price per Share.

#### **Declining Firm**

If  $r < K_e$ , Lower the Retention Ratio [i.e. 100% Dividend Pay-out Ratio] Higher the Market Price per Share.

#### **Constant Firm**

If  $r = K_e$ , any Retention Ratio or any dividend payout ratio will not affect market price of share. MPS will remain same Under any Dividend Payout or Retention Ratio.

### **Criticism**

The Walter's model has been criticized on the following grounds:

- No external financing:** By assuming that the company shall not resort to borrowing, this model may result in a sub-optimal investment decision. Suppose funds can be borrowed at 10% and equity costs 15%. If the rate of return on investment opportunities is 12%, this model passes up a good investment just because the firm does not borrow money.

## **2. GORDON'S MODEL:**

The Gordon's model propounded in 1962 by Myron Gordon bases its arguments on the following assumptions.

### **Assumptions:**

- The firm is an all equity firm.
- The firm uses only retained earnings to finance its investments.
- The rate of return on the firm's investment is constant.
- The cost of equity is constant.
- The firm has an infinite life.
- The retention ratio is constant.
- The growth ratio is constant.
- $K_e$  is greater than growth rate where growth is the product of retention ratio and return on equity.
- Taxes are absent.



**Postulation**

Gordon argues that the market price of a share is the present value of future dividends. Since under Gordon's assumption, dividends are assumed to grow at a uniform rate forever, the Gordon's model suggests that the market price of a share is the present value of a growing perpetuity.

$$P_0 = \left[ \frac{D_1}{K_e - g} \right]$$

Where

$D_1$  = DPS next year

$g$  = Growth rate in dividends

$K_e$  = Cost of equity

$P_0$  = Current market price

**Criticism**

The Gordon's model suffers from the same imperfections as the Walter's model. The assumptions relating to 100% equity funding does not lead to maximization of wealth. The assumptions about constant rate of return and constant opportunity cost are suspect.

3. **Modigliani and Miller (MM) Hypothesis:** Modigliani and Miller Hypothesis is in support of the irrelevance of dividends. Modigliani and Miller argue that firm's dividend policy has no effect on its value of assets and is, therefore of no consequence i.e. dividends are irrelevant to shareholders wealth. According to them, 'Under conditions of perfect capital markets, rational investors, absence of tax discrimination between dividend income and capital appreciation, given the firm's investment policy, its dividend policy may have no influence on the market price of shares'.

**Assumptions:**

- The firm operates in perfect capital markets in which all investors are rational and information is freely available to all.
- There are no taxes. Alternatively, there are no differences in the tax rates applicable to capital gains and dividends.
- The firm has a fixed investment policy.
- There are no floatation or transaction costs.
- Risk of uncertainty does not exist. Investors are able to forecast future prices and dividends with certainty, and one discount rate is appropriate for all securities and all time periods. Thus,  $r = k = k_t$  for all  $t$ .

MM Hypothesis is primarily based on the arbitrage argument. Through the arbitrage process, the MM Hypothesis discusses how the value of the firm remains same whether the firm pays dividend or not. It argues that the value depends on the earnings of the firm and is unaffected by the pattern of income distribution. Suppose, a firm which pays dividends will have to raise funds externally to finance its investment plans, MM's argument, that dividend policy does not affect the wealth of the shareholders, implies that when the firm pays dividends, its advantage is offset by external financing. This means that the terminal value of the share declines when dividends are paid. Thus, the wealth of the shareholders - dividends plus terminal price - remains unchanged. As a result, the present value per share after dividends and external financing is equal to the present value per share before the payments of dividends. Thus, the shareholders are indifferent between payment of dividends and retention of earnings.

Market price of a share after dividend declared on the basis of MM model is shown below:

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

Where,

$P_0$  = The prevailing market price of a share

$K_e$  = The cost of equity capital

$D_1$  = Dividend to be received at the end of period one

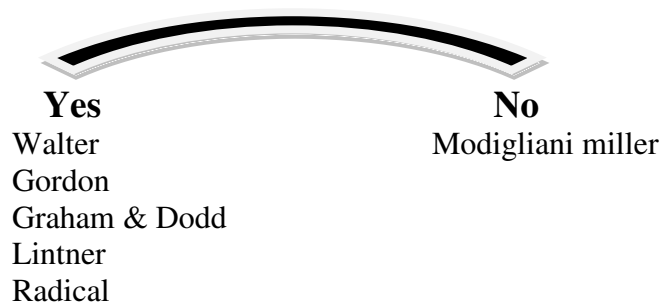
$P_1$  = Market price of a share at the end of period one.

**Q.1a.** On the 1<sup>st</sup> of November the board of directors of Zee Software announced a dividend payable on 1<sup>st</sup> of December to shareholders whose name appears in the register of members as at 20<sup>th</sup> November. The cheque will be paid out on 1<sup>st</sup> December and the shares go ex-dividend at the stock market on 17<sup>th</sup> November. Identify the various activities with the dates mentioned. If the share price `75 and dividend declare is `5 per share what will be the price on 17<sup>th</sup> November? What will be the price on other dates, other things remaining the same?

**Ans.**

Date	Activity	Share Price	
01 <sup>st</sup> November	Declaration date	75	
16 <sup>th</sup> November	Last cum-dividend-date	75	Until 16 <sup>th</sup> November the share price will be `75, on the 17 <sup>th</sup> November it will fall to `70.
17 <sup>th</sup> November	Ex-dividend date	70	
20 <sup>th</sup> November	Record date	70	
01 <sup>st</sup> December	Payment date	70	

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##### Assumptions

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- (k) The firm has an infinite life
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##### Postulation

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The logical build up to the formula runs thus:

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Thus the value of a share is the present value of all dividends plus the present value of all retentions (*a k a* capital gains).

$$P_0 = \frac{D}{K_e} = \frac{\frac{r}{K_e}(E - D)}{K_e}$$

Where

$P_0$  = Current market price

D = Dividend per Share

E = Earnings per Share

r = Rate of Return

$K_e$  = Cost of Equity

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#### **Criticism**

The Walter's model has been criticized on the following grounds:

- (b) **No external financing:** By assuming that the company shall not resort to borrowing, this model may result in a sub-optimal investment decision. Suppose funds can be borrowed at 10% and equity costs 15%. If the rate of return on investment opportunities is 12%, this model passes up a good investment just because the firm does not borrow money.

**Q. 1.** The following information is available in respect of a firm:

Capitalization rate ( $k_e$ ) = 0.10

Earnings per share (E) = ₹10

Assumed rate of return on investments (r): (i) 15, (ii) 8, and (iii) 10.

Show the effect of dividend policy on the market price of shares, using Walter's Method.

**Q. 2.** The cost of capital and the rate of return on investment of SK Ltd. is 10% and 15% respectively. The company has one million equity shares of ₹10 each outstanding and its earnings per share is ₹5. Calculate the value of the firm in the following situations using Walters model:

- (i) 100% retention, **Ans. 75M**
- (ii) 50% retention; and **Ans. 62.5M**
- (iii) No retention. Comment on your result. **Ans. 50M**

**Q. 3. [Study Mat.]** Following are the details regarding three companies P Ltd., Q Ltd., and R Ltd.:

Details	P Ltd.	Q Ltd.	R Ltd.
Internal rate of return	15%	5%	10%
Cost of equity capital	0%	10%	10%
Earning per share	₹8	₹8	₹8

Calculate the value of an equity share of each of these companies applying Walter's formula when dividend payment ratio (D/P) is (i) 50% (ii) 75% (iii) 25%.

What conclusion do you draw?

- Q. 4.** Determine the market value of shares of the company from the following information as per Walters model;
- |                              |           |
|------------------------------|-----------|
| Earning of the company       | ₹5,00,000 |
| Dividend paid                | ₹3,00,000 |
| Number of shares outstanding | 1,00,000  |
| Price earnings ratio         | 8         |
| Rate of return on investment | 15%       |
- Are you satisfied with the current dividend policy of the firm? If not, what should be optimal dividend payout ratio?

**Ans.** Ph Net D/P = 0%

- Q. 5.** From the given information for Alpha & Company you are required to (I) to find out whether the firms dividend pay – out ratio is optimal according to Walters formula. The firm was started a year before with equity capital of ₹40 lakhs.

Earnings of the firm	₹4,00,000
Dividend paid	₹3,20,000
Price earnings ratio	12.5
Number of share	40,000 @ ₹100 each
Will the company change its dividend policy if P/E ratio is 8 instead of 12.5?	

- Q. 6.** A company earns ₹10 lacs after tax and pays out 60% of its profits as dividends .The number of shares outstanding is 1 lacs . Price earnings multiple is 6 The company can invest its retained earnings in projects that give its retaining earnings in projects that give it an IRR of 15%
- Compute the theoretical market price using Walter’s Model ? ₹57.58
  - Is the company’s pay out practice in sync with maximizing the wealth of the shareholders ? D/P=100%
  - If the answer to (ii) above is “ NO” what pay –out would you suggest ?
  - If the Walter’s model very different from the all or nothing approach ? Explain .

## 2. GORDON’S MODEL:

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Where

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 $g$  = Growth rate in dividends  
 $P_0$  = Current market price

**Criticism**

The Gordon's model suffers from the same imperfections as the Walter's model. The assumptions relating to 100% equity funding does not lead to maximization of wealth. The assumptions about constant rate of return and constant opportunity cost are suspect.

- Q. 7.** The following information is available in respect of the rate of return on investment ( $r$ ), the capitalization rate ( $k_e$ ) and earnings per share ( $E$ ) of Hypothetical Ltd.

$r$  = 12 per cent  
 $E$  = `20

Determine the value of its shares, assuming the following:

	<b>D/P= (1 – b)</b>	<b>Retention ratio (b)</b>	<b><math>k_e</math> (%)</b>
(a)	10	90	20
(b)	20	80	19
(c)	30	70	18
(d)	40	60	17
(e)	50	50	16
(f)	60	40	15
(g)	70	30	14

- Q. 8.** From the following information about XYZ Ltd. you are required to calculate the market price of a share under:

- (i) Walter's Model  
 (ii) Dividend Growth Model

Earnings per share                      `10  
 Dividend per share                      `6  
 Cost of capital                              15%  
 Internal Rate of return                      20%  
 Retention ratio                              50%

- 3. Modigliani and Miller (MM) Hypothesis:** Modigliani and Miller Hypothesis is in support of the irrelevance of dividends. Modigliani and Miller argue that firm's dividend policy has no effect on its value of assets and is, therefore of no consequence i.e. dividends are irrelevant to shareholders wealth. According to them, 'Under conditions of perfect capital markets, rational investors, absence of tax discrimination between dividend income and capital appreciation, given the firm's investment policy, its dividend policy may have no influence on the market price of shares'.

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- The firm has a fixed investment policy.
- There are no floatation or transaction costs.
- Risk of uncertainty does not exist. Investors are able to forecast future prices and dividends with certainty, and one discount rate is appropriate for all securities and all time periods. Thus,  $r = k = k_t$  for all  $t$ .

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dividend policy does not affect the wealth of the shareholders, implies that when the firm pays dividends, its advantage is offset by external financing. This means that the terminal value of the share declines when dividends are paid. Thus, the wealth of the shareholders - dividends plus terminal price - remains unchanged. As a result, the present value per share after dividends and external financing is equal to the present value per share before the payments of dividends. Thus, the shareholders are indifferent between payment of dividends and retention of earnings.

Market price of a share after dividend declared on the basis of MM model is shown below:

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

Where,

$P_0$  = The prevailing market price of a share

$K_e$  = The cost of equity capital

$D_1$  = Dividend to be received at the end of period one

$P_1$  = Market price of a share at the end of period one.

**Q. 9.** Angle Ltd. belongs to a risk class which the appropriate capitalization rate is 10%. It currently has 1,00,000 shares selling at ₹100 each. The firm is contemplating declaration of a dividend of ₹6 per share at the end of the current fiscal year, which has just begun. Answer the following questions based on Modigliani and Miller Model and assumption of no taxes.

- (i) What will be the price of the share at the end of the year if a dividend is not declared?
- (ii) What will be the price if dividend is declared?
- (iii) Assuming that the firm pays dividend has net income of ₹10 lakhs and makes new investments of ₹20 lakhs during the period, how many new shares must be issued?
- (iv) Is the Modigliani and Miller Model realistic with respect to valuation? What factors might mar its validity?

**Ans.** (i) 110            (ii) 104            (iii) 15385            (iv) 12000000

**Q.10.** A chemical company belongs to a risk class for which the appropriate P/E ratio is 10. It currently has 50,000 equity shares (outstanding) selling at ₹100. The firm is contemplating the declaration of dividend of ₹8 per share at the current fiscal year which has just started. Given the assumptions of Modigliani and Miller, answer the following questions:

- (i) What will be the price of share at the end of the year (a) if dividend is not declared; and (b) it is declared?
- (ii) Assuming that the company pays the dividend, having net income (y) of ₹5,00,000 and makes new investments of ₹10,00,000 during the period, how many new shares must be used?

**Ans.** (i) 110            (ii) 102

#### 4. Residual Approach:

When new equity is raised floatation costs are involved. This makes new equity costlier than retained earnings. Under the Residual approach, dividends are paid out of profits after making provision for money required to meet upcoming capital expenditure commitments.

**Q.11.** M. Corporation is considering four investment opportunities. The required investment outlays and expected rates of return for these investments are shown below:

The firm's cost of capital is 14%. The investments are to be financed by 40% debt 60% common equity. Internally generated funds obtaining funds totaling ₹7,50,000 are available for reinvestment.

- (a) Which investments should be accepted? According to the residual dividend theory, what amount should be paid out in dividends?

(b) How would your answer change if the cost of capital were 10% ?

Investment	Investment cost	Internal rates of return
A	`2,75,000	17.50%
B	3,25,000	15.72%
C	5,50,000	14.25%
D	4,00,000	11.65%

**Q.12.** A Ltd. has made a profit of `1,20,000. Its gear ratio is 0.4. It is to be maintained. Its cost of capital are: debt 10%, equity 22%, retained earnings 20%. Four projects are under consideration.

	Investment Required	Rate of Return on Investment
A	`60,000	19%
B	`50,000	18%
C	`80,000	17%
D	`20,000	16%

What amount should be paid as dividend ?

### 5. Dividend Discount Model

It is a financial model that values shares at the discounted value of the future dividend payments. The model provides a means of developing an explicit expected return for the market. Since shares are valued on the actual cash flows received by the investors, it is theoretically the correct valuation model. Under this model, the price a share will be traded is calculated by the net present value of all expected future dividend payment discounted by an appropriate risk-adjusted rate. This dividend discount model price is the intrinsic value of the stock. If the stock pays no dividend, then the expected future cash flows is the sale price of the stock. The security with a greater risk must potentially pay a greater rate of return to induce investors to buy the security. The required rate of return (capitalization rate) is the rate of return required by investors to compensate them for the risk of owning the security. This capitalization rate can be used to price a stock as the sum of its present values of its future cash flows in the same way that interest rates are used to price bonds in terms of its cash flows. The price of a bond is the sum of the present value of its future interest payments discounted by the market rate. Similarly, the dividend discount model (DDM, dividend valuation model, DVM) prices a stock by the sum of its future cash flows discounted by the required rate of return that an investor demands for the risk of owning the stock. Future cash flows include dividends and the sale price of the stock when it is sold. This DDM price is the intrinsic value of the stock. If the stock pays no dividend, then the expected future cash flow is the sale price of the stock.

Intrinsic Value = Sum of Present Value of Future Cash Flows

Intrinsic Value = Sum of Present Value of Dividends + Present Value of Stock Sale Price

P = Selling Price of Stock

D = Annual Dividend Payment

k = Capitalization Rate

n = Number of Years until Stock is Sold;

$$\text{Stock Intrinsic Value} = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + \dots + \frac{D_n}{(1+k)^n} + \frac{P}{(1+k)^n}$$

### Dividend Decisions

In the above equation, it is assumed that dividend is paid at the end of each year and that the stock is sold at the end of the nth year. This is done so that the capitalization rate (k) is an annual rate, since most rates of return are presented as annual rates. If the stock is never sold, then it is essentially perpetuity, and its price is equal to the sum of the present value of its dividends. Since the DDM considers the current sale price of the stock to be equal to its future cash flows, then it must also be true that the future sale price of the stock is equal

to the sum of the cash flows subsequent to the sale discounted by the capitalization rate. In an efficient market, the market price of a stock is considered to be equal to the intrinsic value of the stock, where the capitalization rate is equal to the market capitalization rate, the average capitalization rate of all market participants.

There are 3 models used in the dividend discount model:

- a. **Zero-growth**, which assumes that all dividends paid by a stock remain the same.
- b. **Constant-growth** model, which assumes that dividends grow by a specific percent annually.
- c. **Variable-growth model**, which typically divides growth into 3 phases: a fast initial phase, then a slower transition phase that ultimately ends with a lower rate that is sustainable over a long period.

a. **Zero-Growth Rate DDM**

Since the zero-growth model assumes that the dividend always stays the same, the stock price would be equal to the annual dividends divided by the required rate of return.

**Stock's Intrinsic Value = Annual Dividends / Required Rate of Return**

This is basically the same formula used to calculate the value of a perpetuity, which is a bond that never matures, and can be used to price preferred stock, which pays a dividend that is a specified percentage of its par value. A stock based on the zero-growth model can still change in price if the capitalization rate changes, as it will if perceived risk changes, for instance, if a share pays dividend of **1.80 per year**, and the **required rate of return for the stock is 8%**, then its intrinsic value is

**Intrinsic Value of Stock =  $1.80/0.08 = \text{`22.50}$ .**

b. **Constant-Growth Rate DDM (Gordon Growth Model)**

The constant-growth DDM (Gordon Growth model, because it was popularized by Myron J. Gordon) assumes that dividends grow by a specific percentage each year, and is usually denoted as  $g$ , and the capitalization rate is denoted by  $k$ .

Constant-Growth Rate DDM Formula

$$\text{Intrinsic Value} = \frac{D_1}{k - g}$$

$D_1$  = Next Year's Dividend

$k$  = Capitalization Rate

$g$  = Dividend Growth Rate

The constant-growth model is often used to value stocks of mature companies that have increased the dividend steadily over the years. Although the annual increase is not always the same, the constant-growth model can be used to approximate an intrinsic value of the stock using the average of the dividend growth and projecting that average to future dividend increases. If both the capitalization rate and dividend growth rate remains the same every year, then the denominator doesn't change, so the stock's intrinsic value will increase annually by the percentage of the dividend increase. In other words, both the stock price and the dividend amount will increase by the constant-growth factor,  $g$ .

- Q.13.** Shyam Ltd. has just paid a dividend of `2 per share and it is expected to grow @ 6% p.a. After paying dividend, the Board declared to take up a project by retaining the next three annual dividends. It is expected that this project is of same risk as the existing projects. The results of the project will start coming from the 4<sup>th</sup> year onward from now. The dividends will then be `2.50 per share and will grow @ 7% p.a.

An investor has 1,000 shares in Shyam Ltd. and wants a receipt of at least `2,000 p.a. from the investment. Show that the market value of the share is affected by the decision of the Board. Also show as to how the investor can maintain his target receipt from the first 3 years and improved income thereafter, given that the cost of capital of the firm is 8%.



**Q.14.** A company is toying with the idea of declaring dividends .It has reported a post tax profit of `2.4 lacs and there are 1 lakh shares outstanding .The investor normally expect a return of about 12% for companies which are in this risk class .

- (i) What would be the market price if all earnings were distributed as dividends ? 20
- (ii) Will the market price be likely to be different if the dividend pay out is 50% and both earnings and dividends are expected to grow at a constant rate 8% ?

$$\frac{2.4(1.08)(140.08)}{0.12-0.08}$$

$$0.12-0.08$$

- (iii) Will the position in (ii) change if investors believe that earnings and dividend will grow at 10% per annum in next two years and at 4% per annum thereafter ? 17.38

**Q.15.** A company has been growing at a rate of 18% per year in recent years .The abnormal growth is expected to continue for another 4 years , then it is likely to grow at the normal rate (g) of 6% .The required rate of return on the shares of the investment community is 12% and the dividend paid per share last years was `3 (Do = `3 ) At what price would you as an investor be ready to buy the shares of the company now (t =0) , and at the end of years 1,2,3,4 respectively ? Will there be extra advantage by buying shares at t= 0 on in any of the subsequent four years, assuming all other things remain unchanged? Thereafter the D/P is expected 125%.

**Q.16.** The shares of a chemical company are selling at `20 per share. The firm had paid dividend @ `2 per share last year. The estimated growth of the company is approximately 5% per year.

- i. Determine the cost of equity capital of the company.
- ii. Determine the estimated market price of the equity share if the anticipated growth rate of the firm (a) rises to 8% and (b) fall to 3%.

**Q.17.** Z Ltd. is foreseeing a growth rate of 12% per annum in the next 2 years. The growth rate is likely to fall to 10% for the third year and fourth year. After that the growth rate is expected to stabilize at 8% per annum. If the last dividend paid was `1.50 per share and investors' required rate of return is 16%, find out the intrinsic value per share of Z Ltd. as of date. You may use the following table:

Years	0	1	2	3	4	5
Discounting Factor at 16%	1	0.86	0.74	0.64	0.55	0.48

**Q.18.** Piyush Loonker and Associates presently pay a dividend of Re. 1.00 per share and has share price of `20.00.

- (i) If this dividend were expected to grow at a rate of 12% per annum forever, what is the firm's expected or required return on equity using a dividend – discount model approach ?
- (ii) Instead of this situation in part (i), suppose that the dividends were expected to grow at a rate of 20% per annum per annum for 5 years and 10% per year thereafter. Now what is the firm's expected, or required, return on equity ?

## 6. Lintner's Model:

The classic study of the actual dividend behavior was done by John Lintner in 1956. The study was conducted in two stages. First, he conducted a series of interviews with businessmen to form a view of how they went about their dividends decisions. He then formed a model on the basis of those interviews which could be tested on a larger data. His formula is

$$D_1 = D_0 + [(EPS \times \text{Target Payput}) - D_0] \times A_F$$

Where

$D_1$  = Dividend in year 1

$D_0$  = Dividend in year 0

EPS = Earnings Per Share

$A_F$  = Adjustment Factor

Lintner model has two parameters:

- (1) The target pay-out ratio and
- (2) The spread at which current dividends adjust to the target.

From the interviews he conducted, it emerged that investment needs were not a major consideration in the determination of dividend policy, rather the decision to change the dividend was usually a response to a significant change in earnings which had disturbed the existing relationship between earnings and dividends. Lintner concluded that

- (1) Companies tend to set long run target dividends-to-earning ratios according to the amount of positive net present value (NPV) project that are available.
- (2) Earning increases are not always sustainable. As a result, dividend policy is not changed until managers can see that new earnings level is sustainable.

**Q.19.** What will be the dividend per share of R Ltd. for the year 2003 given the following information about the company?

EPS of 2003	=`3	DPS for 2002	=`1.2
Target payout ratio	= 0.6	Adjustment ratio	= 0.7

Apply the Linter Model 1.62

#### Dividend based on Tax Rate

**Q.20.** The NDPL Company has `1,000 of extra cash. It can retain the cash and invest it in Treasury bills yielding 10%, or it can pay the cash to shareholders as a dividend. Shareholders can also invest in Treasury bills with the same yield. Suppose the corporate tax rate is 34%, and the individual tax rate is 28%. How much cash will investors have after 5 years under each policy?

**Ans.** 991.11, 1019.30

**Q.21.** X Ltd. has `1000 of profits available for distribution. It needs to decide whether to distribute it as dividends or retain it. Suppose the money can be deployed in government of India securities at 8% fully taxable. The tax rate for individuals is 30% and for the company is 36.75%. The corporate dividend tax is 12.5%. Decide.

**Ans.** 113.72, 1167.26

#### 7. Traditional Position

According to the traditional position expounded by Graham and Dodd, the stock market places considerably more weight on dividends than on retained earnings. For them, the stock market is overwhelmingly in favour of liberal dividends as against niggardly dividends. Their view is expressed quantitatively in the following valuation model:

$$P = m (D + E/3)$$

Where,

P = Market Price per share

D = Dividend per share

E = Earnings per share

m = a Multiplier.

As per this model, in the valuation of shares the weight attached to dividends is equal to four times the weight attached to retained earnings. In the model prescribed, E is replaced by (D+R) so that

$$\begin{aligned} P &= m \{ D + (D+R)/3 \} \\ &= m (4D/3) + m ( R/3) \end{aligned}$$

The weights provided by Graham and Dodd are based on their subjective judgments and not derived from objective empirical analysis. Notwithstanding the subjectivity of these weights, the major contention of the traditional position is that a liberal payout policy has a favourable impact on stock prices.

**8. Radical Approach**

This approach takes into consideration the tax aspects on dividend i.e. the corporate tax and the personal tax. Also it considers the fact that tax on dividend and capital gains are taxed at different rates. The approach is based on one premise that if tax on dividend is higher than tax on capital gains, the share of the company will be attractive if the company is offering capital gain. Similarly, if tax on dividend is less than the tax on capital gains, i.e. company offering dividend rather than capital gains, will be priced better.

**9. Miscellaneous Questions**

**Q.22.** PDQ Ltd. is a medium – sized listed company. The results to 31<sup>st</sup> Dec. 1994 have just been announced. Earnings per share (EPS) and declared dividends per share (DPS) for the last five years are shown below:

	<b>1994</b>	<b>1993</b>	<b>1992</b>	<b>1991</b>	<b>1990</b>
EPS (₹)	140	136	131	127	122
DPS (₹)	82	81	79	78	77

Dividends are paid on 31<sup>st</sup> December each year, and the dividend shown as declared in a particular year would have been or will be paid on 31<sup>st</sup> December the following year. If the current dividend policy is maintained, the directors of PDQ Ltd. estimate that annual growth in earnings and dividends will be no better than the average growth earnings over the past four years.

PDQ Ltd. is reluctant to take on debt at the present time to finance growth. The company is therefore considering a change in its dividend policy and total investment programme to allow 50% of its earnings to be retained for identified capital investment projects, which are estimated to have an average post – tax return of 15%. The market risk premium is expected to be 4% over the risk – free rate of 6%. The company's beta is currently quoted at 1.5 and is not expected to change for the foreseeable future.

**Requirements:**

- Calculate the share price, which might be expected by the market. If the company does not announce a change in dividend policy.
- If the company does announce a change in dividend policy, using whatever model (s) you think appropriate.

**Ans.** (i) 998.47 (ii) Yes

**Q.23.** The Beta of XYZ Ltd. is 1.4 the company paid dividend for last year ₹4 expected growth rate is 8% risk free rate on Govt. securities is 10%. Return on Market Portfolio is 15%. The current market Price of a share XYZ is ₹36 and

- What will be equilibrium price for a share XYZ Ltd ?
- Would you advise purchase of share of XYZ Ltd. ?

**Ans.** (i) 48 (ii) Yes

**Q.24.** The price of a company's share is ₹80, and the value of growth opportunities is ₹20. If the company's capitalization rate is 15 percent, what is the earnings price ratio ? How much is earnings per share ?

**Ans.**  $Eps/mps = 0.1125$   $Eps = 9$

**Q.25.** The risk free return is 10% and the risk premium is 5% with beta of a company is 1.6. The company has declared the latest dividend @ ₹3 (2002) whereas it has declared a dividend of ₹2.115 in the year 1996. The company's earnings and the dividend experience constant growth. Find out the intrinsic value of the shares. Take into account the following PV factor table value if useful.

<b>Percentage cost of capital</b>	<b>PV Values at the end of 6 years</b>
5%	0.746
6%	0.705
7%	0.666

**Ans.**  $G=6\%$  , 26.50

**Q.26.** A company has 20 lakhs shares of ₹1 each. Four years ago it paid a dividend of ₹6,10,000. It has just paid a dividend of ₹9,60,000 on the same capital. The current market price of each share is ₹6. Find cost of equity and growth rate.

**Ans.**  $g=12\%$   $K_e = 20.96\%$

**Q.27. (CA FINAL MAY 2003)** An investor is holding, 1000 shares of Fatless Company, Presently the rate of dividend being paid by the company is ₹2 per share and the share is being sold at ₹25 per share in the market. However several factors are likely change during the course of the Year as indicate below :

Particulars	Existing	Revised
Risk Free rate	12%	10%
Market Risk Premium	6%	4%
Beta Value	1.4%	1.25%
Expected growth rate	5%	9%

In the view of the above factors whether the investor should buy , hold or sell the shares and why?

### Stock Split

**Q.28.** A company has the following shareholders' equity account.

Share capital (Face value ₹10)	₹25 lakhs
Reserves	₹100 lakhs
Shareholders equity	₹150 lakhs

Current market price is ₹75 per share. What will be the number of shares outstanding & change in reserves and trend in share price after corporate action in the following situations. Consider each situation independently.

- If there is a bonus issue in the ratio 1:5.
- A 2 for 1 stock split
- A 1 for 2 reserve stock split

### Buyback / Stock Repurchase

**Q.29.** A company decides to use buyback. The details of the company's fundamentals are given below:

Net Profit	₹20 lakhs
Number of share	₹10 lakhs (before purchase)

The company decides to repurchase 20% shares at ₹32 a share. Assuming the P/E ratio stays unchanged after repurchase; find the post buyback price of this company.

**Q.30.** Abhishek Ltd. has a surplus cash of ₹80 lakhs and wants to distribute 30% of it to the shareholders. The company decides to buyback shares. The finance manager of the company estimates that its share price after re purchase is likely to be 10% above the buyback price, if the buyback route is taken. The number of shares outstanding at present is 10 lakhs and the current EPS is ₹3.

You are required to determine:

- The price at which the shares can be repurchased if the market capitalization of the company should be ₹180 lakhs after buy back.
- The number of shares that can be repurchased.
- The impact of share repurchase on the EPS, assuming the net income is same.

**Introduction**

- A firm invests a part of its permanent capital in fixed assets and keeps a part of it for working capital i.e., for meeting the day to day requirements.
- We will hardly find a firm which does not require any amount of working capital for its normal operations. The requirement of working capital varies from firm to firm depending upon the nature of business, production policy, market conditions, seasonality of operations, conditions of supply etc.
- Working capital to a company is like the blood to human body. It is the most vital ingredient of a business.
- Working capital management if carried out effectively, efficiently and consistently, will assure the health of an organization.

**Meaning of Working Capital :**

**Working capital** is defined as the excess of current assets over current liabilities.

Current assets are those assets which will be converted into cash within the current accounting period or within the next year as a result of the ordinary operations of the business. They are cash or near cash resources. These include:

- Cash and Bank Balances
- Receivables
- Inventory
  - Raw materials, stores and spares
  - Work – in - progress
  - Finished goods
- Prepaid expenses
- Short-term advances
- Temporary investments

The value represented by these assets circulates among several items. Cash is used to buy raw – materials, to pay wages and to meet other manufacturing expenses. Finished goods are produced. These are held as inventories. When these are sold, accounts receivables are created. The collection of accounts receivable brings cash into the firm. The cycle starts again. **Current liabilities** are the debts of the firms that have to be paid during the current accounting period or within a year.

These include:

- Creditors for goods purchased.
- Outstanding expenses i.e., expenses due but not paid.
- Short – term borrowings.
- Advances received against sales.
- Taxes and dividends payable
- Other liabilities maturing within a year.

**Working capital** is also known as circulating capital, fluctuating capital and revolving capital. The magnitude and composition keep on changing continuously in the course of business.

**Gross and Net Working Capital**

Generally the Working capital has its significance in two perspectives – ‘Gross working capital’ and ‘Net Working capital’.

**Gross Working capital:** The gross working capital refers to investment in all the current assets. The total of investments in all current assets is known as gross working capital.

**Net Working Capital:**

- (i) It is the excess of current assets over current liabilities. This is, as a matter of fact, the most commonly accepted definition. Some people define it as only the difference between current assets and current liabilities.
- (ii) It is that portion of a firm's current assets which is financed by long – term funds.

**Need for Working Capital**

The basic objective of financial management is to maximize shareholders' wealth. This is possible only when the company earns sufficient profit. The amount of such profit largely depends upon the magnitude of sales. However, sales do not convert into cash instantaneously. There is always a time gap between the sale of goods and receipt of cash. Working capital is required for this period in order to sustain the sales activity. In case adequate working capital is not available for this period, the company will not be in a position to sustain the sales since it may not be in a position to purchase raw materials, pay wages and other expenses required for manufacturing the goods to be sold.

**Permanent and Temporary Working Capital:**

Working capital can be divided into two categories on the basis of time:

1. Permanent Working Capital
2. Temporary or Variable Working capital.

Permanent working capital represents the assets required on continuing basis over the entire year, whereas temporary working capital represents additional assets required at different items during the operation of the year.

**Permanent working capital:** This refers to that minimum amount of investment in all current assets, which is required at all times to carry out minimum level business activities. In other words, it represents the current assets required on a continuing basis over the entire year. Tandon Committee has referred to this type of working capital as "Hard Core current basis".

The following are the characteristics of this type of working capital:

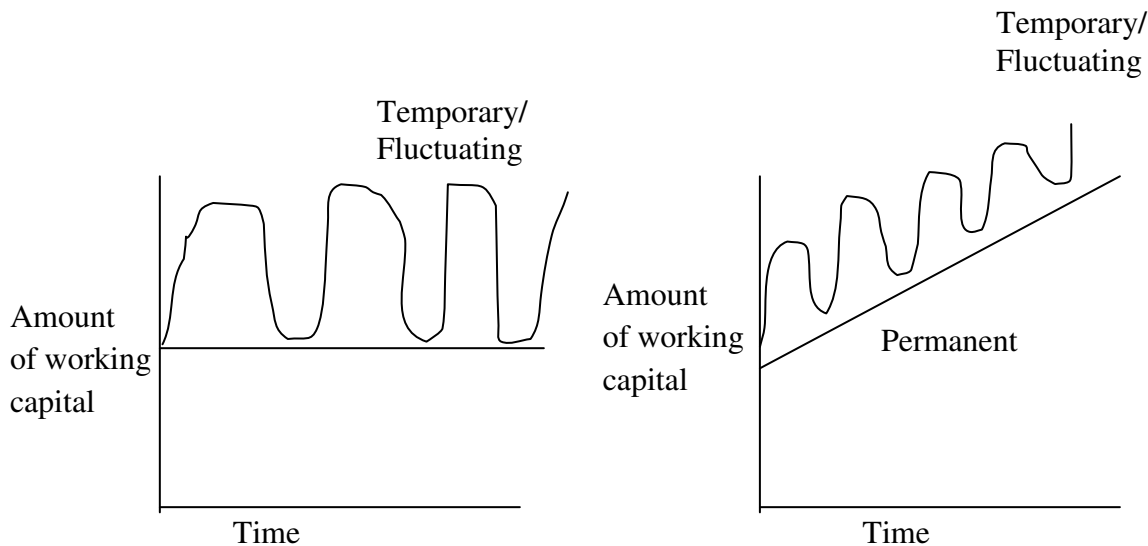
1. Amount of permanent working capital remains in the business in one form or another. This is particularly important from the point of view of financing. The suppliers of such working capital should not expect its return during the life-term of the firm.
2. It also grows with the size of the business. In other words, greater the size of the business, greater is the amount of such working capital and vice versa.

Permanent working capital is permanently needed for the business and therefore, it should preferably be financed out of long – term funds.

**Temporary working capital:** It refers to that part of total working capital which is required by a business over and above permanent working capital. It is also called variable working capital. Since the volume of temporary working capital keeps on fluctuating from time to time. In other words, it represents additional current assets required at different times during the operating year. For example, extra inventory has to be maintained to support sales during peak sales period. Similarly, receivable also increase and must be financed during period of high sales. On the other hand investment in inventories, receivables, etc., will decrease in periods of depression. Temporary working capital is generally financed from short – term sources of finance such as bank credit.

The diagrams given below illustrate the difference between permanent and temporary working capital.

Permanent working capital is fixed over a period of time, while temporary working capital is fluctuating. The permanent working capital is increasing over a period of time with increase in the level of business activity. This happens in case of a growing company. Hence, the permanent working capital line is not horizontal with the base line.



### Importance of adequate working capital:

The need for adequate investment in working capital can be understood from the following points:

- (1) Working Capital is required to use fixed assets profitably. For example a machine cannot be used productively without raw materials etc.
- (2) Funds are required for day-to-day operations and transaction. These are provided by Cash and cash equivalents, forming part of current assets.
- (3) Adequate working capital determines the short-term solvency of the firm. An adequate working capital means that the firm will be unable to meet its immediate payment commitments. This represents under – Capitalization.
- (4) Increase in activity levels and sales should be backed up by suitable investment in working capital.
- (5) The aspects of liquidity and profitability should be suitably analysed by the finance manager. Too much emphasis on profitability may adversely affect liquidity.

Hence working capital levels are said to be adequate when:

- Current Assets are greater than Current Liabilities.
- Current Ratio = Current Assets / Current Liabilities is about 2 : 1. This may differ from industry to industry.
- Quick Ratio = Quick Assets/Quick Liabilities is at least 1:1. This may also differ from industry to industry.

### Disadvantages of Insufficient Working Capital:

The disadvantages suffered by a company with insufficient working capital are as follows:

- The company is unable to take advantage of new opportunities or adapt to changes.
- Trade discounts are lost. A company with ample working capital is able to finance large stocks and can therefore place large orders.
- Cash discounts are lost. Some companies will try to persuade their debtors to pay early by offering them a cash discount off the price owed.
- The advantages of being able to offer a credit line to customers are foregone.
- Financial reputation is lost result in non – cooperation from trade creditors in times of difficulty.
- There may be concerted action by creditors and will apply to court for winding up.

### Working Capital Management:

Working Capital Management is usually concerned with the administration of all the current assets and current liabilities, it is basically concerned with:

- (a) Determining the need for working capital.

- (b) Determining the optimal levels of investment in various current assets, and
- (c) Examining the salient points regarding each element of working capital.

It is obvious that given a constant level of production, higher the amount of working capital, the lower will be the return on investment since capital turnover ratio will be less. On the other hand, lower the amount of working capital, the higher would be the amount of the risk since the company would not have adequate liquidity to meet its short – term obligations. In working capital management, therefore, we have to strike a balance between risk and profitability. We have to find out that level of investment in working capital which gives us a reasonable amount of liquidity subject to a good working capital turnover ratio. In fact, working capital management policies have a great influence on a firm's profitability, liquidity and structural health.

#### **Major considerations in working capital management and policies:**

The three major considerations in working capital management are:

- (a) Profitability
- (b) Liquidity and
- (c) Structural health
  - If the amount of working capital is high, liquidity is high. But due to low Capital Turnover ratio, the return on investment or profitability will also be low.
  - Similarly, if the amount of working capital is less, a high turnover indicates higher profitability. But liquidity may be seriously affected, causing loss of reputation in the short – run.
  - Also, the structural health of the firm on the long – term and short – term basis depends upon the optimum amount of working capital.

Hence, the finance manager has to strike a balance between liquidity and profitability without affecting the structural health of the firm.

#### **Hard Core Working Capital**

Hard core working capital or core current assets may be defined as that part of the current assets which represents the very minimum level of raw materials, process stock, finished goods, stores, accounts receivable and cash which are in circulation to ensure continuity of production. Thus, the core current assets represent a fixed element just like assets of the company. Such current assets are basically in the nature of circulating assets but are blocked for long term. For example, funds invested in core inventories, comprising process stock plus minimum raw materials, finished goods and stores are tied up on long – term basis arising out of technological and business considerations, quite like the investment in fixed assets like machinery & building. In relation to inventory, the base stock would be – treated as “hard core”.

Determination of hard core working capital in different industries would require a careful analysis of the items of inventory, receivables, work in process and cash.

#### **Impact of double shift working capital requirements:**

Working capital Shift leads to economics of scale due to greater use of fixed assets. As a firm increases the number of production hours, working capital requirements also increase. But the increase in the working capital may not be directly proportional.

The impact of double shift working on various components of working capital is as under:

- (1) **Raw Materials:** Stock requirements as regard units, may double since consumption per day will be twice as earlier. However, due to bulk purchasing, the firm may avail of quantity discounts.
- (2) **Work in progress:** There will be no change in the quantity of work in progress since work commenced in first shift will be completed in the second and vice versa. At the end of any day, the average quantity of work – in – progress remains the same.
- (3) **Finished Goods:** Due to greater production, finished goods stocks may double in quantity. But cost of production per unit may be reduced to lower cost of raw materials, economies of fixed costs etc.
- (4) **Debtors:** Increase in demand and increased sales will lead to higher amount of Debtors, for the same credit period. But the increase may not be proportional or it may not double in



case of reduction in credit period. Also discounted selling price may be offered in order to sell the increased production.

- (5) **Creditors:** Due to bulk purchasing and better bargaining power the firm may avail extended credit period for payment. Unless otherwise specified, the amount of creditors may double.
- (6) Fixed overheads will remain fixed whereas variable overheads will increase in proportion to the increased production. Semi – variable overheads will increase according to the variable element in them.

### Financing of Working Capital:

After determining the level of working capital, there comes the question of financing. Two other short term sources of working capital finance are

1. Trade Credit
2. Short term bank credit for working capital:
  - (i) Cash credit
  - (ii) Letter of credit
  - (iii) Bills finance
  - (iv) Working capital demand loan
  - (v) Overdraft facility.
3. Factoring of receivables
4. Commercial paper
5. Long term sources comprising equity capital and long term borrowings.

**Q. 1. [2004-Dec]** Distinguish between the hedging and conservative approaches to financing of working capital.

**Ans.** Hedging Approach (HA) and Conservative Approach (CA) are the two extreme approaches and do not help much the financial manager in managing the working capital need. The HA is more risky as the short – term (current) assets are financed by short-term liabilities only and the firm may not have sufficient liquidity with it. On the other hand, the CA is more costly as the long-term sources may remain idle in slack period. The comparison between the two is as follows:

Hedging Approach	Conservative Approach
<b>Advantages</b> 1. The cost of financing is reduced 2. The investment in net-working capital is nil or	It is less risky and the firm is able to absorb shocks. The firm does not face frequent financing problems
<b>Disadvantages</b> 1. Frequent efforts are required 2. The risk is increased as the firm is vulnerable to sudden shocks.	The cost of financing is higher. Large investment is blocked in temporary working capital.

**Q. 2. [1998-June]**

- (a) What are the alternative methods of working out the maximum permissible level of bank borrowings recommended by the Tandon Committee? Explain.
- (b) What are the aggressive and conservative current asset financing policies? State your preference with reasons.

**Ans.** (a) Tandon Committee had recommended following three methods to determine the maximum permissible level of bank borrowings.

*First Method:* 75% (Current Assets – Current Liabilities other than bank borrowings)

Under this method, the borrower will provide 25% of working capital gap from long term funds i.e. borrowed funds and equity capital. This method will give a minimum current ratio of 1:1.

*Second Method:* 75% (Current Assets) – Current Liabilities other than bank borrowings.

Under this method, the borrower will contribute 25% of total current assets from long term sources. This method will give a current ratio of 1:3:1.

*Third Method:* 75% (Current Assets – Core Current Assets) – Current Liabilities other than bank borrowings.

Under this method, the borrower will contribute 100% of core current assets and 25% of the balance of current assets from long term sources. This method will further strengthen the current ratio.

Thus, these methods successively, yield higher current ratio and make the decreasing reliance on bank finance.

**Q. 3. [ June 2007]** Write notes on ‘Determinants of working capital requirements’.

**Ans.** Requirements of working capital are dependent on number of factors. Some of the factor which determines the requirement of Working Capital are:-

1) Nature of Business

- The kind of business in which the company is engaged determines the requirement of working capital.
- A company engaged in manufacturing items requires more amount of working capital than a company which provides services on cash payment.
- Thus we can conclude that working capital of any enterprise is basically related to the conduct of business.

2) Production cycle

- Production cycle also determine the amount of working capital.
- Production cycle is the total time taken from the procurement of the raw material till the realization of sale proceeds.
- Longer the production cycle higher will be the requirement of working capital.
- Thus production cycle & working capital requirement are directly related to each other.

3) Dividend Policy

- Dividend policy of a company, affect the working capital requirement.
- A change in dividend policy of a company requires a change in the working capital policy also.
- A company that desires to pay a higher dividend needs more working capital and vice-versa.

4) Size

- Requirement of working capital depends on the size of the company.
- The amount needed may be relatively large per unit of output for a small company subject to higher overhead costs, less favourable buying terms and higher interest rates.

5) Growth & diversification

- A company that has a diversification programme requires more working capital.
- As a company grows, it is logical to expect that a larger amount of working capital is required.
- The composition of working capital in a growing company also shifts with economic circumstances and corporate practices, so the growth industries require more working capital than those that are static.

6) Sales **Dec 2008]** Write notes on ‘Working capital and dividend policy’.

**Ans.**

- Working capital policy is the policy which governs the quantum, financing and other aspects of working capital.

- Dividend policy is the one which determines the quantum of dividend to be declared and that to be kept as reserves out of the surplus so generated.
- There is a relationship between working capital policy and dividend policy.

**Q.[June 2010]** Write notes on 'ABC Analysis'.

**Ans.** The system is based on the assumption that in view of the scarcity of managerial time and attention should be paid to those items which account for a larger chunk of the value of rather than the quantity of consumption. Let us take an example of a firm having components of raw material:-

S NO.	Component	Units Consumed	% of Total Quantity	Value per unit	Total Value (Lacs)	% of Total Value
1	X	5,000.00	45.45	1,000.00	50.00	22.93
2	Y	4,000.00	36.36	1,200.00	48.00	22.00
3	Z	2,000.00	18.18	6,000.00	120.00	55.05
		<b>11000.00</b>			<b>218.00</b>	<b>99.98</b>

Thus the cost of raw material Z which accounts for 55% of the total consumption value should be given priority over item X although the number of units consumed of the latter is much more than former.

**Q. 6. [Dec 2010]** Write note on 'Important motives to hold cash'

**Ans.** There are three important motives to hold cash, being

1) Transactional Motive

- It is the prime motive of holding cash.
- Cash is the most liquid medium.
- It is cash which helps to carry out all the transaction of the firm.

2) Precautionary Motive

- As the name suggest, cash is also required for precautionary reasons.
- Cash helps to mitigate uncertainty and contingencies.

3) Speculative Motive

- The speculative motive covers the aspect that cash can be utilized to earn more cash by making investments in profitable avenues.

**Q. 7. [ June 2004]** Distinguish between the hedging and conservative approaches to financing of working capital.

**Ans.**

S NO.	Hedging approach to financing of working capital	Conservative approaches to financing of working capital
1	It is quite risky approach.	This approach to financing of working capital is less risky.
2	Under hedging approach we deploy short term liabilities to finance current assets.	Under conservative approach current assets term liabilities to finance current are financed using long term sources.
3	Cost of financing is less in comparison to that under conservative approach.	Cost of financing is higher.

**Q. 8. [June 2009]** Distinguish between 'Financing of current assets' and 'financing of fixed assets'.

**Ans.**

S NO.	Financing of Current Assets	Financing of Fixed Assets
1	Current Assets investment involves investment in debtors, stock etc.	Investment in fixed assets involve investment in plant & machinery land &

		building etc.
2	Financing of current assets is usually made in form of overdraft, cash credit etc.	Financing of fixed assets is carried on by procuring loans or by coming up with public issue.
3	Investment in current assets should be minimized.	Investment in fixed assets should be boosted up.

**Q. 9. [June 1999]** When will the working capital be negative? What does it signify in terms of the financial health of an enterprise?

**Ans.**

- Working capital is the difference between the current assets & current liabilities.
- When current liabilities are more than current assets, then the working capital will be negative.
- In terms of the financial position, it suggests that the liquidity position of the company is falling & it has a deteriorating liquidity.
- Company should take the steps to improve its working capital.

**Q.10. [Dec 2000]** Is the 'aggressive approach' to working capital financing a good proposition? Also state the consequences.

**Ans.**

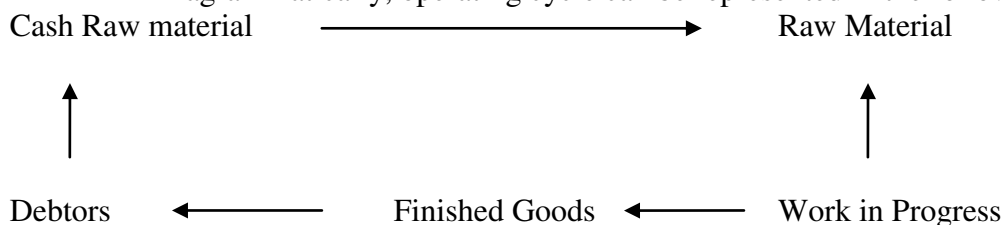
- 'Aggressive approach' to working capital financing refers to that approach wherein the organization deploys long term sources to finance its fixed assets and some portions of permanent current assets whereas short term sources to finance the remaining permanent current assets and the whole of temporary current assets.
- As against this, under the conservative approach to working capital financing, the organization business enterprise deploys long term sources to finance its fixed assets, part of temporary current assets and permanent current assets whereas short terms funds are employed merely to finance temporary current assets.
- While in aggressive approach the enterprises rely more on short term funds, in conservative financing is carried out mostly through long term source.
- Since short term funds are procured for financing under the 'aggressive approach', the enterprise has to continuously engage itself in the task of procuring funds.
- Though using short term funds results in reducing interest burden, it increases the degree of risk.

**Q.11. [ June 2003]** What is the concept of 'operating cycle'? Why is it important in working capital management? Give a suitable example to illustrate the operating cycle concept.

**Ans.** Operating cycle refers to the length of time between the enterprise paying cash for raw material, conversion of raw material into goods and finally realizing cash from the debtors.

- Operating cycle = Raw Material Storage Period  
+ Work-in-Progress holding period  
+ Finished goods storage period  
+ Debtors/Receivables Collection period  
- Creditors Payment period

- Diagrammatically, operating cycle can be represented in the following manner:-



- Operating cycle reflects the time frame within which the funds once employed for production can be recouped back.
- Smaller the operating cycle, better it is, since it indicates lesser blockage of funds in working capital.
- Thus, operating cycle is an important tool in working capital management.
- It can rightly be said that the length of operating cycle is the major determinant of working capital needs of a business firm.

**Q.12. [ Dec 2003]** “Efficient cash management will aim at maximizing the availability of cash inflows by decentralizing collections and decelerating cash outflows by centralizing disbursements.” Discuss.

**Ans.**

- Efficient cash management is one of the key indicator of good working capital management.
- Cash budget proves out to an effective method for better cash management.
- Control aspects of cash management includes:-
  - Speeding up of cash collection.
  - Prolongation/ lingering upon cash payments.
- For speeding up cash collection the enterprise should adopt lock-box system or go in for decentralization of the banking system by opening up collection centres in areas where debtors mostly reside resulting in lesser time frame and consequently prompt cash collection.
- Apart from this, exercising control over cash payment can also act as a means of cash management.
- The same can be ensured via billing float along with banking processing float.

**Q.13. [Dec 2007]** “Adequacy of current assets is a myth”. Comment.

**Ans.**

- It will be incorrect to state that adequacy of current assets is merely a myth.
- As opposed to this notion (viewpoint/belief) adequacy of current assets is of vital importance.
- It is very crucial for an organization to ensure that current assets are well maintained by the company.
- Level of current assets has a direct impact on the working operations of the enterprise.
- Level of current assets is to be judiciously determined. In case current assets are kept at higher level it may adversely affect the profitability.
- Thus, adequacy of current assets is not a myth rather is a pre-requisite for the proper working of a business enterprise.

**Q.14. [ June 2009]** “In addition to transaction motive, more motives force corporate to hold inventory”. Comment.

**Ans.**

- There are three main motives for investment in inventory, being:-
  - Transaction Motive
  - Precautionary Motive
  - Speculative Motive
- Transaction motive of holding inventory takes into consideration the view that inventory level needs to be maintained in the right quantum to ensure proper functioning of business.
- Precautionary motives provide that the level of inventory should also take into account the aspect that purchases may prove out to be time consuming in some cases and hence ample inventory should be maintained to avoid stock — out situation.
- Speculative motives talk about availing of discount and concessions associated with bulk purchase.

- Thus, in addition to transaction motive, corporate are influenced by precautionary and speculative motives to hold inventory.

**Q.15.** Most business need cash funds to meet contingencies. Comment.

**Ans.**

- Holding right quantum of cash funds is pre-requisite for proper functioning of any business house.
- Cash is required not only for purchasing raw material but also for carrying out other operations.
- The time period/length from purchase of raw materials till realization from debtors constitute working capital cycle/operating cycle.
- The length of operating cycle also influences the amount of cash deposits required to be kept.
- Apart from this, cash is also required to be held for contingencies i.e. uncertainties arising from unexpected & unprecedented happenings.

**Q.16. [Dec. 2011]** Comment, it is not always necessary that inventory is held for smooth manufacturing and sales operations.

**Ans.**

- Inventory or the stock in which an enterprise deals, is held by the enterprise depending upon the nature, size and scale of operations which it is carrying on.
- Holding inventory does not come free of cost, as it requires investment to build up inventory.
- The amount and quantum of inventory has to be decided rationally.
- Keeping huge inventory will require high cash outlay and involve high cost of carrying, while maintaining stock of less than required may lead to less of orders and customer dissatisfaction.
- However, it is not always necessary that inventory is to be held for smooth manufacturing & sales operation.
- The concept of JIT or Just in time advocates the philosophy of placing purchase order just before the sales orders are received & is a proven method of reducing inventory handling time & minimize carrying cost also.

## Practical Questions

**Q. 1.** The cost sheet of PQR Ltd. provides the following data:

	Cost per unit
Raw material	`50
Direct Labour	20
Overheads (including depreciation of `10)	<u>40</u>
Total cost	110
Profits	<u>20</u>
Selling Price	<u>130</u>

Average raw material in stock is for one month. Average material in work-in-progress is for half month. Credit allowed by suppliers: one month; credit allowed to debtors: one month. Average time lag in payment of wages: 10 days; average time lag in payment of overheads 30 days. Cash balance expected to be `1,00,000. Finished goods lies in the warehouse for one month.

You are required to prepare a statement of the working capital needed to finance a level of the activity of 54,000 units of output. Production is carried on evenly throughout the year and wages and overheads accrue similarly. State your assumptions, if any, clearly.

**Ans.**

	Cost/unit	Stage of Raw Material	1 month
Raw Material	` 50	Stage of WIP	½ month

Direct Labour	₹ 20	Stage of creditors	1 month
Overhead (including dep. ₹ 10)	₹ 40	Stage of debtors	1 month
Total	₹ 110	Stage of finished goods	1 month
Cash Balance	₹ 1,00,000	Time lag in payment 7 wages	10 days
Production unit	54000	Time lag in payment of outstanding	30 days

**Estimation of net working capital on cash cost basis**

<b>Current Assets</b>		₹
Stock of Raw Material	$\frac{27,00,000}{12} \times 1$	2,25,000
Work-in-progress		
Material	$\frac{27,00,000}{12} \times \frac{1}{2}$	1,12,500
Labour	$\frac{10,80,000}{12} \times \frac{1}{2} \times 0.5$	22,500
Overheads	$\frac{16,20,000}{12} \times \frac{1}{2} \times 0.5$	<u>33,750</u>
Stock of finished goods	$\frac{54,00,000}{12} \times 1$	4,50,000
Debtors	$\frac{54,00,000}{12} \times 1$	4,50,000
Cash & Bank		1,00,000
<b>Total Current Assets</b>	<b>(A)</b>	<b>13,93,750</b>
<b>Current liability</b>		₹
Creditors	$\frac{27,00,000}{12} \times 1$	2,25,000
Outstanding wages	$\frac{10,80,000}{360} \times 10$	30,000
Outstanding overhead	$\frac{16,20,000}{360} \times 30$	1,35,000
<b>Total Current liability</b>	<b>(B)</b>	<b>3,90,000</b>
<b>Working capital = Current Assets – Current Liability = (A) – (B)</b>		<b>10,3,750</b>

**Working Note:**

Calculation of cost of production and cost of sales on cash basis

Raw Material	$54,000 \times 50 =$	27,00,000
Wages	$54,000 \times 20 =$	10,80,000
Overheads	$54,000 \times (40 - 10) =$	<u>16,20,000</u>
<b>Cost of Production</b>		<b>54,00,000</b>
Selling overhead		<u>Nil</u>
<b>Cost of sale</b>		<b><u>54,00,000</u></b>

- Q. 2.** Calculate the amount of working capital requirement of SRCC Ltd. from the following information:

	₹ (per unit)
Raw material	160
Direct Labour	60
Overheads	<u>120</u>
Total cost	340
Profit	<u>60</u>
Selling Price	<u>400</u>

Raw materials are held in stock on an average for one month. Materials are in process on an average for half – a – month. Finished goods are in stock on average for one month.

Credit allowed by suppliers is one month and credit allowed to debtors is two months. Time lag in payment of wages is 1½ week. Time lag in payment of overhead expenses is one month. One fourth of the sales are made on cash basis.

Cash in hand and at the bank is expected to be `50,000; and expected level of production amounts to 1,04,000 units for a year of 52 weeks.

You may assume that production is carried on evenly throughout the year and a time period of four weeks is equivalent to a month.

<b>Ans.</b>	Cost/unit	Stage of Raw Material	1 month
Raw Material	` 160	Stage of WIP	½ month
Direct Labour	` 60	Stage of finished goods	1 month
Overhead	<u>120</u>	Stage of creditors	1 month
Total costs	` 340	Stage of debtors $\left(\frac{1}{4} \text{ sales on cash}\right)$	2 month
Selling price	400	Time lag in payment of overheads	1 month
Cash & Bank Balance	` 50,000	Time lag in payment of wages	½ week
Production unit	1,04,000	4 week	1 month
		1 year	52 weeks

Estimation of net working capital on cash cost basis

Current Assets		
Stock of Raw Material	$\frac{1,66,40,000}{52} \times 4$	12,80,000
Work-in-progress		
Material	$\frac{1,66,40,000}{52} \times 2$	6,40,000
Labour	$\frac{62,40,000}{52} \times 2 \times 0.5$	1,20,000
Overheads	$\frac{1,24,80,000}{52} \times 2 \times 0.5$	<u>2,40,000</u>
Stock of finished goods	$\frac{3,53,60,000}{52} \times 4$	27,20,000
Debtors	$\frac{3,53,60,000}{52} \times 8 \times \left(1 - \frac{1}{4}\right)$	40,80,000
Cash & Bank		50,000
<b>Total Current Assets</b>	<b>(A)</b>	<b>91,30,000</b>
Current liability		
Creditors	$\frac{1,66,40,000}{52} \times 4$	12,80,000
Outstanding wages	$\frac{62,40,000}{52} \times \frac{3}{2}$	1,80,000
Outstanding overhead	$\frac{1,24,80,000}{52} \times 4$	9,60,000
<b>Total Current liability</b>	<b>(B)</b>	<b>24,20,000</b>
Working capital = Current Assets – Current Liability = (A) – (B)		67,10,000

#### Working Note

Calculation of cost of production and cost of sales on cash basis

Raw Material	1,04,000 × 160 =	1,66,40,000
Wages	1,04,000 × 60 =	<u>62,40,000</u>
Prime cost		2,28,80,000



Add: Overheads	1,04,000 × 120 =	<u>1,24,80,000</u>
<b>Cost of Production</b>		<b>3,53,60,000</b>
Add: Selling overhead		<u>Nil</u>
<b>Cost of sale</b>		<b><u>3,53,60,000</u></b>

**Note:** Where ever 1 month = 4 weeks and 1 year = 52 weeks is given, then must change month and year in week.

- Q. 3.** The management of Royal Industries has called for a statement showing the working capital to finance a level of activity of 1,80,000 units of output for the year. The cost structure for company's product for the above mentioned activity level is detailed below:

	<b>Cost per unit</b>
Raw material	₹20
Direct Labour	5
Overheads (including depreciation of ₹5 per unit)	<u>15</u>
Profit	40
Selling Price	<u>10</u>
	<u>50</u>

**Additional information:**

- Minimum desired cash balance is ₹20,000.
- Raw materials are held in stock, on an average, for two months.
- Work – in – progress (assume 50% completion stage) will approximate to half – a – month production.
- Finished goods remain in warehouse, on an average, for a month.
- Suppliers of materials extend a month's credit and debtors are provided two month's credit; cash sales are 25% of total sales.
- There is a time – lag in payment of wages of a month; and half – a – month in the case of overheads.

From the above facts, you are required to prepare a statement showing working capital requirements.

<b>Ans.</b>	<b>Cost/unit</b>	<b>Stage of Raw Material</b>	<b>2 month</b>
Raw Material	₹20	Stage of WIP (50% completion)	½ month
Direct Labour	₹5	Stage of finished goods	1 month
Overhead (including dep. ₹5/unit)	<u>15</u>	Stage of creditors	1 month
Total costs	₹40	Stage of debtors (25% cash sales)	2 month
Profit	<u>10</u>	Time leg in payment of overheads	$\frac{1}{2}$ month
Selling price	50	Time leg in payment of wages	1 month
Cash & Bank	₹20,000	Production unit	1,80,000

**Estimation of net working capital on cash cost basis**

<b>Current Assets</b>			<b>₹</b>
Stock of Raw Material	$\frac{36,00,000}{12} \times 2$		6,00,000
Work-in-progress			
Material	$\frac{36,00,000}{12} \times \frac{1}{2} \times 0.5$	75,000	
Labour	$\frac{9,00,000}{12} \times \frac{1}{2} \times 0.5$	18,750	
Overheads	$\frac{18,00,000}{12} \times \frac{1}{2} \times 0.5$	<u>37,500</u>	
			1,31,250

Stock of finished goods	$\frac{63,00,000}{12} \times 1$	5,25,000
Debtors	$\frac{63,00,000}{12} \times 2 \times (1 - 0.25)$	7,87,500
Cash & Bank		20,000
<b>Total Current Assets</b>	<b>(A)</b>	<b>20,63,750</b>
<b>Current liability</b>		<b>`</b>
Creditors	$\frac{36,00,000}{12} \times 1$	3,00,000
Outstanding wages	$\frac{9,00,000}{12} \times 1$	75,000
Outstanding overhead	$\frac{18,00,000}{12} \times \frac{1}{2}$	75,000
<b>Total Current liability</b>	<b>(B)</b>	<b>4,50,000</b>
Working capital = Current Assets – Current Liability = (A) – (B)		16,13,750

**Working Note**

Calculation of cost of production and cost of sales on cash basis

Raw Material	$1,80,000 \times 20 =$	36,00,000
Wages	$1,80,000 \times 5 =$	9,00,000
Overheads	$1,80,000 \times (15 - 5) =$	18,00,000
<b>Cost of Production</b>		<b>63,00,000</b>
Add: Selling overhead & distribution overheads		Nil
<b>Cost of sale</b>		<b>63,00,000</b>

- Q. 4.** Grow More Ltd. is presently operating at 60% level, producing 36,000 units per annum. In view of favorable market conditions, it has been decided that from 1<sup>st</sup> January 2000, the Company would operate at 90% capacity. The following information's are available:

(i) Existing cost - price structure per unit is given below:

Raw material	4.00
Wages	2.00
Overheads (Variable)	2.00
Overheads (Fixed)	1.00
Profits	1.00

- (ii) It is expected that the cost of raw material, wages rate, expenses and sales per unit will remain unchanged in 2000.
- (iii) Raw materials remain in stores for 2 months before these are issued to production. These units remain in production process for 1 month.
- (iv) Finished goods remain in go down for 2 months.
- (v) Credit allowed to debtors is 2 months. Credit allowed by creditors is 3 months.
- (vi) Lag in wages and overhead payments is 1 month. It may be assumed that wages and overhead accrue evenly throughout the production cycle.

You are required to:

- (a) Prepare profit statement at 90% capacity level; and
- (b) Calculate the working requirements on an estimated basis to sustain the increased production level.

Assumptions made if any, should be clearly indicated.

**Ans.** Calculation of production unit at 90% capacity =  $\frac{36,000}{60\%} \times 90\% = 54,000$

	Cost/unit	Stage of Raw Material	2 month
Raw Material	` 4	Stage of WIP	1 month
Direct Labour	` 2	Stage of finished goods	2 month
Overhead :			

Variable	2		
Fixed	<u>1</u>	Stage of creditors	3 month
Total costs	` 9	Stage of debtors	2 month
Profit	<u>1</u>	Time leg in payment of overheads	1 month
Selling price per unit	10	Time leg in payment of wages	1 month
Cash & Bank	` 20,000		

(i) Preparation of profit statement at 90% capacity

Cost of Raw material	54,000 × 4 =	2,16,000
Add: Wages	54,000 × 2 =	1,08,000
Add: Overheads		
Variable	54,000 × 2 = 1,08,000	
Fixed	36,000 × 1 = <u>36,000</u>	<u>1,44,000</u>
Cost of production		4,68,000
Profit		<u>72,000</u>
Sale revenue 36,000 × 10		5,40,000

**Note:** When ever fixed cost per unit is given then it is calculated at production unit at which cost structure (cost/unit) is given these after is production increase & decrease fixed cost doesn't change.

(i) Estimation of net working capital on cash cost basis

Current Assets		
Stock of Raw Material	$\frac{2,16,000}{12} \times 2$	36,000
Work-in-progress		
Material	$\frac{2,16,000}{12} \times 1$	18,000
Labour	$\frac{1,08,000}{12} \times 1 \times 0.5$	4,500
Overheads	$\frac{1,44,000}{12} \times 1 \times 0.5$	<u>6,000</u>
Stock of finished goods	$\frac{4,68,000}{12} \times 2$	78,000
Debtors	$\frac{4,68,000}{12} \times 2$	78,000
Cash & Bank		Nil
<b>Total Current Assets</b>	<b>(A)</b>	<b>2,20,500</b>
Current liability		
Creditors	$\frac{2,16,000}{12} \times 3$	54,000
Outstanding wages	$\frac{1,08,000}{12} \times 1$	9,000
Outstanding overhead	$\frac{1,44,000}{12} \times 1$	12,000
<b>Total Current liability</b>	<b>(B)</b>	<b>75,000</b>
Working capital = Current Assets – Current Liability = (A) – (B)		1,45,500

### Working Note

Calculation of cost of production and cost of sales on cash basis

Raw Material	1,80,000 × 20 =	36,00,000
Wages	1,80,000 × 5 =	9,00,000
Overheads	1,80,000 × (15 – 5) =	<u>18,00,000</u>
<b>Cost of Production</b>		<b>63,00,000</b>

Add: Selling overhead &amp; distribution overheads

Nil

Cost of sale

63,00,000**Q. 5.** Prepare a working capital forecast from the following information:

Production during the previous year was 10,00,000 units. The same level of activity is intended to be maintained during the current year.

The expected ratios of cost to selling price are:

Raw Materials 40%

Direct Wages 20%

Overheads 20%

The raw materials ordinarily remain in stores for 3 months before production. Every unit of production remains in the process for 2 months and is assumed to be consisting of 100% raw material, wages and overheads. Finished goods remain in the warehouse for 3 months. Credit allowed by creditors is 4 months from the date of the delivery of raw material and credit given to debtors is 3 months from the date of dispatch.

The estimated balance of cash to be held `2,00,000

Lag in payment of wages ½ month

Lag in payment of expenses ½ month

Selling price is `8 per unit. Both production and sales are in a regular cycle. You are required to make a provision of 10% for contingency (except cash). Relevant assumptions may be made.

**Ans.** Selling price per unit ` 8

	Cost/unit	Stage of Raw Material	3 month
Raw Material 40% of `8	` 3.20	Stage of WIP (100% Mate. Lab. Ohd.)	2 month
Wages 20% of `8	` 1.60	Stage of finished goods	3 month
Overhead 20% of `8	` 1.60	Stage of creditors	4 month
Cash balance	` 2,00,000	Stage of debtors	3 month
Production unit	10,00,000	Time leg in payment of overheads	$\frac{1}{2}$ month
Contingency 10% except cash		Time leg in payment of wages	$\frac{1}{2}$ month

**Estimation of net working capital on cash cost basis**

Current Assets			`
Stock of Raw Material	$\frac{32,00,000}{12} \times 3$		8,00,000
Work-in-progress			
Material	$\frac{32,00,000}{12} \times 2$	5,33,333.33	
Labour	$\frac{16,00,000}{12} \times 2$	2,66,666.67	
Overheads	$\frac{16,00,000}{12} \times 2$	<u>2,66,666.67</u>	10,66,666.67
Stock of finished goods	$\frac{64,00,000}{12} \times 3$		16,00,000
Debtors	$\frac{64,00,000}{12} \times 3$		16,00,000
Cash & Bank			2,00,000
<b>Total Current Assets</b>	<b>(A)</b>		<b>52,66,666.67</b>

Current liability		
Creditors	$\frac{32,00,000}{12} \times 4$	10,66,666.67
Outstanding wages	$\frac{16,00,000}{12} \times \frac{1}{2}$	66,666.67
Outstanding overhead	$\frac{16,00,000}{12} \times \frac{1}{2}$	66,666.67
<b>Total Current liability</b>	<b>(B)</b>	<b>12,00,000</b>
Working capital = Current Assets – Current Liability = (A) – (B)		40,66,666.67
Contingency add $(40,66,666.67 - 2,00,000) \times \frac{10}{100}$		3,86,666.67
Net working capital		44,53,334.00

**Working Note**

Calculation of cost of production and cost of sales on cash basis

Raw Material	$10,00,000 \times 3.2 =$	32,00,000
Direct Wages	$10,00,000 \times 1.6 =$	16,00,000
Prime cost		48,00,000
Add Overheads	$10,00,000 \times 1.6 =$	16,00,000
<b>Cost of Production</b>		<b>64,00,000</b>
Add: Selling overhead & distribution overheads		Nil
<b>Cost of sale</b>		<b>64,00,000</b>

**Q. 6.** On 1<sup>st</sup> January, 2000, the Board of Directors of Dowell Co. Ltd. wishes to know the amount of working capital that will be required to meet the program of activity they have planned for the year. The following information's are available:

- Issued and paid – up capital `2,00,000.
- 5% Debentures (secured on assets) `50,000.
- Fixed assets valued at `1,25,000 on 31.12.2000.
- Production during the previous year was 60,000 units. It is planned that the level of activity should be maintained during the present year.
- The ratios of cost to selling price are – raw materials 60%., direct wages 10%, and overheads 20%.
- Raw materials are expected to remain in stores for an average of two months before these are issued for production.
- Each unit production is expected to be in process for one month.
- Finished goods will stay in warehouse for approximately three months.
- Creditors allow credit for 2 months from the date of delivery of raw materials.
- Credit allowed to debtors is 3 months from the date of dispatch.
- Selling price per unit is `5.
- There is a regular production and sales cycle.

**Prepare -----**

- working capital requirement forecast; and
- an estimated Profit and Loss Account and Balance Sheet at the end of the year.

**(Similar questions 34,42,43,54)**

**Ans.** W/c = 161250, Profit = 27500

**Q 7.** Prepare an estimate of net working capital requirement for the WCM Ltd. adding 10% for contingencies from the information given below:

Estimated cost per unit of production ₹170 includes raw materials ₹80, direct labour ₹30 and overheads (exclusive of depreciation) ₹60. Selling Price is ₹200 per unit. Level of activity per annum 1,04,000 units. Raw material in stock: average 4 weeks; work – in – progress (assume 50% completion stage): average 2 weeks; finished goods in stock: average 4 weeks; credit allowed by suppliers: average 4 weeks; credit allowed to debtors: average 8 weeks; lag in payment of wages: average 1.5 weeks, and cash at bank is expected to be ₹25,000. You may assume that production is carried on evenly throughout the year (52 weeks) and wages and overheads accrue similarly. All sales are on credit basis only. You may state your assumptions, if any.

<b>Ans.7.</b>	Cost/unit	Stage of Raw Material	4 weeks
Raw Material	₹ 80	Stage of WIP (50% completion stage)	2 weeks
Direct Labour	₹ 30	Stage of finished goods	4 weeks
Overhead	₹ 60	Stage of creditors	4 weeks
Total costs	₹ 170	Stage of debtors	8 weeks
Profit	₹ 30	Time lag in payment of wages	1.5 weeks
Selling price per unit	200	10% contingency	
Cash & Bank	₹ 25,000	Production unit	1,04,000

#### Estimation of net working capital on cash cost basis

Current Assets			₹
Stock of Raw Material	$\frac{83,20,000}{52} \times 4$		6,40,000
Work-in-progress			
Material	$\frac{83,20,000}{52} \times 2 \times 0.5$	1,60,000	
Labour	$\frac{31,20,000}{52} \times 2 \times 0.5$	60,000	
Overheads	$\frac{62,40,000}{52} \times 2 \times 0.5$	<u>1,20,000</u>	3,40,000
Stock of finished goods	$\frac{1,76,80,000}{52} \times 4$		13,60,000
Debtors	$\frac{1,76,80,000}{52} \times 8$		27,20,000
Cash & Bank			25,000
<b>Total Current Assets</b>	<b>(A)</b>		<b>50,85,000</b>
Current liability			₹
Creditors	$\frac{83,20,000}{52} \times 4$		6,40,000
Outstanding wages	$\frac{31,20,000}{52} \times 1.5$		90,000
<b>Total Current liability</b>	<b>(B)</b>		<b>7,30,000</b>
Working capital = Current Assets – Current Liability = (A) – (B)			43,55,000
Add: 10% contingency			4,35,500
Net working capital			47,90,500

#### Working Note

Calculation of cost of production and cost of sales on cash basis

Raw Material	1,04,000 × 80 =	83,20,000
Wages	1,04,000 × 30 =	<u>31,20,000</u>

Prime cost		1,14,40,000
Add: Overheads	1,04,000×60 =	<u>62,40,000</u>
<b>Cost of Production</b>		<b>1,76,80,000</b>
Add: Selling overhead & distribution overheads		<u>Nil</u>
<b>Cost of sale</b>		<b><u>1,76,80,000</u></b>

- Q. 8.** A newly formed company has applied for a loan to a commercial bank for financing its working capital requirements. You are requested by the bank to prepare an estimate of the requirements of the working capital for the company. Add 10 per cent to your estimated figure to cover unforeseen contingencies. The information about the projected profit and loss account of the company is as under:

Sales	₹ 21,00,000
Cost of good sold	<u>15,30,000</u>
Gross Profit	<u>5,70,000</u>
Administrative expenses	₹ 1,40,000
Selling expenses	<u>1,30,000</u>
	<u>2,70,000</u>
Profit before tax	3,00,000
Provision for tax	<u>1,00,000</u>
<b>Note:</b> Cost of goods sold has been derived as follows:	
Material used	8,40,000
Wages and manufacturing expenses	6,25,000
Depreciation	<u>2,35,000</u>
	<u>17,00,000</u>
Less stock of finished goods (10 per cent not yet sold)	<u>1,70,000</u>
	<u>15,30,000</u>

The figures given above relate only to the goods that have been finished and not work in progress; goods equal to 15 per cent of the year's production (in terms of physical units) are in progress on an average, requiring full materials but only 40 per cent of other expenses. The company believes in keeping two months consumption of material in stock; Desired cash balance ₹ 40,000.

Average time – in lag in payment of all expenses is 1 month; suppliers of materials extend 1.5 months credit; sales are 20 per cent cash; rest are to two months credit; 70 per cent of the income tax has to be paid in advance in quarterly installments.

You can make such other assumptions as you deem necessary for estimating working capital requirements.

**(Similar Questions 47,53,56)**

- Q. 9.** X Ltd. sells goods at a gross profit of 20 per cent. It includes depreciation as a part of cost of production. The following figures for the 12 month – period ending March 31, current year are given to enable you to ascertain the requirements of working capital of the company on a cash cost basis.

In your working, you are required to assume that:

- A safety margin of 15 per cent will be maintained;
- Cash is to be held to the extent of 50 per cent of current liabilities;
- There will be no work – in – progress;
- Tax is to be ignored;
- Finished goods are to be valued at manufacturing costs. Stocks of raw materials and finished goods are kept at one month's requirements.

Sales at 2 month's credit, ₹ 27,00,000

Materials consumed (suppliers' credit is for 2 months), ₹ 6,75,000

Wages (paid on the last day of the month, ₹ 5,40,000)

Manufacturing expenses outstanding at the end of the year (cash expenses are paid one month in arrear), ₹ 60,000

Total administrative expenses (paid as above), `180,000

Sales promotion expenses (paid quarterly in advance), `90,000.

(Similar question 16, 31, 33, 49, 51)

**Ans.** Net W/c = 564937

**Q.10.** Marks Limited is launching a new project for the manufacture of a unique component. At full capacity of 24,000 units, the cost per unit will be as follows:

Material	`80
Labour and variable expenses	40
Fixed manufacturing and administrative expenses	20
Depreciation	<u>10</u>
	150

The selling price per unit is expected at `200 and the selling expenses per unit will be `10, 80 per cent being variable.

In the first two years, production and sales are expected to be as follows:

Year	Production units	Sales units
1	15,000	14,000
2	20,000	18,000

To assess working capital requirement, the following additional information is given:

- Stock of raw material – 3 month's average consumption.
- Work – in – progress – Nil
- Debtors – 1 month average cost of sales.
- Creditors for supply of materials – 2 months average purchases of the year.
- Creditors for expenses – 1 month average of all expenses during the year.
- Minimum desired cash balance – `20,000.
- Stock of finished goods is taken at average cost.

You are required to prepare a projected statement of working capital requirements for two years.

**Ans.** Net W/c = 1<sup>st</sup> Year 662.667 – 353333      2<sup>nd</sup> Year 1085714 – 406000

**Q.11.** MA Limited is commencing a new project for manufacture of a plastic component. The following cost information has been ascertained for annual production of 12,000 units which is the full capacity.

	Cost per unit `
Materials	40
Direct Labour and variable expenses	20
Fixed Manufacturing expenses	6
Depreciation	10
Fixed Administration expenses	4
	<u>`80</u>

The selling price per unit is expected to be `96 and the selling expenses `5 per unit, 80% of which is variable. In the first two years of operations, production and sales are expected to be as follows:

Year	Production no. of units	Sales no. of units
1	6,000	5,000
2	9,000	8,500

To assess the working capital requirements, the following additional information is available:

- Stock of materials      2.25 months' average consumption
- Work in process      Nil
- Debtors      1 month's average sales



- (d) Cash balance ₹10,000  
 (e) Creditors for supply of 1 month's average purchases materials during the year  
 (f) Creditors for expenses 1 month's average of all expenses during the year.

Prepare, for the two years,

- (i) A projected statement of Profit / Loss (ignoring taxation); and  
 (ii) A projected statement of working capital requirements.

**Ans.** (i) loss in 1<sup>st</sup> Year 52000 (ii) gain in 2<sup>nd</sup> Year ₹22000

**Q.12.** A company is floated to manufacture a new chemical called 'moin'. Currently 'moin' is imported in India at a landed cost of ₹8,500 per tonne. The following data have been collected regarding the project.

(i) *Investment:*

Land	₹1 lakh
Building	₹8 lakhs
Plant & Machinery	₹12 lakhs

*Cost of production:*

Imported raw materials	₹6,50,000
Indigenous raw materials	₹6,26,000
Salaries and wages	₹1,35,000

Repairs and maintenance:

on plant cost and	5%
on building cost	2%

Depreciation:

on plant; and	7%
on building	2 – ½ %

Administrative expenses – ₹50,000

Steam requirements – 7,000 tones at ₹16 per tone

Power – ₹60,000

Packing drums – ₹30 each per 500 kgs.

(ii) *Working capital requirements:*

Imported raw material stock	6 months
Local raw material stock	3 months
Packing material stock	3 months
Finished product stock	1 month
Credit to customers	1 month
Credit from suppliers	1 month
Cash expenses (prepaid)	1 month

(iii) Expected production – 250 M/T per annum.

- (a) Calculate the total capital needed for the project.  
 (b) Assuming that the entire production can be sold at the imported price, calculate the percentage yield on the investment and profit on sales.  
 (c) Also calculate the rate of cash generation per annum before taxation.

**Ans.** (a) 2897332 (b) 10.25%, 13.97 (c) 401000

**Q.13.** The APS (P) Ltd. proposes to raise its turnover from ₹6,00,000 to ₹8,40,000 next year and to ₹9,60,000 in the succeeding year. It is expected that the purchases will go up from ₹1,80,000 to ₹2,40,000 and then to ₹2,70,000 in next two years. A steady profit of 10% on

turnover is estimated over the years; and the materials, labour and factory overheads are expected uniformly to be 30%, 20% and 30% respectively of the total cost of the goods sold. At the end of the each year the raw materials stock would amount to two months consumption, work in progress to one month's factory cost and finished goods to half a month's total cost. There is a two month's credit period allowed to customers and received from suppliers. The company has a policy of carrying cash equivalent to one months requirement for payment of labour and other overhead cost. Ignoring prepayments and accrued charges as they normally offset each other, work out an estimate of working capital requirement for all three years separately. State assumptions, if any.

**Ans.** W/c 187000, 263800, 302200

**Q.14.** Strong Cement Company Ltd. has an installed capacity of producing 1.25 lakh tones of cement per annum; its present capacity utilization is 80%. The major raw material to manufacture cement is limestone, which is obtained on cash basis from a company located near the plant. The company produces cement in 200 kgs. drum. From the information given below, determine the net working capital (NWC) requirement of the company for the current year. Cost structure per drum of cement (estimated) is as under:

Gypsum	25
Limestone	15
Coal	30
Packing Material	10
Director Labour	50
Factory overheads (including depreciation of `10)	30
Administrative overheads	20
Selling overheads	<u>25</u>
Total Cost	205
Profit Margin	<u>45</u>
Selling Price	250
Add: Sales tax (10% of selling price)	<u>25</u>
Invoice price to consumer	<u>275</u>

**Additional Information:**

- (1) Desired holding period of raw material
 

Gypsum	3 months
Limestone	1 month
Coal	2.5 months
Packing Material	1.5 months
- (2) The product is in process for a period of ½ month (Assume full units of materials. Namely – gypsum, limestone and coal are required in the beginning; other conversion costs are to be taken at 50%).
- (3) Finished goods are in stock for a period 1 month before they are sold.
- (4) Debtors are extended credit for a period of 3 months.
- (5) Average time lag in payment of wages is approximately 1½ month and of overheads 1 month.
- (6) Average time lag in payment of sale tax is ½ months.
- (7) The credit period extended by various suppliers are:
 

Gypsum	2 months
Coal	1 month
Packing material	1½ month
- (8) Minimum desired cash balance is `25 lakh. You may state your assumptions, if any.

Ans. W/c = 467.705 – 97.9330

**Q.15.** The data of ABC Ltd. is as under:

Production for the year	69,000 units
Finished goods inventory	3 months
Raw materials inventory	2 months consumption
Production process	1 month
Credit allowed by creditors	2 months
Credit given to debtors	3 months
Selling price per unit	₹50 each
Raw material	50% of selling price
Direct wages	10% of selling price
Overheads	20% of selling price

There is no regular production and sales cycle; and wages and overheads accrue evenly. Wages are paid in the next month of accrual. Material is introduced in the beginning of manufacturing process and other conversion costs equivalent to 50%.

**You are required to:**

- its working capital requirement; and
- its permissible bank borrowing as per 1<sup>st</sup> and 2<sup>nd</sup> of lending under Tandon Committee norms.

**Q.16.** From the following ascertain the working capital requirement of Juhi Ltd. on cash cost basis:

- Juhi Ltd. sells goods on a gross profit of 30%.
- The company counts depreciation as a part of cost of production.
- Sales ₹24,00,000.
- Material consumed ₹6,00,000.
- Wages paid – [monthly in arrears] ₹4,80,000.
- Manufacturing expenses outstanding at the end of the year [cash expenses are paid one month in arrears] ₹45,000.
- Administration expenses paid as above – ₹1,60,000.
- Sales promotion expenses paid (quarterly in advance) ₹80,000.
- The company keeps one month's stock of each raw – material and finished goods. It keeps cash ₹1,50,000.
- Debtors and suppliers are allowed 2 months and the company assumes 18% safety margin.

#### **TANDON COMMITTEE NORMS**

**Q.17.** Compute the maximum bank borrowings permissible under Method I, Method II and Method III of Tandon Committee norms from the following figures and comment on each method:

	₹(lakhs)		₹(lakhs)
<i>Current Liabilities:</i>		<i>Current Assets:</i>	
Creditors for purchase	400	Raw Materials	800
Other current liabilities	200		
	600	Work-in-progress	80

Bank borrowings including bills discounting with bankers	880	Receivable including bills discounted with bankers	200
		Finished goods	360
		Other current assets	40
	<u>1480</u>		<u>1480</u>

Assume core current assets are `380 lakhs.

### WORKING CAPITAL CYCLE

- Q.18.** Maya Ltd. Company has obtained the following data concerning the average working capital cycle for other components in the same industry.

	Days
Raw Material Stock	
Turn over	20
Credit Received	(40)
Work in progress turnover	15
Finished goods stock turnover	40
Debtors collection period	60
	95

Using the following information, you are required to calculate the current working capital cycle for Maya Ltd. and comment on it.

	`(000)
Sales	3000
Cost of Sakes	2100
Purchases	600
Average Raw Mat. Stock	80
Average work in progress	85
Average finished goods stock	180
Average creditors	90
Average debtors	350

(Similar Question 25,32,58,59)

- Q.19.** From the following data, compute the duration of the operating cycle for each of the two years and comment on the increase / decrease:

	`Thousands	
	Year 1	Year 2
<i>Stocks:</i>		
Raw Materials	20	27
Work – in – progress	14	18
Finished Goods	21	24
Purchases	<u>96</u>	<u>135</u>
Cost of Goods sold	<u>140</u>	<u>180</u>
Sales	160	200
Debtors	32	50
Creditors	16	18

Assume 360 days per year for computational purposes.

(Solution Question No. 36)

- Q.20.** A company newly commencing business in 2003 has the under mentioned projected

Profit and Loss Account:

Sales		42,00,000
Cost of goods sold		<u>30,60,000</u>
Gross profit		11,40,000
Administrative expenses	2,80,000	
Selling expenses	<u>2,60,000</u>	5,40,000
Profit before tax		6,00,000

Provision for taxation	2,00,000
Profit after tax	<u>4,00,000</u>
The cost of goods sold has been arrived at as under:	
Material used	16,80,000
Wages and manufacturing expenses	12,50,000
Depreciation	<u>4,70,000</u>
	34,00,000
Less: stock of finished goods (10% of goods produced not yet sold)	<u>3,40,000</u>
	<u>30,60,000</u>

The figures given above relate only to finished goods and not to work-in-progress. Goods equal to 15% of the year's production (in terms of physical units) will be in process on the average requiring full materials but only 40% of the other expenses. The company believes in keeping material equal to two months consumption in stock.

All expenses will be paid in one month in arrear. Suppliers of material will extend 1½ month's credit; Sales will be 20% for cash and the rest at two month's credit; 90% of the income tax will be paid in advance in quarterly instalments. The company wishes to keep ₹1,00,000 in cash.

Prepare an estimate of the requirement of

- Working Capital; and
- Cash cost of Working Capital.

**Q.21.** An engineering company is considering its working capital investment for the year 2003–04. The estimated fixed assets and current liabilities for the next year are ₹6.63 crore and ₹5.967 crore respectively. The sales and earnings before interest and taxes (EBIT) depend on investment in its current assets – particularly inventory and receivables. The company is examining the following alternative working capital policies:

Working Capital Policy	Investment in Current Assets (`Crore)	Estimated Sales (`Crore)	EBIT (`Crore)
Conservative	11.475	31.365	3.1365
Moderate	9.945	29.325	2.9325
Aggressive	6.63	25.50	2.55

You are required to calculate the following for each policy:

- Rate of return on total assets.
- Net working capital position.
- Current assets to fixed assets ratio.
- Discuss the risk-return trade off each working capital policy.

**Meaning of receivables**

- Receivables are asset accounts representing amounts owed to the firm as a result of sale of goods/services in the ordinary course of business.
- They represent the claims of a firm against its customers and are carried to the “assets side” of the balance sheet under titles such as accounts receivable, trade receivables, customer receivables, customer receivables or book debts.
- They are the result of extension of credit facility to the customers.
- The objective of such a facility is to allow the customers.
- The objective of such a facility is to allow the customers a reasonable period of time in which they can pay for the goods purchased by them.

**Purpose of receivables:**

Accounts receivables are created because of credit sales. Hence, the purpose of receivables is directly connected with the objectives of making credit sales. The objectives of credit sales are as follows:

- Achieving growth in sales:** If a firm sells goods on credit, it will generally be in a position to sell more goods than if it insisted on immediate cash payment. This is because many customers are either not prepared or not in a position to pay cash when they purchase the goods. The firm can sell goods to such customers, in case it resort to credit sales.
- Increasing profits:** Increase in sales results in higher profits for the firm not only because of increase in the volume of sales but also because of the firm charging a higher margin of profit on credit sales as compared to cash sales.
- Meeting competition:** A firm may have to resort to granting of credit facilities to its customers because of similar facilities being granted by the competing firms to avoid the loss of sales from customers who would buy elsewhere if they did not receive the expected credit.

**Meaning of receivables management:**

Receivables are a direct result of credit sales —————> Credit sale is resorted to by a firm to push up its sales, which ultimately result in pushing up the profits earned by the firm —————> At same time, selling goods on credit results in blocking of funds in accounts receivable. Additional funds are therefore, required for the operational needs of the business, which involve extra costs in terms of interest, required for the operational needs of the business which involve extra costs in terms of interest.

Moreover, increase in receivables also increases chances of bad debts. Thus,—————> creation of accounts receivable is beneficial as well as dangerous.

The finance manager has to follow a policy which uses cash funds as economically as possible in extending receivables without adversely affecting the chances of increasing sales and making more profits.

Management of accounts receivable may, therefore, be defined as the process of making decisions relating to the investment of funds in this asset which will result in maximizing the overall return on the investment of the firm.

Thus, “the objective of receivables management is to promote sales and profits until that point is reached where the return on investment in further funding of receivables is less than the cost of funds raised to finance that additional credit (i.e. cost of capital).

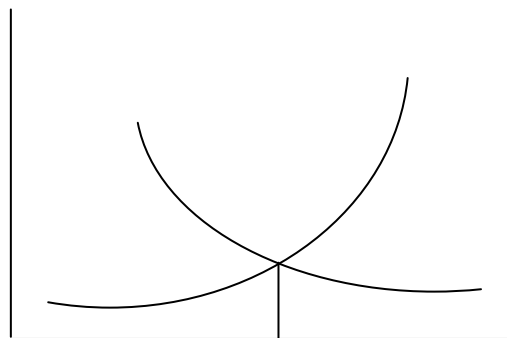
**Costs of maintaining receivables:**

The cost with respect to maintenance of receivables can be identified as follows:

1. **Capital Costs:** Maintenance of accounts receivable results in blocking of the firm's financial resources in them. This is because there is a time lag between the sale of goods to customers and the payments by them. The firm has, therefore, to arrange for additional funds to meet its own obligations, such as payment to employees, suppliers of raw materials, etc., while awaiting for payments from its customers. Additional funds may either be raised from outside or out of profits retained in the business. In both the cases, the firm incurs a cost. In the former case, the firm has to pay interest to the outsider while in the latter case, there is an opportunity cost to the firm, i.e., the money which the firm could have earned otherwise by investing the funds elsewhere.
2. **Administrative costs:** the firm has to incur additional administrative costs for maintaining accounts receivable in the form of salaries to the staff kept for maintaining accounting records relating to customers, cost of conducting investigation regarding potential credit customers to determine their creditworthiness, etc.
3. **Collection costs:** The firm has to incur costs for collecting the payments from its credit customers. Sometimes, additional steps may have to be taken to recover money from defaulting customers.
4. **Defaulting costs:** Sometimes after making all serious efforts to collect money from defaulting customers, the firm may not be able to recover the over dues because of the inability of the customers. Such debts are treated as bad debts and have to be written off since they cannot be realized.

**Optimum size of receivables :**

The optimum investment in receivables will be at a level where there is a trade – off between costs and profitability. When the firm resorts to a liberal credit policy results in increased investment in receivables, increased chances of bad debts and more collection costs. The total investment in receivables increases and, thus, the problem of liquidity is created. On the other hand, a stringent credit policy reduces the profitability but increases the liquidity of the firm. Thus, optimum credit policy occurs at a point where there is a “trade – off” between liquidity and profitability as shown in chart below.

**Credit period :**

**Meaning:** Credit Period denotes the period allowed for payment by customers, in the normal course of business. The credit period is generally stated in terms of net days. For example, if the credit terms are “net 30”, it means that customers will repay credit obligations not later than 30 days.

**Factor:** Credit period depends on a number of factors, for example:

- (1) Nature of product i.e., if demand is inelastic, credit period may be small.
- (2) Quantum of Sales – Credit may not be allowed if small quantities are purchased.
- (3) Customs and Practices – normal trade practices and those followed by competitors.
- (4) Funds available with the Company.
- (5) Credit Risk i.e. possibility of bad debts.

**Discount Policy :**

**Meaning:** In the context of Debtors Management, Discount Policy involves decisions relating to:

- Percentage of Cash Discount to be offered as incentive for early settlement of invoice.
- Period within which cash discount can be availed.

Normally, credit terms are expressed in this order:

- (a) the rate of discount,
- (b) the cash discount period and
- (c) the net credit period.

For example, credit terms of “2/10 net 30” means that cash discount of 2% will be granted if customer pays within 10 days; if he does not avail the offer he must pay within 30 days, being the credit period.

**Role:** Discounts are given to speed up the collection of debts. Hence, it improves the liquidity of the seller.

**Credit Evaluation :**

A firm selling on credit terms cannot extend credit to all customers. Credit granting decision is taken on a case – to – case basis, based on the following illustrative factors:

- (1) **Trade references:** The prospective customer may be required to give two / three trade references. Thus, the customers may give a list of personal acquaintances or some other existing credit – worthy customers. The credit manager can send a short questionnaire, seeking relevant information, to the referees.
- (2) **Bank references:** Sometimes, the customer is asked to request the banker to provide the required information. In India, bankers do not generally give detailed and unqualified credit reference.
- (3) **Credit bureau reports:** Associations for specific industries may maintain a credit bureau, which provides useful and authentic credit information for their members.
- (4) **Past experience:** The past experience of dealings with an existing customer is a valuable source of essential data. The transactions should be carefully scrutinized and interpreted for finding out the credit risk involved.
- (5) **Published financial statements:** Published financial statements of a customer, (in case of limited companies) can be examined to determine the credit – worthiness.
- (6) **Salesman’s interview and reports:** Credit – worthiness can be evaluated by the reports provided by consulting salesmen or sales representatives. Such reports provide first hand information to the Company for proper determination of the credit limit.
- (7) **Credit-worthiness of the customer:** The credit-worthiness of the customer is the most crucial factor in deciding whether credit should be granted or not. This based on past experience (for existing customers) and credit analysis (for existing new customers).
- (8) **Credit Rating:** If the customer is an corporate institution the firm selling on credit may also check its credit rating so as to check the safety of its dues.

**Collection Policy :**

**Role of Collection Policy :** Average Collection Period and Bad Debt losses are reduced by efficient and timely collection of debtors. Hence, a proper collection policy should be laid down.

**Aspects of Collection Policy :** The following aspects should be covered in Collection Policy and procedures.

- Timing of the collection process-when to start reminding etc.
- Despatch of reminder letters to customers.
- Personal follow-up by Company’s representatives and telephonic calls.
- Appointment of agents for collection or follow-up.
- Dealing with default accounts, legal action to be initiated, notice to defaulting customer etc.



**Measures for monitoring receivables:**

Monitoring of receivables involves the following measures:-

- (1) **Average Age of Receivables:** Debtors Turnover Ratio and Average Collection Period are worked out at periodic intervals. These are compared with the industry norms or the standards set by the firm. In case of high collection period, intense collection efforts are initiated.
- (2) **Ageing Schedule:** The pattern of receivables is determined by preparing the Ageing schedule. If the receivables denote old outstanding due for longer periods, suitable action should be taken to collect them immediately.
- (3) **Collection Programme:** The procedures for collection e.g. reminding letters, direct follow – up etc. should be initiated based on the company's

**Ageing Schedule:**

**Meaning:** In a 'Ageing Schedule', the receivables are classified according to their age, i.e. period for which they have been outstanding, e.g. less than 30 days, 30-45 days, above 60 days etc.

**Role:** Preparation of ageing schedule helps management in the following ways:

- (a) Analysis of quality of individual accounts.
- (b) Intimation of due dates to customers.
- (c) Telegraphic and telephonic advice to customers on the due date.
- (d) Threat of legal action on overdue accounts.
- (e) Legal action on overdue accounts.

**Decision trees :**

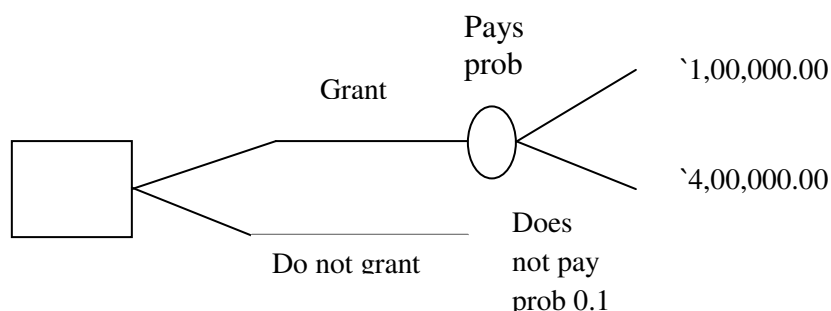
In practice there may be more than one source of uncertainty, which must be simultaneously taken into account when making a decision, and the interaction of different sources of uncertainty can greatly increase the number of possible outcomes. Decision trees provide a useful means of representing a decision problem in a way that illustrates the interaction of different variables and choices leading to the range of possible outcomes.

Decision tree technique provides a useful graphical way of representing decision problems and their possible outcomes, and of keeping track of the many interactions between different variables that can occur.

**Decision tree analysis of credit granting :** The decision whether to grant credit or not, is a decision involving costs and benefits. When a customer pays, the seller makes profit but when he fails to pay the amount of cost going into the product is also gone. If the relative chances of recovery are 9 out of 10 then probability of recovery is 0.9 and that of default is 0.1.

Credit evaluation of a customer shows that the probability of recovery is 0.9 and that of default is 0.1. The revenue from the order is ₹5 lakhs and cost is ₹4 lakhs. The decision is whether credit should be granted or not.

The analysis is presented in the following diagram:



The weighted net benefit is  $₹[1,00,000 \times 0.9 \text{ i.e. } 90,000 - 0.1 \times 4,00,000 \text{ i.e. } 40,000] = 50,000$ . So credit should be granted.

**Factoring :**

“**Factoring**” is a new financial service that is presently being developed in India. It is not just single service, rather a portfolio of complementary financial services available to clients i.e. sellers. The sellers are free to avail of any combination of services offered by the factoring organizations according to their individual requirements.

Generally, **Factoring involves provision of specialized services relating to :**

- Credit investigation;
- Sales ledger management;
- Purchase and collection of debts;
- Credit protection as well as provision of finance against receivables and risk bearing.

In factoring, accounts receivables are generally sold to a financial Institution (a subsidiary of commercial bank – called “Factor”), who charges commission and bears the credit risks associated with the accounts receivables purchased by it.

Its operating is very simple. Clients enter into an agreement with the “factor” working out a factoring arrangement according to his requirements. The factor then takes the responsibility of monitoring, follow up, collection and risk taking and provision of advance. The factor generally fixed up a limit customer – wise for the client (seller).

In factoring, an agreement between the factor and the seller is entered into to spell out legal obligations and procedural arrangements. As soon as the seller receives an order from a buyer, a credit approval slip is written and immediately sent to factoring company for a credit check. If the factors do not approve the sale, the seller generally refuses to fulfill the order. The details about the buyer’s credit worthiness are given to the seller by the factor. If the sale is approved, shipment is made. When sale is affected, the receivable is immediately turned over to the factor for collection. When the bill is paid, the factor forwards the money to the selling firm, less a discount for its services. More often, the factor also provides financing by purchasing the receivables at a discount on the day of sale. In this way, the borrowing firm gets money in exchange for its receivables.

Factoring offers the following advantages which makes it quite attractive to many firms:

- (1) The firm can convert accounts receivables into cash without bothering about repayment.
- (2) Factoring ensures a definite pattern of cash in flows.
- (3) Continuous factoring virtually eliminates the need for the credit department. That is why receivables financing through factoring is gaining popularity as useful source of financing short term funds requirements of business enterprises because of the inherent advantage of flexibility it affords to the borrowing firm. The seller firm may continue to finance its receivables on a more or less automatic basis. Its sales expand or contract, it can vary the financing proportionately.
- (4) Unlike an unsecured loan, compensating balances are not required in this case. Another advantage consists of relieving the borrowing firm of substantially credit and collection costs and to a degree from a considerable part of cash management.

In India RBI has permitted selected commercial banks to operate the business of factoring. At present only two government agencies are involved in the business – SBI Factors Limited and Can bank Factors Limited. In addition, many non – banking finance companies and other agencies are also factoring in book debts.

However, factoring as a means of financing is comparatively costly source of financing since its cost of financing is higher than the normal lending rates.

**Q. 1. [ Dec 2011] Write notes on Forfaiting.**

**Ans.**

- Forfaiting is that mode of export trade financing whereby bank advances cash to the exporter.
- The advance so granted is against the invoices and is generally for a long period.
- The amount advanced is lesser than the invoice since it is discount by the bank at a rate so determined taking into account all risk factors.

**Q. 2. [Dec2005/ 2008/ 2009/ 2010]** Factoring & bill discounting

**Ans.** Factoring is a continuing arrangement between a financial intermediary called a Factor & a seller of goods or services. Based on the type of factoring, the factor performs the following services in respect of the accounts receivables:-

- Purchase all accounts receivables of the seller for immediate cash.
- Administers the sales ledger of the seller.
- Collects the accounts receivables.
- Assumes the losses which may arise from bad debts.
- Provides relevant advisory services to the seller.

The factor handle all the receivables arising out of the credit sales of the seller company & not just some specific bills or invoices as is done in a bills discounting agreement.

Factoring offers a very flexible mode of cash generation against receivables. Once a line of credit is established, availability of cash is directly geared to sales so that as sales increase so does the availability of finance. The mechanics of factoring comprises of the sequence of events outlined below

**Q. 3. [ June 2003]** Recourse factoring.

**Ans.** Recourse factoring can be referred as a non-fund based financial service wherein a finance company called 'factor', undertakes to collect the receivables of a company in return for collection charges called factoring commission (as a %of the factor receivables)

Factoring can be of two types:-

- Recourse factoring
- Non recourse factoring

In non recourse factoring the risk of bad debts is on the client .the factor provider's finance & in case of default in payment of debt he is in entitled to recover the same from the client.

**Q. 4. [ June 2000]** Write notes on undisclosed factoring.

**Ans.**

- Undisclosed factoring refers to that form of factoring wherein client's customers are not notified about the factoring arrangement
- Customers continue to make payment to the client though the same have been assigned to the factor
- Thus, in such a case the customers are not informed or notified about the arrangement entered into between factor and client.
- This agreement is entered in respect of organisations enjoying good business reputation.

**Q. 5. [ June 2005]** Describe the mechanics involved in factoring.

**Ans.** Factoring offers a very flexible mode of cash generation against receivables. Once a line of credit is established, availability of cash is directly geared to sales so that as sales increase so does the availability of finance. The mechanics of factoring comprises of the sequence of events outlined below:-

- 1) Seller (client) negotiates with the factor for establishing factoring relationship.
- 2) Seller requests credit check on buyer (client).
- 3) Factor checks credit credentials and approves buyer. For each approved buyer a credit limit and period of credit are fixed.
- 4) Seller sells goods to buyer.
- 5) Seller sends invoice to factor. The invoice is accounted in the buyers account in the factor's sales ledger.
- 6) Factor sends copy of the invoice to buyer.
- 7) Factor advises the amount to which seller is entitled after retaining a margin, say 20%, the residual amount paid later.
- 8) On expiry of the agreed credit period, buyer makes payment of invoice to the factor.
- 9) Factor pays the residual amount to seller after his agreed compensation.

**Q. 6.** [ Dec 2008] 'Factoring' and 'securitization'

**Ans.** Factoring

1. Factoring is associated with receivables of manufacturing and trading companies.
2. It mainly deals with trade receivables of clients.
3. The entire credit risk is passed on to the factor subject to the terms of agreement
4. Factor himself takes up the collection work.
5. No issue of securities against book debts.

Securitisation

1. Securitisation is concerned with loans and receivables of financial institutions.
2. It deals with receivables arising out of loans like Hire purchase finance and receivables from Government departments.
3. Part of the credit risk is absorbed by the originator by transferring the assets at a discount.
4. In this case, collection work can be done by the originator or by a servicing agent.

Marketable securities are issued against loans and receivables, term loans to financial companies, receivables from Government departments and government companies, hire purchase loans (vehicle loans), Mortgage loans, lease finance and credit card receivables etc.

## Practical Question

### CREDIT POLICY

**Q. 1.** A firm is currently selling a product @ `10 per unit. The most recent annual sales (all credit) were 30,000 units. The variable cost per unit is `6 and the average cost per unit, given a sales volume of 30, 000 units, is `8. The total fixed cost is `60,000. The average collection period may be assumed to be 30 days.

The firm is contemplating a relaxation of credit standards that is expected to result in a 15 per cent increase in unit sales; the average collection period would increase to 45 days with no change in bad debt expenses. It is also expected that increased sales will result in additional net working capital to the extent of `10,000. The increase in collection expenses may be assumed to be negligible. The required return on investment is 15 per cent.

Should the firm relax the credit standard?

**Ans.1.** Evaluation of credit policy

Credit period	Existing policy 30 days	Proposed policy 45 days
Credit sales unit	30000	$30000(1+0.15) = 34500$
Sales revenue @ 10	3,00,000	3,45,000
Less variable cost @ 6	1,80,000	2,07,500
Less fixed cost 30000(8-6)	60,000	60,000
Operating Profit (A)	60,000	78,000
Average debtors = $\frac{V.C. + F.C.}{360} \times C.P.$	$\frac{1,80,000 + 60,000}{360} \times 30$ = 20,000	$\frac{2,07,500 + 60,000}{360} \times 45$ = 33,437.50
Less expenditure due to credit sale (B)		
Opportunity cost @ 15%	3,000	5,015.62
Opportunity cost on		1500
Net profit	57,00	71,484
Net profit		14,484

**CASH DISCOUNT**

- Q. 2.** Assume that the firm in Q1 is contemplating to allow 2 per cent discount for payment within 10 days after a credit purchase. It is expected that if discounts were offered, sales will increase by 15 per cent and the average collection period will drop to 15 days. Assume bad debt expenses will not be affected; return on investment expected by the firm is 15 per cent; 60 per cent of the total sales will be on discount. Should the firm implement the proposal?

**Ans.**

Credit period	Existing policy 30 days	Proposed policy:- cash discount=2%; 15 days
Sales revenue @ 10	3,00,000	$30000(1+0.15) \times 10 = 3,45,000$
Less variable cost	1,80,000	2,07,500
Less fixed cost	60,000	60,000
Profit (A)	60,000	78,000
Cash discount customer Average debtors = $\frac{V.C. + F.C.}{360} \times C.P.$	20,000	$60\% \text{ of } 3,45,000 = 2,07,000$ $\frac{2,07,000 + 60,000}{360} \times 15 = 11,125$
Less expenditure due to credit sale (B)		
Opportunity cost @ 15%	3,000	1,669
Cash discount		4,140
Net profit (A) – (B)	57,00	72,191
Net profit		15,191

**CREDIT PERIOD**

- Q. 3.** Suppose, a firm is contemplating an increase in the credit period from 30 to 60 days. The average collection period which is at present 45 days is expected to increase to 75 days. It is also likely that the bad debt expenses will increase from the current level of 1 per cent to 3 per cent of sales. Total credit sales are expected to increase from the level of 30,000 units to 34,500 units. The present average cost per unit is `8, the variable cost and sales per unit is `6 and `10 per unit respectively. Assume the firm expects a rate of return of 15 per cent. Should the firm extend the credit period?

**Ans.** Evaluation of credit period

Average collection period	Existing policy 45 days	Proposed policy 75 days
Bad debt	1%	3%
Sales unit	30000	34500
Sales revenue @ 10	3,00,000	3,45,000
Less variable cost @ 6	1,80,000	2,07,500
Less fixed cost 30000(8–6)	60,000	60,000
Operating Profit (A)	60,000	78,000
Average debtors = $\frac{V.C. + F.C.}{360} \times C.P.$	$\frac{1,80,000 + 60,000}{360} \times 45 = 30,000$	$\frac{2,07,000 + 60,000}{360} \times 75 = 55,625$
Less expenditure due to credit sale (B)		
Opportunity cost @ 15%	4,500	8,343.75
Bad debts	3,000	10350
Net profit (A) – (B)	52,500	59,306.25
Net profit		6,806.25

**COLLECTION POLICIES**

- Q. 4.** A Firm is contemplating stricter collection policies. The following details are available:
1. At present, the firm is selling 36,000 units on credit at a price of ₹32 each; the variable cost per unit is ₹25 while the average cost per unit is ₹29; average collection period is 58 days; and collection expenses amount to ₹10,000; bad debts are 3 per cent.
  2. If the collection procedures are tightened, additional collection charges amounting to ₹20,000 would be required, bad debts will be 1 per cent; the collection period will be 40 days; sales volume is likely to decline by 500 units.
- Assuming a 20 per cent rate of return on investments, what would be your recommendation? Should the firm implement the decision?

**Ans.** Collection policies

	Existing policy	Proposed policy
Sales unit	36000	36,000–500 = 35,500
Collection expenses	10000	10,000+20,000 = 30,000
Bad debt	3%	1%
Collection period	58 days	40 Days
Sales revenue @ 32	11,52,000	11,36,000
Less variable cost @ 25	9,00,000	8,87,500
Less fixed cost 36,000(29–25)	1,44,000	1,44,000
Operating Profit (A)	1,08,000	1,04,5000
Average debtors = $\frac{V.C. + F.C.}{360} \times C.P.$	$\frac{9,00,000 + 1,44,000}{360} \times 58$ = 1,68,200	$\frac{8,87,500 + 1,44,000}{360} \times 40$ = 1,14,611
Less expenses due to credit sales opportunity cost @20%	33,640	22,922.22
Bad debts	34,560	11,360
Collection expenses	10,000	30,000
Net profit (A) – (B)	29,800	40,218
Gain Profit		10,418

**FACTORING**

- Q. 5.** The turnover of R Ltd. is ₹60 lakhs of which 80% is on credit. Debtors are allowed one month to clear off the dues. A factor is willing to advance 90% of the bills raised on credit for a fee of 2% a month plus a commission of 4% on the total amount of debts. R Ltd. as a result of this likely to save ₹21,600 annually in management costs and avoid bad debts at 1% on the credit sales.

A scheduled bank has come forward to make an advance equal to 90% of the debts at an interest rate of 18% p.a. However its processing fee will be at 2% on the debts. Would you accept factoring or the offer from the bank?

**Ans.** Bank borrow is better Factor 17400, Bank 13400

- Q. 6.** Under an advance factoring arrangement Bharat Factors Ltd. (BFL) has advanced a sum of ₹14 lakhs against the receivables purchased from ABC Ltd. The factoring agreement provides for an advance payment of 80% (maintaining 'factor reserve' of 20% to provide for disputes and deductions relating to the bills assigned) of the value of factored receivables and for guaranteed payments after three months from the date of purchasing the receivables. The advance carries a rate of interest of 20% per annum compounded quarterly and the factoring commission is 1.5% of the value of factored receivables. Both the interest and commission are collected up – front.
- (i) Compute the amount of advance payable to ABC Ltd.
  - (ii) Calculate per annum the effective cost of funds made available of ABC Ltd.
  - (iii) Calculate the effective cost of funds made available to ABC Ltd. assuming that the interest is collected in arrear and commission is collected in advance.

**Ans.** (i) 13.042, (ii) 32.85% (iii) 31.03%

- Q. 7.** Kareena Kapoor Ltd. intends to produce a new product period at `1,000 per unit with expected annual sales of 5,000 units. Variable costs amount to `750 per unit and 2 months credit is to be granted. It is estimated 10 per cent of customer's will default, other will pay on the due day. Interest rates are 15 per cent annum. A credit agency has offered the company a system, which it claims can help identify possible bad debts. It will cost `2,50,000 per annum to run and will identify 20 per cent of customers as being potential bad debts. If these customers are rejected no actual bad debts will result. Should the credit agency's system be use?

**Ans.** Evaluation of credit average offer

Credit period	Existing policy 30 days	Proposed policy 45 days
Credit sales unit	50000	50000(1-0.20) = 40000
Credit period	2 months	2 months
Sales revenue @ 1000	50,00,000	40,00,000
Less variable cost @ 750	37,50,000	30,00,000
Contribution (A)	12,50,000	10,00,000
Average debtors = $\frac{V.C. + F.C.}{12} \times C.P.$	$\frac{37,50,000}{12} \times 12$ = 6,25,000	$\frac{30,00,000}{12} \times 2$ = 5,00,000
Less expenses due credit sale		
Opportunity cost @ 15%	93,750	75,000
Bad debts 10%	5,00,000	
Credit agency fee		2,50,000
Net profit	6,56,250	6,75,000
Saving due to credit		
Agency suggestion		18,750

**Decision** Since there is saving due to credit policy agency by `18,750 hence credit agency suggestion is followed.

- Q. 8.** Easy Limited specializes in the manufacture of a computer component. The component currently sold for `1,000 and its variable cost is `800. For the year ended 31.12.1992 the company sold on an average 400 components per month.

At present the company grants one month credit to its customers. The Company is thinking of extending the same to two months on account of which the following is expected: -

Increase in sales	25%
Increase in stock	`2,00,000
Increase in creditors	`1,00,000

**You are required:**

To advise the company on whether or not to extend the credit terms if:

- all customers avail the extended credit period of two month and
- existing customers do not avail the credit terms but only the new customers avail the same.

Assume in this case entire increase in sales is attributable to the new customers.

The company expects a minimum return of 40% on the investment.

**Ans.** Evaluation of credit policies

	Existing policy	Proposed I	Proposed II
Sales unit per annum	400×12 = 4800 1 month	4,800(1+0.25) = 6,000 2 months	6000 (4800 = 1 month) (1200 = 2 months)
Sales revenue @ 1000	48,00,000	60,00,000	12,00,000
Less variable cost @ 800	30,40,000	48,00,000	9,60,000

Profit (A)	9,60,000	12,00,000	2,40,000
Average debtors = $\frac{\text{V.C.} + \text{F.C.}}{12} \times \text{C.P.}$	$\frac{38,40,000 + 0}{12} \times 1$ = 3,20,000	$\frac{48,00,000 + 1}{12} \times 2$ = 8,00,000	$\frac{9,60,000}{12} \times 2$ = 1,60,000
Opportunity cost @ 40% on average debtors	1,28,000	3,20,000	64,000
Opportunity cost on increase wage capital 1,00,000		40,000	40,000
Net profit	8,32,000	8,40,000	1,36,000 + 8,32,000
Gain profit		8,000	1,36,000

**Decision** Under both proposed policy profit is going to increase but profit under second policy is more.

Working capital = Current Assets – Current Liabilities  
= Increase Stock – Increase Credit  
= 2,00,000 – 1,00,000 = 1,00,000

- Q. 9.** ABC Ltd. is examining the question of relaxing its policy. It sells at present 20,000 units at a price of `100 per unit, the variable cost per unit is `88 and average cost per unit at the volume is `92. All the sales on credit, the average collection period being 36 days. A relaxed credit policy is expected to increase sales by 10% and the average age of receivable to 60 days. Assuming 15% return, should the firm relax its credit policy?

**Ans.** Evaluation of credit period

Average collection period	Existing policy	Proposed policy
Sales revenue @ 100	20,000 × 100 = 20,00,000	20,000(1+0.10) × 100 = 22,00,000
Less variable cost @ 88	20,000 × 88 = 17,60,000	22,000 × 88 = 19,36,000
Less fixed cost 20,000(92–88)	80,000	80,000
Profit	1,60,000	1,84,000
Average debtors = $\frac{\text{V.C.} + \text{F.C.}}{360} \times \text{C.P.}$	$\frac{1,76,000 + 80,000}{360} \times 36$ = 1,84,000	$\frac{19,36,000 + 80,000}{360} \times 60$ = 3,36,000
Less expenses due to credit sale		
Opportunity cost @ 15%	27,600	50,400
Bad debts		
Net profit	1,32,400	1,33,600 1,200

- Q.10.** A company has sales of `10,00,000. Average collection period is 50 days, bad debt losses 6% of sales and collection expenses `10,000. The cost funds is 15% p.a. The company has two alternative collection programmes.

	I	II
Average collection period reduced to	40 days	30 days
Bad debt losses reduced to	4% of sales	3% of sales
Collection expenses	`20,000	`30,000
Evaluate which programme is viable		

**Ans.** Evaluation of collection policies

	Existing policy	Proposed I	Proposed II
Average debtors = $\frac{\text{Sales}}{360} \times \text{C.P.}$	$\frac{10,00,000}{360} \times 50$ = 1,38,888.89	$\frac{10,00,000}{360} \times 40$ = 1,11,111.111	$\frac{10,00,000}{360} \times 30$ = 83,333.333
Expenditure due to			



<b>credit sale</b>			
Opportunity cost @ 15%	20,833.33	16,666.67	12,500
Bad debts	60,000	40,000	30,000
Collection expenses	10,000	20,000	30,000
Total expenditure due to credit sales	90,833.33	76,666.67	72,500

Proposed II has lowest cost hence proposed II is consider.

**Q.11.** In order to increase sales from the normal level of ₹24 lakhs per annum, the marketing manager submits a proposal for liberalising credit policy as under:

Normal Sales - ₹24 lakhs

Normal credit period - 30 days

Proposed increase in credit Relevant increase over

Period beyond normal 30 days	Normal sales (₹)
15 days	1,20,000
30 days	1,80,000
45 days	2,10,000
60 days	2,40,000

The P.V. ratio is 25%.

The company expects a pre – tax return of 20% on investment. Evaluate the above four alternatives and advise the management. (Assume 360 days in a year).

**Ans.** Evaluation of credit policies

Credit policy	Existing policy 30 days	Proposed I 30+15 = 45 days	Proposed II 30+30 = 60 days	Proposed II 30+45 = 75 days	Proposed IV 30+60 = 90 days
Credit sales	24,00,000	25,20,000	25,80,000	26,10,000	26,40,000
Less variable cost 75%	18,00,000	18,90,000	19,35,000	19,57,500	19,80,000
Contribution 25% (A)	6,00,000	6,30,000	6,45,000	6,52,500	6,60,000
Average debtors = $\frac{V.C. + F.C.}{360} \times C.P.$	$\frac{6,00,000 + 0}{360} \times 30$ = 1,50,000	$\frac{18,90,000 + 0}{360} \times 45$ = 2,36,250	$\frac{19,35,000}{360} \times 60$ = 3,22,500	$\frac{19,57,500}{360} \times 75$ = 4,07,812.5	$\frac{19,80,000}{360} \times 90$ = 4,95,000
Less expenses due to credit sales (B) Opportunity cost @ 20%	30,000	47,250	64,500	81,562.5	99,000
Net profit	5,70,000	5,82,750	5,80,500	5,70,937.5	5,61,000
Gain profit		12,750	10,500	937.50	--9000

**Decision** Increase profit under credit policy I i.e. 45 days credit period is 12,750 which is maximum than other credit policy hence 45 days credit policy is accepted.

**Note:** If P/V ratio is 25% it means contribution of sales is 25%, Hence variable cost of sales is 75%.

Working capital = Current Assets – Current Liabilities

= Increase Stock – Increase Credit

= 2,00,000 – 1,00,000 = 1,00,000

**Q.12. [June 2007]** The present credit terms of P Company are 1/10 net 30. Its annual sales are ₹80 lakhs, its average collection period is 20 days. Its variable costs and average total costs to sales are 0.85 and 0.95 respectively and its cost of capital is 10 per cent. The proportion of sales of which customers currently take discount is 0.5. P company is considering relaxing its discount terms to 2/10 net 30. Such relaxation is expected to increase sales by ₹5 lakhs, reduce the average collection period to 14 days and increase

the proportion of discount sales to 0.8. What will be the effect of relaxing the discount policy on company's profit? Take year as 360 days.

**Q.13.** A company is considering using a factor the following information is relevant:

- The current average collection period for the company's debt is 80 days and  $\frac{1}{2}\%$  of debtors default. The factor has agreed to pay over money due, after 60 days, and it will suffer the loss of any bad debts.
- The annual charge for the factoring is 2% of turnover payable annually in arrears. Administration cost saving will total `1,00,000 per annum.
- Annual sales, all on credit are `1,00,00,000. Variable costs total 80% of sales price. The company's cost of borrowings is 1.5% per annum. Assume year consisting of 365 days.

Should the company enter into a factoring agreement?

**Ans.** Salary due to Each 15758

**Q.14.** Household Appliances Ltd. deals with consumer durables, having an annual turnover of `80 lacs, 75% of which are credit sales effected through a large number of dealers while the balance sales are made through showrooms on cash basis. Normal credit allowed is 30 days.

The company proposes to expand its business substantially and there is good demand as well. However, the marketing manager finds that the dealers have difficulty in holding more stocks due to financial problems. He, therefore, proposes a change in the credit policy as follows:

Proposal	Credit Period	Expected Credit Sales
Plan I	60 days	`70,00,000
Plan II	90 days	75,00,000

The products yield an average contribution of 25% on sales. Fixed costs amount to be `5,00,000 per annum. The company expects a pre – tax return of 20% on capital employed.

The finance manager after a review of the proposal has recommended increasing the provision for bad debts from the current 1% of  $1\frac{1}{2}\%$  for Plan I and to 2% for Plan II.

Evaluate the merits of the new proposals and recommend the best policy.

**Ans.** Evaluation of credit policies

	Existing policy	Proposed I	Proposed II
Credit period	30 days	60 days	90 days
Bad debts	1%	$1\frac{1}{2}\%$	2%
Sales revenue	60,00,000	70,00,000	75,00,000
Less variable cost 75%	45,00,000	52,50,000	56,25,000
Less Fixed cost	5,00,000	5,00,000	5,00,000
	10,00,000	12,50,000	13,75,000
Bad debts	60,000	1,05,000	1,50,000
Profit	9,40,000	11,45,000	12,25,000
Incremental Profit (A)		2,05,000	2,85,000
Average debtors = $\frac{V.C. + F.C.}{360} \times C.P.$	$\frac{45,00,000 + 5,00,000}{360} \times 30$ = 4,16,666.67	$\frac{52,50,000 + 5,00,000}{360} \times 60$ = 9,58,333.33	$\frac{56,25,000 + 5,00,000}{360} \times 90$ = 15,31,125
Gain Average debtors		5,41,666.67	11,14,583.33
Opportunity cost 20%		1,08,333	2,22,916.67
Net increase profit		96,666.67	62,083

**Decision** Since incremental profit under 60 days credit is more than 90 days credit policy hence 60 days credit policy is assumed.

**Q.15. [2006 –June]** A dealer having annual sales of `50 lakh. Extends 30 days credit period to its debtors. The variable costs are 80% on sales and fixed costs are `6,00,000. The dealer intends to change the credit policy for which the following information is given :

Credit Policy	Average Collection period (Days )	Annual Sales(In lakh )
A	45	56
B	60	60
C	75	62

Rate of return (pre tax ) required on investment is 20%.

You are required to assess the most profitable policy with the help of incremental approach .Calculation may be restricted to two decimal places

**Evaluation credit policy**

Credit period	Existing	proposed-A	proposed-B	Proposed-C
Credit sales	50,00,000	56,00,000	60,00,000	62,00,000
Less : Variable cost – 80%	40,00,000	44,80,000	48,00,000	49,60,000
Fixed Cost	6,00,000	6,00,000	6,00,000	6,00,000
Profit- A	4,00,000	5,20,000	6,00,000	6,40,000
Average debtor $\frac{V.C. + F.C.}{360} \times \text{credit period}$	$\frac{40,00,000 + 600,000}{360} \times 30$ 3,83,333.33	$\frac{44,80,000 + 600,000}{360} \times 45$ 6,35,000	$\frac{48,00,000 + 600,000}{360} \times 60$ 9,00,000	$\frac{49,60,000 + 600,000}{360} \times 90$ 13,90,000
Less opportunity cost@20%	76,666.67	1,27,000	1,80,000	2,78,000
Increase profit		69,666.67	96,666.67	38,666.67

**Ans.** Policy B having Average Collection period 60 day's yields the maximum profit and this is must profitable

**Q.16. [2006–Dec.]** Sales manager of a company process to sell goods to a group of new customers with 10% risk of non payment .This group would require one and a half month's credit and is likely to increase sales by `1,00,000 per annum .Production and selling expenses amount to 80% of sales and income tax rate is 30% .The company's minimum required rate of return after tax is 25% .

Should the sales manager's proposal be accepted ?

Find the degree of risk of non payment that the company should be willing to assume, if required rate of return after tax is (i) 30% (ii) 40% or (iii) 60%

**Ans.** Available rate of return is 70% which is higher than the required rate of return of 25%, the sales manager proposal should be accepted.

**Q.17. [June 2011]** Peacock Ltd. has been engaged in manufacturing of textiles. It has a current sales of? 30 lakh per annum. The cost of sales is 75% of sales and bad debts are 1 % of sales. The cost of sales comprises 80% variable costs and 20% fixed cost, while the company's required rate of return is 12%. The company 'currently allows customers 30 days' credit, but is now considering increasing this to 60 days' credit in order to attract more customers.

It has been estimated that this change in policy will increase sales by 15%, while bad debts will increase from 1 % to 4%. It is expected that the policy change will not result in any increase in fixed costs, creditors and stock level. Should Peacock Ltd. introduce proposed policy?

Evaluation of credit policy

Credit period	30 Days	60 Days
Bad debts	1%	4%
Sales revenue	30,00,000	34,50,000
Less : Variable cost	18,00,000	20,70,000
Fixed cost	4,50,000	4,50,000
Profit (A)	7,50,000	9,30,000
Average debtor = $\frac{V.C. + F.C.}{360} \times \text{credit period}$	$\frac{18,00,000 + 4,50,000}{360} \times 30$ 1,87,500	$\frac{20,70,000 + 4,50,000}{360} \times 60$ 4,20,000
<u>Less exp<sup>n</sup> due to credit sale</u>		
Opportunity cost @12%	22,500	50,400
Bad debts	30,000	1,38,000
Net profit	6,97,500	7,41,600
Increase profit		44,100

Since profit increases due to increase of credit period therefore it is better decision to change credit period.

**Q.18. [Dec. 2011]** Following are the details regarding operations of Radiance Enterprises Ltd. during a period of last 12 months:

Sales	12,00,000
Selling price (per unit)	10
Variable cost (per unit)	7
Total cost (per unit)	9

Credit period allowed to customers is one month.

The company is considering a proposal for a more liberal credit by increasing the average collection period from one month to two months. This relaxation is expected to increase sales by 25%. You are asked to advise the company regarding adoption of new credit policy assuming that the company's required rate of return on investment is 30%.

### **Answer -18**

Sales revenue = 12,00,000

s.p./unit = 10

sales unit =  $\frac{12,00,000}{10} = 1,20,000 \text{ unit}$

variable cost =  $1,20,000 \times 7 = 8,40,000$

variable cost as a % of sales =  $\frac{8,40,000}{12,00,000} \times 100 = 70\%$

fixed cost =  $(9-7) \times 1,20,000 = 2,40,000$

## Evaluation of credit policy

Credit period	Existing policy One month	Proposed policy Two months
Sales revenue	12,00,000	12,00,000(1+0.25) 15,00,000
Less : Variable cost	8,40,000	20,70,000
Fixed cost	2,40,000	4,50,000
Profit (A)	1,20,000	2,10,000
Average debtor = $\frac{V.C. + F.C.}{360} \times \text{credit period}$	$\frac{8,40,000 + 2,40,000}{12} \times 1$ 90,000	$\frac{10,50,000 + 2,40,000}{12} \times 2$ 2,15,000
<u>Less exp<sup>n</sup> due to credit sale</u>		
Opportunity cost @30%	27,000	64500
Net profit	93,000	1,45,500
Increase profit		52,500

Since profit increases due to increase of credit period therefore it is better decision to change credit period.

**Q.19. [June 2012]** Sawan Ltd. currently has sales of 30,00,000 with an average collection 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 will result as under:

- The average collection period would reduce to one month.
- 50% of customers would take advantage of 2% discount. The company would normally require a 25% return on its investment.

Advise the management whether to extend the discount on cash sales.

Credit period	Existing policy 2 months	Proposed policy:- cash discount=2%; 1month
Cash discount customer Average debtors $= \frac{\text{sales}}{12} \times \text{credit period}$	$\frac{50,00,000}{12} \times 2 = 8,33,333.33$	50% of 30,00,000 = 25,00000 $\frac{50,00,000}{12} \times 1 = 4,16,666.67$
Less: expenditure due to credit sale (B) Opportunity cost @ 25%	2,08,3333.33	1,04,166.67
Cash discount		2% OF 25,00,000=50,000
Total cost	2,08,333.333	1,54,166,67

**Q.20. (CS Final Dec. 2010 & 2012):** Dec 2010 (b) Gel Corporation presently gives credit terms of 'net 30 days'. It has 60 lakh in credit sales and its average collection period is 45 days. To stimulate sales, the company may give credit terms of 'net 60 days' with sales expected to increase by 15%. After the change, the average collection period is expected to be 75 days with no difference in payment habits between old and new customers. Variable costs are Re. 0.80 for every Re. 1 of sales; and the company's before tax required rate of return on investment in receivables is 20%. Assume 360 days in a year. Should the company extend its credit period? **(8 marks)**

**Answer :**

**Evaluation credit policy**

Credit policy Credit period	Existing 45 days	Proposed policy 75 days
Sales revenue	60,00,000	60,00,000(1+0.15 ) 69,00,000
Less : variable cost	48,00,000	55,20,000
Operating profit A	12,00,000	13,80,000
Average debtor $\frac{V.C. + F.C.}{360} \times \text{credit period}$	$\frac{48,00,000 + 0}{360} \times 45 = 6,00,000$	$\frac{55,20,000 + 0}{360} \times 75 = 11,15,000$
Less: exp <sup>n</sup> due to credit sales (B) Opportunity cost @ 20% on debtor	1,20,000	2,23,000
Net profit	10,80,000	11,57,000
Increase profit		77,000

**Q.21.** Reliance Garments Ltd. manufactures readymade garments and sells them on credit basis through a network of dealers. It present sale is `60 lakhs per annum with 20 days credit period. The company is contemplating an increase in the credit period with a view to increasing sales. Present variable costs are 70% of sales and the total fixed costs `8 lakhs per annum. The company expected pre – tax return on investment @ 25%. Some other details are given as under:

Proposed Credit	Average Collection	Expected Annual	
Policy	Period (days)	Sales ('in lakhs)	
I	30	65	
II	40	70	
III	50	74	
IV	60	75	

Required: which credit policy should the company adopt? Present your answer in a tabular form. Assume 360 – day a year. Calculations should be made up to two digits after decimal.

**Ans.: Statement Showing Evaluation of Various Credit Policies under Consideration**

Particulars	Policy I	Policy II	Policy III	Policy IV
<b>Incremental gains:</b>				
Contribution (See Working Note 1)	1,50,000	3,00,000	4,20,000	4,50,000

(A)	1,50,000	3,00,000	4,20,000	4,50,000
<b>Incremental costs:</b>				
Opportunity cost of Investment in debtor (See working note 2)	42,014	88,889	1,38,194	1,82,639
(B)	42,014	88,889	1,38,194	1,82,639
<b>Net incremental gains (A) – (B)</b>	1,07,986	2,11,111	2,81,806	2,67,361

### Working Notes: (i) Computation of Incremental Contribution

Particulars	Existing	Policy I	Policy II	Policy III	Policy IV
Sales (in lakhs)	60	65	70	74	75
(-) Variable contribution of sales (70%)	(42)	(45.5)	(49)	(51.8)	(52.5)
Contribution	18	19.5	21	22.2	22.5
Incremental Contribution		1.5	3	4.2	4.5

**(ii) Computation of Incremental Opportunity cost of Investment in Debtors**

Particulars	Existing	Policy I	Policy II	Policy III	Policy IV
Total cost of sales (Variable Cost + Total Fixed Cost)	50,00,000	53,50,000	57,00,000	59,80,000	60,50,000
Average collection Period (Days)	20	30	40	50	60
Average investment in Debtors	2,77,778	4,45,834	6,33,333	8,30,556	10,08,334
Incremental investment in Debtors		1,68,156	3,55,555	5,52,778	7,30,556
Opportunity cost of incremental investment in Debtors		42,014	88,889	1,38,194	1,82,639

**Q.22.** ABC firm is considering to make certain relaxation in its credit policy. The ABC management has evaluated two new policies. From the following details advise the ABC management which policy has to be adopted?

- |       |  |             |                        |
|-------|--|-------------|------------------------|
| (i)   | Annual credit sales at present                           |             | ₹87.5 lakhs            |
| (ii)  | Proposed credit sales:                                   |             |                        |
|       | Under alternative – I                                    |             | Under alternative – II |
|       | ₹105 lakhs   |             | ₹118 lakhs             |
| (iii) | Accounts receivable turnover ratio and bad debts losses: |             |                        |
|       | <b>Existing</b>  | <b>I</b>    | <b>II</b>              |
|       | 7 times  | 5.25 times  | 4.2 times              |
|       | ₹ 2.63 lakhs   | ₹5.25 lakhs | ₹7.88 lakhs            |

(iv) The ABC is required to give a return over 30% on the investment in new accounts receivable.

(v) Its PV ratio is 30%

**Ans. Statement showing evaluation of Credit Policies**

	Proposal I	Proposal II
<b>Incremental Gains</b>		
Contribution on new sales (17,50,000/30,50,000)×30%	5,25,000	9,15,000
(A)	5,25,000	9,15,000
<b>Incremental Costs</b>		
Bad Debts	2,62,000	5,25,000
Opportunity Cost of Investment in Debtors (see W.N. 1)	1,57,500	3,27,500
	4,19,500	8,52,500
(B)	1,05,500	62,500

Net Incremental gain (A – B)		
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**Advise:** Accept Proposal I

W.N. 1	Existing	I	II
Sales	87,50,000	1,05,00,000	1,18,00,000
Cost of credit sales (70%)	61,25,000	73,50,000	82,60,000
DTR	7	5.25	4.2
Average Investment in Debtors	8,75,000	14,00,000	19,66,667
Opportunity Cost of Investment in Debtors (30%)	2,62,500	4,20,000	5,90,000
Inc. opportunity cost		1,57,500	3,27,500

**Alternative solution:**

Credit policy	Existing	Proposed:-1	Proposed:-1
Sales revenue	87,50,000	1,05,00,000	1,18,00,000
Less: variable cost	61,25,000	73,50,000	82,60,000
Contribution	26,25,000	31,50,000	35,40,000
Incremental contribution (A)		5,25,000	9,15,000
average debtor = $\frac{\text{variable cost}}{\text{debtor turn over ratio}}$	$= \frac{61,25,000}{7}$ 8,75,000	$\frac{73,50,000}{5.25}$ 14,00,000	$\frac{82,60,000}{4.2}$ 19,66,666.67
Less: Exp <sup>n</sup> due to credit sale			
Opportunity cost on ave. debtor	2,62,500	4,20,000	5,90,000
Bad debt	2,63,000	5,25,000	7,88,000
Incremental opportunity cost		1,57,500	3,27,500
Incremental bad debt		2,62,000	5,25,000
Net incremental profit		1,05,500	62,500

**Q.23.** A Group of customers want to enter into a contract with you to buy goods worth `20 lakhs during 2007 the deliveries to be made in four equal instalments quarterly. The price of the commodity is `20 per unit on which you expect a profit of `10. The acceptance of this proposal would mean an additional recurring expenditure of `10000 p.a. on your part.

The ageing schedule of accounts receivables in respect of this group of customers in the past was as follows:

Period	Percentage of bills for which payment received
At the end of 30 days	15%
At the end of 60 days	25%
At the end of 90 days	40%
At the end of 100 days	20%

Assuming on opportunity cost of 20% of the funds locked up in accounts receivables, will it be desirable to accept this proposal?

**Ans.** ACP = (30 days × 15%) + (60 days × 25%) + (90 days × 40%) + (100 days × 20%)  
= 75.5 days

Incremental sales 20,00,000



(-) Cost $\left[ 2000000 \times \frac{10}{20} \right]$	<u>(10,00,000)</u>
Profit	10,00,000
(-) Recurring Expenses	(10,000)
(-) Opportunity cost of investment in Debtors $\left[ 10,00,000 \times \frac{75.5}{360} \times 20\% \right]$	<u>(41,944)</u>
Net profit	9,48,056
Yes, the proposal should be accepted.	

1. **Economic Order Quantity (EOQ).** (Recording Quantity). It is not a stock level. It is a quantity to be ordered when the stock reaches the minimum level. Reorder quantity is such that when it is added to the minimum stock, it should not exceed the maximum level. It is the quantity of inventory which can be reasonably ordered at a time and purchased economically. It is also known as standard order quantity, optimum quantity or economic lot size. It means that the total cost is at minimum. The problem is, how much to buy at a time. In case, large quantities are to be purchased the cost of carrying the inventory is high. This includes interest on investment obsolescence, overstocking losses, space costs etc. On the other hand, for frequent purchases, in small quantities, the cost is high – short of materials, loss of sales, increased in buying expenses such as stationary, postage etc. therefore, the quantity to be ordered depends upon two factors, i.e. the acquisition cost and cost of possessing materials. When order for material is placed, it must facilitate more trade discount, economy in transport etc. and at the same time it should not incur heavy charges on account of storage, insurance etc.

$$\text{Formula EOQ} = \sqrt{\frac{2AB}{CS}}$$

EOQ	=	Economic Order quantity
A	=	Annual consumption
B	=	Buying cost per order
C	=	Cost per unit
S	=	Storage and carrying cost.

### **Average Stock**

The level indicates the average stock held by the firm. It is calculate by the following formula:

$$\text{Average Stock Level} = \text{Maximum Level} + \text{Minimum Level} \times \frac{1}{2}$$

A more refined method of measuring average stock level is given below:

$$\text{Average Stock Level} = \text{Minimum Stock Level} + \frac{1}{2} \text{Reorder quantity}$$

- Q. 1.** From the following particulars, calculate the Economic Order Quantity.

Annual consumption of material	-	1,20,000 units
Cost of placing one order	-	Rs.80
Cost per unit	-	Rs.1.50
Cost of Carrying Inventory	-	20% per annum.

- Q. 2.** A company manufactures a product having monthly demand of 2000 units. For one unit of the finished product, 2 kgs of a particular raw material is needed. The purchase price of the material is Rs.20 per kg. The ordering cost is Rs.120 per order and holding cost is 10% per annum. Calculate

- Economic Order Quantity (EOQ)
- Ordering and Holding Cost.

- Q. 3.** JP Ltd. manufacturer of a special product, follows the policy of EOQ for one of its components. The components details are as follows:

	<b>Rs.</b>
Purchase Price per Components	200
Cost of an Order	100
Annual Cost of Carrying One unit in Inventory	10% of Purchase Price

Total Cost of storage and Ordering per Annum 4,000

The company has been offered a discount of 2% on the price of the component provided the lot size is 2,000 components at a time.

You are required to:

- Compute the EOQ
- Advise whether the quantity discount can be accepted. (Assume that the inventory carrying cost does not vary according to discount policy.)
- Would your advice differ if the company is offered 5% discount of a single order?

**Q. 4.** Pumpkin Pump Co. uses amount 75,000 valves per year and the usage is fairly constant at 6,250 valves per month, the valves cost Rs.1.50 per unit when bought in quantities and the carrying cost is estimated to be 20% of average inventory investment on the annual basis. The cost to place an order and process the delivery is Rs.18. It takes 45 days to receive delivery from the date of an order and a safety stock of 3,200 valves is desired.

You are required to:

- the most economical order quantity and frequency of orders.
- The order point.

**Q. 5.** A company manufactures a product which is purchased at Rs.60 per kg. The company incurs handling cost of Rs.360 plus freight of Rs.390 per order. The carrying cost of inventory of raw material is Re.0.50 per kg per month. In addition, the cost of working capital finance on investment in inventory of raw material is Rs.9 per kg per annum. The annual production is 1,00,000 units and 2.5 units are obtained from 1kg of raw material.

You are required to:

- Calculate EOQ of raw material.
- How frequently the orders should be placed.
- If the company proposes to rationalize placement of order on quarterly basis, what percentage of discount in the price of raw material should be negotiated.

**Q. 6.** EXE Ltd. has received an offer of quantity discounts on its order of materials as under

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

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

What will be your answer to the above question if there are no discounts offered and the price per tonne is Rs.1,500?

**Q. 7.** The quarterly production of a company's product is 20,000 units. Each unit of product requires 0.5 kg of raw material. The cost of placing one order is Rs.100 and inventory carrying cost of 1 kg. is Rs.2 per annum. The lead time for procurement of order is 36 days and safety stock of 1,000 kgs. of raw material is maintained by the company. The company has been able to negotiate following discount structure with the raw material supplier:

Order	Quantity (kgs.)	Total Discount (Rs.)
Upto 6,000		NIL
6,000 –	8,000	400
8,000 –	16,000	2,000
16,000 –	30,000	3,200
30,000 –	45,000	4,000

**You are required to:**

- (i) Calculate the reorder point taking 30 days in a month.
- (ii) Prepare a statement showing total cost of procurement and storage of raw material after considering the discount if the company elects to place one, two, four or six orders in a year.
- (iii) State the number of orders which the company should place to minimize the cost after taking EOQ into consideration.

**Q. 8. [2007 June]** Blue Berry Ltd. estimates its carrying cost at 12% and its ordering cost at Rs. 12 per order. The estimated annual requirement is 40,000 units at a price of Rs. 5 per unit. What is the most economical number of units to order and how often will an order need to be placed?

**Ans.**  $EOQ = \sqrt{\frac{2 \times 40,000 \times 12}{0.6}} = 1265 \text{ units}$        $\text{Time} = \frac{1265}{109.589} = 11.54 \text{ days}$

**Q. 9. [2010 June]** Ratan Enterprises requires 1,80,000 units of a certain item annually. The cost per unit and the cost per purchase order are Rs. 6 and Rs. 600 respectively. The inventory carrying cost is Rs. 6 per unit per year

- (i) What is the economic order quantity?
- (ii) What should the firm do if the supplier offers discount as below

Order quantity	Discount (%)
9000-11999	2
12,000 and above	3

**Q.10. [CS Final June 2008]** Elite Ltd. manufactures a product from a raw material, which is purchased at Rs.100 per kg. The company incurs a handling cost of Rs.300 plus freight of Rs.325 per order. The incremental carrying cost of inventory of raw material is Re.0.50 per kg. per month. In addition, the annual cost of working capital finance on the investment in inventory of raw material is Rs.4 per kg. The annual production of the product is 1,00,000 units and 2 units are obtained from one kg. of raw material.

Required –

- (i) Calculate the economic order quantity (EOQ) of raw materials.
- (ii) Advise how frequently the orders for procurement of raw materials should be placed.

If the company proposes to rationalize placement of orders for procurement of raw materials on quarterly basis, what percentage of discount in the price of raw materials should be negotiated?

**Q.11. [2009 –Dec]** Vaibhav Ltd. is engaged in manufacturing of machine used in construction. It is considering the possibility of purchasing from a supplier a component it now makes. A supplier has agreed to supply the component in the required quantities at a unit price of Rs. 18. Transportation and insurance charges are Re. 1 per unit. Presently the company produces the component from a single raw material in economic lots of 3,000 units at a cost of Rs. 4 per unit. The average annual demand is Rs. 40,000 units. The annual holding cost for company is Re. 0.50 per unit and it has set a minimum stock level of 800 units. The direct labour costs of the component are Rs. 12 per unit. The company also hires a machine at a rate of Rs. 400 per month on which the component are produced. Suggest whether the company should procure the component.

**Ans.** Ordering cost = Rs. 56.25. Average stock level = 2,300 units

Cost of manufacturing component = Rs. 6,46,681.25

Purchase cost of component = Rs. 7,20,000

Add: Transportation and insurance Charges = 40,000

Since the cost of manufacturing component is less than the purchase of component, the company should manufacture the component.

- Q.12. [Dec. 2011]** Prakash Motors Pvt. Ltd. purchases 9,000 spare parts for its annual requirements ordering one month usage at a time. Each spare part costs 20. The ordering cost per order is 15 and the carrying charges are 15% of unit cost. You have been asked to suggest the most economical purchasing policy for the company. What advice would you offer and how much would it save for the company per year?
- Q.13. [June 2012]** Priyanka Ltd. requires 2,000 units of an item annually. The cost of the item per unit is 20 and ordering cost is 50 per order. If the carrying cost is 25% of the cost of item, find the optimum lot size.  
If the company purchases in lots of 1,000 or more units of the item, it gets a rebate of 3%. Should the company accept the offer?

### Cash budget

**Cash Budget.** This budget represents the amount of cash receipts and payments, and a balance during the budgeted period. It is prepared after monthly or weekly giving the following hints

- (1) It ensures sufficient cash for business requirements.
  - (2) It proposes arrangements to be made overdraft to meet any shortage of cash.
  - (3) It reveals the surplus amount, and the effect of the seasonal fluctuations on cash position.
- The objective of cash budget is the proper co-ordination of total working capital, sale, investment and credit.

- Q.14.** From the following forecasts of income and expenditure prepare a cash budget for the three months commencing 1<sup>st</sup> June, when the bank balance was Rs.1,00,000.

	Sales	Purchases	Wages	Factory Expenses	Admin. & Selling Expenses
	Rs.	Rs.	Rs.	Rs.	Rs.
April	80,000	41,000	5,600	3,900	10,000
May	76,500	40,500	5,400	4,200	14,000
June	78,500	38,000	5,400	5,100	15,000
July	90,000	37,000	4,800	5,100	17,000
August	95,000	35,000	4,700	6,000	13,000

A sales commission of 5 per cent on sales, due two months after sales, is payable in addition to selling expenses. Plant value at Rs.65,000 will be purchased and paid in August, and the dividend for the last financial year of Rs.15,000 will be paid in July. There is a two month credit period allowed to customers and received from suppliers.

A company expects to have Rs.37,500 cash in hand on 1<sup>st</sup> April, and requires you to prepare an estimate of cash position during the three months, April, May and June. The following information is supplied to you:

	Sales	Purchases	Wages	Factory Expenses	Office Expenses	Selling Expenses
		Rs.	Rs.	Rs.	Rs.	Rs.
Feb	75,000	45,000	9,000	7,500	6,000	4,500
March	84,000	48,000	9,750	8,250	6,000	4,500
April	90,000	52,500	10,500	9,000	6,000	5,250
May	1,20,000	60,000	13,500	11,250	6,000	6,570
June	1,35,000	60,000	14,250	14,000	7,000	7,000

Other Information:

- (1) Period of credit allowed by suppliers 2 months.
- (2) 20% of sales is for cash and period of credit allowed to customers for credit is one month.
- (3) Delay in payment of all expenses – 1 month.
- (4) Income tax of Rs.57,500 is due to be paid on June 15<sup>th</sup>.
- (5) The company is to pay dividends to shareholders and bonus to workers of Rs.15,000 and Rs.22,000 respectively in the month of April.
- (6) Plant has been ordered to be received and paid in May. It will cost Rs.1,20,000.

**Q.15. [CS Final June 2008]** Based on the following information prepare a cash budget for ABC Ltd.

	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
Opening cash balance	Rs.10,000			
Collection from customers	1,25,000	Rs.1,50,000	Rs.1,60,000	Rs.2,21,000
Payment:				
Purchase of materials	20,000	35,000	35,000	54,200
Other expenses	25,000	20,000	20,000	17,000
Salary and wages	90,000	95,000	95,000	1,09,200
Income tax	5,000	—	—	—
Purchase of machinery	—	—	—	20,000

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

**Ans.** Cash budget

Particulars	1 <sup>st</sup> quarter	2 <sup>nd</sup> quarter	3 <sup>rd</sup> quarter	4 <sup>th</sup> quarter
Opening cash balance	10,000	15,000	15,000	15,325
Receipts:				
Collection from Customers	1,25,000	1,50,000	1,60,000	2,21,000
(A)	1,35,000	1,65,000	1,75,000	2,36,325
Payments:				
Purchase of materials	20,000	35,000	35,000	54,200
Other expenses:	25,000	20,000	20,000	17,000
Salary and wages	90,000	95,000	95,000	1,09,200
Income Tax	5,000	.....	.....	.....
Purchase of machinery	-----	.....	.....	20,000
(B)	1,40,000	1,50,000	1,50,000	2,00,400
(A) – (B)	(5,000)	15,000	25,000	35,925
Add: Loan taken	20,000	.....	.....	.....
*Less: Loan Repaid	.....	.....	(9,000)	(11,000)
*Payment of interest	.....	.....	(675)	(1,100)
Closing balance	15,000	15,000	15,325	23,825

\*9,000 X 10% X 9/12 = 675

11,000 X 10% = 1,100.

**Q.16.** Prepare a Cash Budget for the three months ending 30<sup>th</sup> June from the following information:

(a)

Month	Sales	Materials	Wages	Overheads
	Rs.	Rs.	Rs.	Rs.
February	14,000	9,600	3,000	1,700
March	15,000	9,000	3,000	1,900
April	16,000	9,200	3,200	2,000
May	17,000	10,000	3,600	2,200
June	18,000	10,400	4,000	2,300

(b) Credit terms are:

Sales/Debtors – 10% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month.

(c) Creditors : Materials, 2 months

Wages, ¼ month

Overheads, ½ month

(d) Cash and Bank Balance on 1<sup>st</sup> April is expected to be Rs.6,000.

(e) Other relevant information's are:

- (1) Plant and Machinery will be installed in February at a cost of Rs.96,000. The monthly instalments of Rs.2,000 are payable from April onwards.
- (2) Dividend @ 5% on Preference share capital of Rs.2,00,000 will be paid on 1<sup>st</sup> June.
- (3) Advance to be received for sale of vehicles Rs.9,000 in June.
- (4) Dividends from investments amounting to Rs.1,000 are expected to be received in June.
- (5) Income-tax (advance) to be paid in June is Rs.2,000.

**Q. 1. What are the basic features of capital budgeting decisions?**

**Ans.** The basic features of capital budgeting decisions are:-

- 1) Current funds are exchanged for future benefits;
- 2) There is an investment in long-term activities; and
- 3) The future benefits will occur to the firm over series of years.

**Q. 2. Briefly discuss the factors which give rise to the need for capital investments.**

**Ans.** The following factors give rise to the need:-

- 1) Wear and tear of old equipments.
- 2) Obsolescence.
- 3) Variation in product demand necessitating change in volume of production.
- 4) Product improvement requiring capital additions.
- 5) Learning-curve effect.
- 6) Expansion.
- 7) Change of plant site.
- 8) Diversification.
- 9) Productivity improvement.

**Q. 3. Discuss the importance of Capital Budgeting.**

**Ans.**

- 1) Long-term Implications

A capital budgeting decision has its effect over a long time span and inevitably affects the company's future cost structure and growth.

- 2) Involvement of large amount of funds

Capital budgeting decisions need substantial amount of capital outlay.

- 3) Irreversible decisions

Capital budgeting decisions in most of the cases are irreversible because it is difficult to find a market for such assets.

- 4) Risk and uncertainty

Capital budgeting decision is surrounded by great number of uncertainties.

- 5) Difficult to make

Capital budgeting decision making is a difficult and complicated exercise for the management.

**Q. 4. What are the factors influencing investment decision.**

**Ans.**

- 1) Management Outlook.
- 2) Competitor's Strategy.
- 3) Opportunities created by technological change.
- 4) Market forecast.
- 5) Fiscal Forecast.
- 6) Cash flow Budget.
- 7) Non-economic factors.

**Q. 5. Write a short note on 'Capital Budgeting Process'.**

**Ans.**

- 1) Identification of Potential Opportunities.
- 2) Establishing the Criteria.
- 3) Screening and co-ordination.
- 4) Evaluating Investment Proposals.
- 5) Budgeting Capital Expenditure.
- 6) Controlling Projects in Process.
- 7) Follow-up and Performance Report.



**Q. 6. Write a short note on 'Investment Criteria'.**

**Ans.** Sound investment criteria should at least provide the following:-

- 1) A means of distinguishing between acceptable and non-acceptable projects;
- 2) Ranking of projects in order of their desirability;
- 3) Choice among several alternatives;
- 4) A criteria which is applicable to any conceivable investment project independent of others;
- 5) Recognizing the fact that the bigger benefits are preferable to smaller one and early benefits are preferable to later benefits;
- 6) Helping to choose among mutually exclusive projects, one which maximizes the shareholders wealth.

**Q. 7. [CS Dec 2000; June 2007; June 2010] Write a short note on 'Capital Rationing' OR Explain how investment decisions are taken in a capital rationing situation.**

**Ans.**

- There may be situations where a firm has a number of projects that yield a positive NPV.
- However, the most important resource in investment decisions, i.e. funds, are not fully available to undertake all the projects. This is considered as a Resource Constraint situation.
- In case of restricted availability of funds, the objective of the firm is to maximize the wealth of shareholders with the available funds. Such investment planning is called Capital Rationing.

There are two possible situations of capital Rationing.

- Generally firms fix up the maximum amount that can be invested in capital projects, during a given period of time, say a year. This budget ceiling imposed internally is called as **Soft Capital Rationing**.
- There may be a market constraint on the amount of funds available for investment during a period. This inability to obtain funds from the market, due to external factors is called **Hard Capital Rationing**.

- Whenever Capital rationing situation arises, the firm should allocate the limited funds available in such a way that maximizes the NPV of the firm.

**Q. 8. "The cash flow approach of measuring future benefits of a project is superior to the accounting approach". Discuss. [CS June 2006]**

**Ans.** The cash flow approach of measuring future benefits of a project is superior to the accounting approach due to following reasons:-

- Unlike accounting approach, cash flow based approach is not affected by discretionary accounting policies.
- It considers the time value of money.
- Cash position and not accounting profits reflects true potential for investment.
- Cash flow approach considers the basic objective of maximizing shareholders' wealth.

**Q. 9. Distinguish between 'Net present value' and 'profitability index'. [CS June 2008]**

**Ans.**

S No.	Net Present Value	Profitability Index
1	NPV is the difference between present value of future cash inflows and present value of future cash outflows.	Profitability index is the ratio of present value of future cash inflows over the present value of cash outflows.
2	NPV is absolute measurement technique.	P1 is a relative measurement technique.
3	The criteria for selection of a project in case of NPV is when NPV is greater than zero.	The criteria for selection of a project in case of Profitability Index is when P1 is greater than one.
4	It is computed as follows:- Present value of cash outflows <b>Minus</b> Present value of cash inflows	It is computed as follows:- Present value of cash inflows _____ Present value of cash outflows

**Q. 10. Write a short note on 'Payback Method'.**

**Ans.** This technique estimates the time required by the project outlay.

Advantages

- It is easy to calculate and investment proposals can be ranked quickly.
- For a firm experiencing shortage of cash, the payback technique may be used with advantage to select investments involving minimum time to recapture the original investment.
- This is ideal in deciding cash investment in a foreign country with volatile political position and a long-term projection of political stability is difficult.
- This is, likewise, more preferred in case of industries where technological obsolescence comes within short period; say electronic industries.

Disadvantages

- The payback method ignores the time value of money and treats all cash flows at par.
- The payback method does not consider cash flows and income that may be earned beyond the payout period.
- Moreover, it does not take into account the salvage or residual value, if any, of the long-term asset.
- The payback technique ignores the cost of capital as the cut-off factor affecting selection of investment proposals.

**Q.11. Write a short note on 'Net Present Value Method'**

**Ans.** Net Present Value is the difference between the sum total of present values of all the future cash inflows and outflows:-

Advantages

- Income over the entire life of the project is considered.
- The method takes into account time value of money.
- The method provides clear acceptance so interpretation is easy.
- When projects involve different amount of investment, the method may not provide satisfactory answers.

Disadvantages

- As compared with the first two methods, the present value approach is certainly more difficult to understand and apply.
- An additional difficulty in this approach is encountered when projects with unequal lives are to be evaluated.
- It is difficult to determine the firm cost of capital or appropriate rate of discount.

**Q.12. Write a short note on 'Internal Rate of Return (IRR)'.**

**Ans.** The internal rate of return refers to the rate which equates the present value of cash inflows and present value of cash outflows. In other words, it is the rate at which net present value of the investment is zero.

Advantages

- The discounted cash flow (IRR) takes into account the time value of money.
- It considers cash benefits, i.e. profitability of the project for the whole of its economic life.
- This method is considered to be a sophisticated and more reliable technique of evaluating capital investment proposals.
- The objective of maximizing of owner's welfare is met.

Disadvantages

- The discounted cash flow is the most difficult of all the methods of project evaluation discussed above.
- The rate may be negative or one or may be multiple rates as per calculations. When a project has a sequence of changes in sign of cash flow, there may be more than one internal rate of return.

**Q.13. Write a short note on 'Profitability Index (P1)'**

**Ans.** Profitability index is the ratio of present value of future cash inflows over the present value of cash outflows.

It is computed as follows:-

Present value of cash inflows

---

Present value of cash outflows

Advantages

- Profitability index method gives due consideration to the time value of money.
- Profitability Index method satisfies almost all the requirements of a sound investment criterion.
- This method can be successfully employed to rank projects of varying cash and benefits in order of their profitability.

Disadvantages

- This method is more difficult to understand and compute.
- This method does not take into account the size of investment.
- When cash outflows occur beyond the cement period Profitability Index Ratio criterion is unsuitable as a selection criterion.

**Q.14. [CS Dec 2005] Distinguish between 'Net Present Value' and 'Internal Rate of Return'**

**Ans.**

1) Interest Rate

Under the net present value method rate of interest is assumed as the known factor whereas it is unknown in case of internal rate of return method.

2) Reinvestment Axiom

Under both the methods, it is assumed that cash inflows can be re-invested at the discount rate in the new projects. However, reinvestment of funds, at cut-off rate is more possible than internal rate of return. So, Net Present Value method is more reliable than Internal Rate of Return method for ranking two or more projects.

3) Objective

The net present value method took to ascertain the amount which can be invested in a project so that its expected yields will exactly match to repay this amount with interest at the market rate. On the other hand, internal rate of return method attempts to find out the rate of interest which is maximum to repay the invested fund out of the cash inflows.

## Practical Question

**Q. 1.** Santosh & Co. is considering setting up a new unit. The following data has been compiled by the company for the purpose of determining the acceptability of the proposal for setting up the new unit.

## (i) Land

- |  |          |
|--|----------|
| (a) To be paid at the time of purchase (t = 0)   | `2 lakhs |
| (b) 1 <sup>st</sup> , 2 <sup>nd</sup> and 3 <sup>rd</sup> installment at the end of next 3 following years<br>each installment | `1 lakh  |

## (ii) Factory Buildings: (Total `20 lakhs)

- |  |           |
|--|-----------|
| (a) Initial payment on signing of contract | `2 lakhs  |
| (b) At the end of year 2                   | `10 lakhs |
| (c) Balance at the end of year 3           | `8 lakhs  |

## (iii) Plant, Machinery &amp; equipment:

To be paid at the beginning of

- |          |           |
|----------|-----------|
| - year 4 | `15 lakhs |
| - year 5 | `5 lakhs  |

## (iv) Extra Margin for working capital (at the end of year 5) `4 lakhs

- (v) Operations will begin in the 6<sup>th</sup> year and will continue for 10 years upto year 15. Assume revenue and costs at the end of each year.
- (vi) Buildings, plant machinery and equipment will be depreciated on straight line method over 10 years starting from year 6, as under:
- |                                |       |
|--------------------------------|-------|
| Building                       | @ 5%  |
| Plant, Machinery and equipment | @ 10% |
- (vii) Buildings are expected to be sold for `6 lakhs and land for `8 lakhs at the end.
- (viii) Plant, Machinery & equipment will have a salvage value of `2 lakhs.
- (ix) Cost of capital is 12%
- (x) Other operating data:
- Annual sales – `30 lakhs
- Variable sales of operation – `12 lakhs

Fixed costs (excluding depreciation) – `8 lakhs; and Tax rate – 50%.

Advise whether the company should accept the project or reject it on the basis of NPV of the project:

**P.V. Factors at 12% for Re.1**

Year 1 – 0.893	Year 6 – 0.507
Year 2 – 0.797	Year 7 – 0.452
Year 3 – 0.712	Year 8 – 0.404
Year 4 – 0.636	Year 9 – 0.361
Year 5 – 0.567	Year 10 – 0.322

Present value of annuity of Re.1 for 9 years at 12% = 5.328.

**Ans.** NPV -11.721

- Q. 2.** (a) A company is considering an investment proposal to install new milling controls at a cost of `50,000. The facility has a life expectancy of 5 years and no salvage value. The tax rate is 35 percent. Assume the firm uses the straight-line depreciation and the same is allowed for tax purposes. The estimated cash flows before depreciation and tax (CFBT) from the investment proposal are as follows:

Year	CFBT
1	`10,000
2	10,692
3	12,769
4	13,462
5	20,385

**Compute the following:**

- |  |                   |
|--|-------------------|
| (i) Pay Back Period                          | Ans. – 4.328 yer. |
| (ii) Average Rate of Return                  | Ans. – 9%         |
| (iii) Internal Rate of return                | Ans. - 6.6 %      |
| (iv) Net present value at 10% discount rate. | Ans. - (4648)     |
| (v) Profitability index at 10 percent.       | Ans. - 0.907      |

(b) A company is considering a proposal to install a machine. The cash flows are as follows:

Machine	Immediate Cash out flows (in lakhs of `)	Cash inflows (in lakhs of `) at the end of Year				
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>
Machine A	45	10	14	16	17	15

The Company's cost of capital is 10%. You are required to make these calculations.

- |                               |                  |
|-------------------------------|------------------|
| (1) Net Present Value         | Ans. - 8.596     |
| (2) Profitability Index       | Ans. – 1.191     |
| (3) Payback Period            | Ans. – 3.29 Yer. |
| (4) Discounted Payback Period | Ans. – 4.08 Yer. |
| (5) IRR                       | Ans. – 17.13%    |

**Note: Present Value of Re. 1 at 10% discount rate are as follows:**

Year	0	1	2	3	4	5
P.V.	1.00	0.909	0.826	0.751	0.683	0.621

**Q. 3.** Following are the data on a capital project being evaluated by the management of X Ltd.

**Project M**

Annual cost saving	₹40,000	
Useful Life	4 years	
I.R.R.	15%	
Profitability Index (P.I.)	1.064	
NPV	?	Ans. – 7304
Cost of Capital	?	Ans. – 12%
Cost of project	?	Ans. 114200
Payback	?	Ans. – 2.855
Salvage value	0	

Find the missing values considering the following table of discount factor only:

Discount Factor	15%	14%	13%	12%
1 year	0.869	0.877	0.885	0.893
2 year	0.756	0.769	0.783	0.797
3 year	0.658	0.675	0.693	0.712
4 year	0.572	0.592	0.613	0.636
	2.855	2.913	2.974	3.038

**Conflict of Rankings**

**Q. 4.** The Cash Flows of projects C and D are reproduced below:

**Cash Flow**

Project	C0	C1	C2	C3	NPV at 10%	IRR
C	₹10,000	+2000	+4000	+12,000	₹4139	6.5%
D	₹10,000	+10,000	+3000	+3000	+₹3823	37.6%

(i) Why there is a conflict of rankings ?

(ii) Why should you recommend project C in spite of lower internal rate of return ?

**Ans.**

- (i) Suppose the discount rate as 0, 10, 15, 30 and 40 percent. The NPV for each of the projects is given below:

NPV		
Discount rate (%)	C	D
0	8,000	6,000
10	4,134	,821
15	2,660	2,942
30	-634	831
40	-2164	238

It is noticed that for project C, the larger cash flows occur later in its life. At the lower discount rates, project's C NPV will be higher than of project D. As in discount rates start increasing, project C's NPV will, however, fall at a faster rate simply because its largest cash flows come late in life when the compounding effects of timings are most significant. Till the discount rate reaches 14% (approximately), project C has higher NPV than project D. After this break – even discount – rate, project D has higher NPV as well as higher IRR. Thus, the rankings of the projects have differed because of the difference in time – patterns of cash flows.

- (ii) If the opportunity cost of capital is 10%, project C should be undertaken because the firm will be richer by additional ₹313 (i.e. ₹4134 – ₹3821). This can be better appreciated if we calculate the profitability of the incremental investment (C – D).

**Cash Flows**

Project	C0	C1	C2	C3	NPV at 10%	IRR
C – D	0	-8000	+1000	+9000	+313	12%

The incremental project C – D involves on outlay of `8000 in year 1 and produces cash in flows `1000 and `9000 in year 2 and 3. At 10% opportunity cost of capital, the NPV is positive, `313. The IRR is 12%. What does this imply ? It implies that project C has all the benefits of project D as well as gives additional wealth.

- Q. 5.** A company is considering which of two mutually exclusive projects it should undertake. The Finance Director thinks that the project with the higher NPV should be chosen whereas the Managing Director thinks that the one with the higher IRR should be undertaken especially as both projects have the same initial outlay and length of life. The company anticipates a cost of capital of 10% and the net after tax cash flows of the projects are as follows:

Year	0	1	2	3	4	5
(cash flows figs 000)						
Project X	(200)	35	80	90	75	20
Project Y	(200)	218	10	10	4	3

Required: -

- Calculate the NPV and IRR of each project.
- State, with reasons, which project you would recommend.
- Explain the inconsistency in the ranking of the two projects.
- At what cost of capital decision will be changed.

The discount factors are as follows:

Year	0	1	2	3	4	5
(cash flows figs 000)						
Project X	1	0.91	0.83	0.75	0.68	0.62
Project Y	1	0.83	0.69	0.56	0.48	0.41

- Q. 6.** A project has the following cash flows:

(In lakhs)

Year 0	Year 1	Year 2	Year 3
- 100	52	40	50

Required:

- What is the IRR of the project ?
- Calculate the unrecovered investment balances using the IRR.
- If you were to calculate the unrecovered investment balances using a rate equal to 10% what is the final investment balance ?
- What is the NPV of the project if the cash flows are discounted at 10% ?
- What is the relationship, if any, between your answers to questions (c) and (d) ?

**Ans.** (A) 20%, (B) 0, (C) 23.82, (D) 17.858, (E)  $T.V = N.P.V (1+r)^n$

### REPLACEMENT DECISION

- Q. 7.** A machine is purchased six years back for `1,50,000 has been depreciated to a book value of `90, 000. It originally had a projected life of fifteen years and zero salvage value. A new machine will cost `2,50,000 and result in a reduced operating cost of `30,000 per year for the next nine years. The older machine could be sold for `50,000. The machine also will be depreciated on a straight line method on nine year life with salvage value of `25,000. The company's tax rate is 50% and cost of capital is 10%. Determine whether the old machine should be replaced.

Given – Present value of Re. 1 at 10% on 9<sup>th</sup> year – 0.424 and present value of an annuity of Re. 1 at 10% for 8 years = 5.335.

**Ans.** (39820)

**Q. 8.** P Ltd. has a machine having an additional life of 5 year, which costs ₹10,00,000 and has a book value of ₹4,00,000. A new machine costing ₹20,00,000 is available. Though its capacity is the same as that of the old machine, it will mean a saving in variable costs to the extent of ₹7,00,000 per annum. The life the machine will be 5 years at the end of which it will have a scrap value of ₹2,00,000. The rate of income tax is 46% and P Ltd. policy is not make an investment if the yield is less than 12% per annum. The old machine if sold today will realize ₹1,00,000 it will have no salvage value if sold at the end of 5<sup>th</sup> year. Advise P Ltd., whether or not the old machine should be replaced. (Present value of Re.1 receivable annually for 5 years at 12% = 3.605, present value of Re.1 receivable at the end of 5 years at 12% per annum = 0.567). Capital gain is tax-free. Ignore Income tax savings on depreciation as well as on loss due to sale of existing machine.

**Ans.** (423910)

**Q. 9.** AP Udyog is considering a new automatic blender. The new blender would last for 10 years and would be depreciated to zero over the 10 year period. The old blender would also last for 10 more years and would be depreciated to zero over the same 10 year period. The old blender has a book value of ₹20,000 but could be sold for ₹30,000 (the original cost was ₹40,000). The new blender would cost ₹1,00,000. It would reduce labour expense by ₹12,000 a year. The company is subject to a 50% tax rate on regular income and a 30% tax rate on capital gains. Their cost of capital is 8%. There is no investment tax credit in effect.

**You are required to:**

- (i) Identify all the relevant cash flows for this replacement decision.
- (ii) Compute the present value, net present value and profitability index.
- (iii) Find out whether this is an attractive project.

Given: The present value of annuity @8% for rupee one for 10 years = 6.710.

**Ans.** 73,000, 10,000, 0.919 No.

**Q.10.** Anuj Enterprises Ltd. is a manufacturer of high quality running shoes. Ms. Dazling, President is considering computerizing the companies ordering, inventory and billing procedures. She estimates that the annual savings from computerization include a reduction of ten clerical employees with annual salaries of ₹15,000 each, ₹8,000 from reduced production delays caused by raw materials inventory problems, ₹12,000 from lost sales due to inventory stock outs and ₹3,000 associated with timely billing procedures. The purchase price of the system is ₹2,00,000 and installation cost are ₹50,000. These outlays will be capitalized (depreciated) on a straight line basis to a zero book salvage value which is also its market value at the end of five years. Operation of the new system requires two computer specialists with annual salaries of ₹40,000 per person. Also annual maintenance and operating (cash) expenses of ₹12,000 are estimated to be required. The companies tax rate is 40% and its required rate of return (cost of capital) for this project is 12%.

**You are required to:**

- (a) find the projects initial net cash outlay.
- (b) find out the projects operating and terminal value cash flows over its five years life.
- (c) Evaluate the project using the NPV method.
- (d) Evaluate the project using PI method.
- (e) Calculate the projects payback method.
- (f) Find the project cash flows and NPV [parts (a) through (c)] assuming that the system can be sold for ₹25,000 at the end of five years even though the book salvage value will be zero.

- (g) Find the project cash flow and NPV [parts (a) through (c)] assuming that the book salvage value for depreciation purpose is ₹20,000 even though the machine is worthless in terms of resale value.

**Ans.** (A) 2,50,000 (B) 68600 (C) (2697) (E) 3.64 Yr. (F) NPV 5808 (G) (3929)

- Q.11.** Manu Bahi & Co. is considering purchase of a machine that will enable production to increase by 25% from 80,000 units to 1,00,000. The machine costs ₹2 lakhs and has a useful life of 10 years with a salvage value of 5%. The company is eligible for investment allowance of 25%. There will be increased requirement of working capital to the extent of ₹40,000.

**The following additional information is also furnished to you:**

Variable Cost [Per Unit]: ₹5

Fixed Cost [Per Annum]: ₹2,00,000

The variable cost will remain the same but the fixed cost will increase by the amount of depreciation on the new machine. The current selling price is ₹10 per unit which may have to be brought down by 50 paise in order to sell the entire production of 1,00,000 units. The company adopt a straight line method of depreciation, Tax rate is 50% and the minimum required rate of return is 15%. P.V. factors at 15%.

(a) Present value of an annuity of Re. 1 at the end of 9 years = 4.772.

(b) Present value of Re.1 receivable at the end of 10 years is .247.

Discuss whether it would be advisable for the company to purchase the machine.

**Ans.** NPV 29,495

- Q.12.** An existing company has a machine, which has been operation for 2 year; its remaining estimated useful life is 10 years, with no salvage value at the end. Its current market value is ₹1,00,000. The management is considering a proposal to purchase an improved model of a similar machine, which gives increased output. The relevant particulars are as follows:

Particulars	Existing Machine	New Machine
Purchase price	₹2,40,000	₹400,000
Estimated Life	12 years	10 years
Salvage value	Nil	Nil
Annual operating hours	2,000	2,000
Selling price per unit	₹10	₹10
Output per hour	15 units	30 units
Materials cost per unit	₹2	₹2
Labour cost per hour	₹20	₹40
Consumable stores per year	₹2,000	₹5,000
Repairs and maintenance per year	₹9,000	₹6,000
Working Capital	₹25,000	₹40,000

The company follows the straight line method of depreciation and is subject to 50% tax. Should the existing machine be replaced? Assume that the company's required rate of return is 15%.

**Note:**

(i) Present Value of annuity of Re. 1 at 15% rate of discount for 10 years is 5.019.

(ii) Present Value of Re. 1 at 15% rate of discount, received at the end of 10<sup>th</sup> year is 0.247.

**Ans.** NPV 290795

- Q.13.** A chemical company is presently an outside firm Re. 1 per gallon to dispose off the waste material resulting from its manufacturing operations. At normal operating capacity, the waste is about 50,000 gallons per year.

After spending ₹60,000 on research, the company discovered that the waste could be sold for ₹10 per gallon if it was processed further. Additional processing would, however, require an investment of ₹6,00,000 in new equipment, which would have an estimated life of 10 years with no salvage value. Depreciation would be calculated by straight line method.



Except for the costs incurred in advertising `20, 000 per year, no change in the present selling and administrative expenses is expected, if the new product is sold. The details of additional processing costs are as follows:

**Variable:** `5 per gallon of waste put into process.

**Fixed:** excluding depreciation): `30, 000 per year.

In costing the new product, general administrative overheads will be allocated at the rate of `2 per gallon.

There will be no losses in processing, and it is assumed that the total waste processed in a given year will be sold in that very year. Estimates indicate that 40,000 gallons of the product could be sold each year.

The management when confronted with the choice of disposing off the waste of processing it further and selling it, seeks your advice. Which alternative would you recommend? Assume that the firm's cost of capital is 15% and it pays on an average 35% tax on its income.

**Note:** Present value of annuity of Re. 1 at 15% rate of discount for 10 years is 5.019.

**Ans.** PV Dispose up off = 1,63,118, Processing = 37,872

### **EXPANSION & DIVERSIFICATION**

**Q.14.** Sagar Industries is planning to introduce a new product with a projected life of 8 years. The project to be set up in backward region, qualifies region, qualifies for a one – time (as its starting) tax-free subsidy from the government of `20 lakhs. Initial equipment cost will be `140 lakhs and additional and additional equipment costing `10 lakhs will be needed at the beginning of the third year. At the end of 8 years, the original equipment will have no resale value, but the supplementary equipment can be sold for `1 lakh. A working capital of `15 lakhs will be needed. The sales volume over the eight year period have been forecast as follows:

Year	Units
1.	80,000
2.	1,20,000
3 – 5	3,00,000
6 – 8	2,00,000

A sale price of `100 per unit is expected and variable expenses will amount 40% of sales revenue. Fixed cash operating costs will amount to `16 lakhs per year. In addition an extensive advertising campaign will be implemented, requiring annual outlays as follows:

Year	`(in lakhs)
1	30
2	15
3-5	10
6-8	4

The company is subject to 50% tax rate and considers 12% to be an appropriate after tax cost of capital for the project. The company follows the straight-line method of depreciation. Should the project be accepted? Assume that the company has enough Income from its existing products.

**Note:** Present value of `1 at 12% rate of discount is as follows:

Year	PV factor at 12%
1	0.893
2	0.797
3	0.712
4	0.636
5	0.567
6	0.507
7	0.452
8	0.404

**Ans.** Out flow = 142.97, In Flow = 286

**Q.15.** A product is currently manufactured on a machine that is not fully depreciated for tax purposes and has a book value of ₹70,000. It was purchased for ₹2,10,000 twenty years ago. The costs of the product are as follows:

	Unit Cost ₹
Direct Labour	28.00
Indirect Labour	14.00
Other variable overhead	10.50
Fixed Overhead	17.50

In the past year 10,000 units were produced. It is expected that with suitable repairs the old machine can be used indefinitely in future, the repairs are expected to average ₹75,000 per year.

A equipment manufacturer has offered to accept the old machine as a trade in for new equipment. The new machine would cost ₹4,20,000 before allowing for ₹1,05,000 for the old equipment. The project costs associated with new machine are as follows:

	Unit cost (₹)
Direct Labour	14.00
Indirect Labour	21.00
Other variable overhead	7.00
Fixed overhead	<u>22.75</u>
	<u>64.75</u>

The fixed overhead cost are allocations from other departments price plus the depreciation of the equipment.

The old machine can be sold now for ₹50,000 in the open market. The new machine has expected life of 10 years and salvage value of ₹20,000 at that time. The current corporate income tax rate is assumed to be 50%. For tax purpose cost of the new machine and the book value of the old machine may be depreciated in 10 years. The minimum required rate is 10%. It is expected that the future demand of the product will stay at 10,000 units per year. This present value of an annuity of Re.1 for 9 years @ 10% discount factor is 5.759. The present value of Re.1 received at the end of 10<sup>th</sup> year @ 10% discount factor is = 0.386.

Should the new equipment be purchased? (Assume no capital gain taxes).

**Ans.** 347162.5

**Q.16.** Ashoka company is setting up a project at a cost of ₹150 lakhs. If the company locates the projects in a backward area it would get a cash subsidy of ₹7.5 lakhs and taxable profit to the extent of 10% exempt for ten years. These benefits will not be available if the company locates the project in a developed area. But in their case the project requires a borrowing of ₹100 lakhs. It would cost 12% in developed area and 10% in backward area. The borrowing have to repaid in 4 equal installments beginning from the end of the 4<sup>th</sup> year.

**Further Information:**

(i) the company adopts straight line depreciation with no residual value.

(ii)	Year: EBI and depreciation (in lakhs)	Developed	Backward
	1	(3)	(25)
	2	17	(10)
	3	27	5
	4	37	10
	5	54	22.5
	6	71	50
	7	78	77.5
	8	115	95
	9	165	115
	10	215	165

(iii) Cost of capital is 18%.

As a financial manager suggest to your board of directors the proper location of the project.

**Ans.** B NPV (24.262) D 43.684

**Q.17.** A product is currently manufactured on a plant that is not fully depreciated for tax purposes and has a book value of ₹60,000 (it was bought for ₹1,20,000 six years ago). The cost of product is as under: -

	Unit Cost
	,
Direct Costs	24.00
Indirect Labour	8.00
Other variable over heads	16.00
Fixed over heads	<u>16.00</u>
	<u>64.00</u>

10, 000 units are normally produced. It is expected that the old machine can be used, indefinitely into the future, after suitable repairs, estimated cost ₹40,000 annually, are carried out.

A manufacturer of machinery is offering a new machine with the latest technology at ₹3,00,000 after trading off the old plant for ₹30,000. The projected cost of the equality of the product will then be:

	Per Unit
	,
Director Costs	14.00
Indirect Labour	12.00
Other variable overheads	12.00
Fixed Overheads	<u>20.00</u>
	<u>58.00</u>

The fixed overheads are allocations from other departments plus the depreciation of plant and machinery.

The old machine can be sold for ₹40, 000 in the open market. The new machine is expected to last for 10 years at the end of which, its salvage value will be ₹20, 000. Rate of corporate taxation is 50%. For tax purposes, the cost of the new machine that of the old one may be depreciated in 10 years. The minimum rate of return expected is 10%.

It is also anticipated that in future the demand for the products will stay at 10, 000 units. advise whether the new machine can be purchased. Ignore capital gain taxes.

**Ans.** NPV 214683

**Q.18.** A product is currently being manufactured on a machine that has a book value of ₹30, 000. The machine was originally purchased for ₹60, 000 ten years ago. The per unit costs of the product are: Direct Labour ₹8.00; direct materials ₹10.00; variable overheads ₹5.00; fixed overheads ₹5.00; and total is ₹28.00. In the past year 6, 000 units were produced and sold for ₹50.00 per unit. It is expected that the old machine can be used indefinitely in the future.

An equipment manufacturer has offered to accept the old machine at Rs. 20, 000, a trade – in for a new version. The purchase price of the new machine is ₹1, 00, 000. The projected per unit costs associated with the new machine are: direct labour ₹4.00; direct materials ₹7.00; variable overheads ₹4.00; fixed overheads ₹7.00 and total is ₹22.00.

The management also expects that, if the new machine is purchased, the new working capital requirement of the company would be less by ₹10, 000. The fixed overheads costs are allocations from other departments plus the depreciation of the equipment. The new machine has an expected life of ten years with no salvage value; the straight line method of depreciation is employed by the company. It is also expected that the future demand of the product would remain at 6, 000 units per year. Should the new equipment be acquired ? Corporate tax is @50%.

Notes: (i) Present value of annuity of Re. 1.00 at 10% rate of discount for 9 years is 5.759. (ii) Present value of Re. 1.00 at 10% rate of discount, received at the end of 10<sup>th</sup> year is 0.386.

**Ans.** NPV 100127.5

**Q.19.** A company invests `3, 00, 000 in a project for manufacture of a new product. The life of the project is 4 years. The manufacturing cost of the first year is estimated at `1, 50, 000 which will increase by `15, 000 every year from the second year onwards. Sales will be normal in the fourth year. In the first three years, sales are expected to be 35%, 60% and 75% of the normal sales respectively. Selling price is to be fixed to earn a profit of 25% on selling price. The cost of capital is 15%. Discounting factors at 15% for years 1 to 4 respectively are 0.870, 0.756, 0.658 and 0.572.

You are required to determine the annual sales of each of the four years.

**Ans.** 574117

## **BUDGATORY CONTROL**

Modern business world is full of competition, uncertainty and exposed to different types of risks. This complexity of managerial problems has led to development of various managerial tools, techniques and procedures useful for the management in managing the business successfully. Budgeting is the most common, useful and widely used standard device of planning and control. The budgetary control has now become an essential tool of the management for controlling costs and maximizing profit. Costs can be reduced, wastage can be prevented and proper relationship between costs and incomes can be established only when the various factors of production are combined in profitable way. The resources of a business can be effectively utilized by efficient conduct of its operations. This requires careful working out of proper plans in advance, co-ordination and control of activities on the part of the management.

A proper planning and control are essential for an efficient management. A good number of tools and devices are available. Of all these, the most important device used is budget. Cost accounting aims not only at cost ascertainment, but also greatly at cost control and cost reduction. Thus, the management aims at the proper and maximum utilization of resources available. It is possible when there is a pre-planning. Modern management aims that all types of operations should be predetermined in advance, so that the cost can be controlled at every step. The more important point is that the actual programme is compared with the pre-planned programme and the variances are analyzed and investigated. All are familiar with the idea of budget, at every walk of life—state, firm, business etc.

### **Definition**

A budget is a detailed plan of operations for some specific future period. Many of us are familiar with the term 'Budget'. For instance, if we want to have a holiday trip to Kashmir, we are to estimate the cost of traveling, boarding, lodging etc. So as to have sufficient amount for the trip. On return from the trip, we may like to compare the actual amount spent with estimated or budgeted figures. Similarly, we can know the importance of budgets even from the household management. The word 'budget' is derived from a French term "Bougette" which denotes a leather pouch in which funds are appropriated for meeting anticipated expenses. The same meaning applies to the business management. A budget is a numerical statement expressing the plans, policies and goals of the enterprise for a definite period in the future. It is a plan laying down the targets to be achieved within a specific period. It is a final and approved share of a forecast. When forecasts are approved by the management as tentative plan for the future they become budget. The following are some of the important definitions:

1. "Budget is an estimate of future needs arranged according to an orderly basis, covering some or all of the activities of an enterprise for a definite period of time."  
---- George R. Terry
2. "A budget is a comprehensive and co-ordinated plan, expressed in financial terms, for the operations and resources of an enterprise for some specific period in the future."  
---- James
3. "A budget is a pre-determined statement of management policy during a given period which provides a standard for comparison with the results actually achieved."  
-- Brown and Howard
4. "A financial and/or quantitative statement, prepared prior to a defined period of time, of the policy to be pursued during that period for the purpose of a given objective."  
---- ICMA, England

A study of the above definitions reveals plan of what the enterprise endeavours of a budget:

1. Budget is a comprehensive plan of what the enterprise endeavours to achieve.
2. It is a statement in terms of money or quantity or both.
3. It is prepared for a definite future period.
4. It is prepared prior to the defined period.
5. It provides yardsticks and measures for the purpose of comparison.
6. It is prepared in advance and refers to the future course of action.
7. It indicates the business policy which has to be followed so as to achieve a given objective.

## Budgeting

A budget is essentially a statement of the intention of management. Budgeting refers to the management action of formulating budgets. Preparation of budgets involves study of business situations and understanding of management objectives as also the capacity of the enterprise. It includes the entire processing of making the budget plans. Preparation of budgets or budgeting is a planning function, and their application or implementation is a control function. When plans are embodied in a budget and the same is used as the basis for regulating operations, we have budgetary control. Budgetary control starts with budgeting and ends with control. Budgeting is defined as:

1. "The entire process of preparing the budgets is known as budgeting."  
----- Batty

2. "Budgeting may be said to be the act of building budgets."  
----- Rowland and Harry

## Fixed and Flexible Budgets

**Fixed Budget.** This is a budget which is designed to remain unchanged irrespective of the level of activity actually attained. This is prepared for definite production and capacity level. It is not adjusted according to activity level attained. The fixed budgets are not effective tools of cost control. These types of budgets have limited use.

A fixed budget has been defined by ICMA, England as "A budget which is designed to remain unchanged irrespective of the level of activity actually attained."

However, in practical life, conditions do not remain static. The main reason is that actual output is often different from the budgeted output. In such a case the budget cannot be used for the purpose of cost control. There may be internal or external factors which force the level of activity to change.

**Flexible Budget.** This is a dynamic budget. It is a budget, which is designed to change in accordance with the level of activity. Actual output may differ from the budgeted output; and as such, it is necessary to modify the budget on the basis of changed output. The budget is prepared in such a way as to present the budgeted cost for different levels of activity, it is more realistic and practical, because changes expected at different levels of activity are given due consideration. It is called variable budget or sliding scale budget. The expenses are divided into three categories – fixed, variable and semi variable. It is an important tool of cost control, as it facilitates comparison of actual results with the budgeted figures.

ICWA, UK defines flexible budget as, "a budget, which by recognizing the difference between fixed, semi-variable costs, is designed to change in relation to the level of activity." Ascertainment of costs at various levels of activity becomes possible. Price fixation, sending quotations and tenders and finding out profit at changed capacities are facilitated.

## Preparation of Flexible Budget

A budget prepared in a manner so as to give the budgeted cost for any level of activity is known as flexible budget. A flexible budget is the opposite of static budget. It is prepared for a range of activity instead of a single level. Fixed costs are related mostly to the period of time and are not concerned with the level of production or volume of sales. Variable costs vary directly and proportionately with the volume of activity. At zero level activity, the variable costs will not be in existence. The semi-variable costs occupy an "in – between"

position between the fixed and variable costs. A part of these costs is variable and the rest is fixed. They are fixed to a certain level of activity and then rise with increase in the level of activity but not in the same proportion as the activity increases. As a matter of fact budget for each department can be prepared on the lines of flexible budget by classifying the costs into 'fixed' and 'variable'. In order to appropriately fix up the costs for different volumes, the degree of variability for each item cost at various levels of output could be evolved on the basis of past experience. This requires a close study of the individual items of expenditure, their nature and variability.

1. Decided the range of activity to develop a flexible budget.
2. Determine the cost behaviour – fixed, variable and semi-variable to each element of cost.
3. Select the activity level (generally in terms of output)
4. Prepare the budget at each activity level.

**Q.1. DEFINE BUDGET AND BUDGETARY CONTROL. STATE THE ADVANTAGES OF BUDGETARY CONTROL IN AN ORGANIZATION.**

**ANS.:** BUDGET IS A WRITTEN PLAN COVERING PROJECTED ACTIVITIES OF A FIRM FOR A DEFINED PERIOD OF TIME, EXPRESSED IN QUANTITATIVE TERMS.

BUDGETARY CONTROL IS A SYSTEM WHICH USES BUDGET AS A MEANS OF PLANNING AND CONTROLLING.

ADVANTAGES OF BUDGETARY CONTROL :

1. THERE IS A PLANNED APPROACH TO EXPENDITURE AND FINANCING OF THE BUSINESS.
2. BUDGETARY CONTROL COMBINES THE IDEAS OF DIFFERENT LEVELS OF MANAGEMENT IN THE PREPARATION OF THE BUDGET.
3. A BUDGET PROVIDES AN INCENTIVE WHENEVER IT IS SET ON ATTAINABLE RESULTS.
4. IT DIRECTS CAPITAL EXPENDITURE IN THE MOST PROFITABLE CHANNELS.
5. THE BUDGET OF CASH RECEIPTS AND EXPENDITURE ENSURES SUFFICIENT WORKING CAPITAL AND OTHER RESOURCES FOR THE EFFICIENT OPERATION OF THE BUSINESS.
6. BUDGETING CO-ORDINATES THE ACTIVITIES OF THE VARIOUS DEPARTMENTS AND FUNCTIONS BY SETTING THEIR LIMITS AND GOALS.

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**Q.2. WHAT ARE LIMITATIONS OF BUDGETARY CONTROL ?**

**ANS.:** BUDGETARY IS NOT A FOOLPROOF TOOL. THOSE WHO CONSIDER USING BUDGETARY CONTROL MUST BE FULLY AWARE OF ITS LIMITATIONS. THE PRINCIPAL LIMITATIONS ARE AS FOLLOWS :

1. THE BUDGET PLAN IS BASED ON ESTIMATES. THE STRENGTH OR WEAKNESS OF A BUDGETARY CONTROL SYSTEM DEPENDS TO A LARGE EXTENT ON THE ACCURACY WITH WHICH ESTIMATES ARE MADE.
2. A BUDGETARY PROGRAMME MUST BE CONTINUOUSLY ADAPTED TO FIT CHANGING CIRCUMSTANCES. NORMALLY, IT TAKES SEVERAL YEARS TO ATTAIN A REASONABLY GOOD SYSTEM OF BUDGETARY CONTROL.



3. EXECUTION OF A BUDGET WILL NOT OCCUR AUTOMATICALLY. ALL LEVELS OF MANAGEMENT MUST PARTICIPATE ENTHUSIASTICALLY IN THE PROGRAMME FOR THE REALIZATION OF BUDGETARY GOALS.
4. NO BUDGETARY SYSTEM WILL ELIMINATE THE NECESSITY FOR SUPERIOR EXECUTIVE ABILITY IN EVERY MAJOR BUSINESS DECISION. IN OTHER WORDS, BUDGETING DOES NOT TAKE THE PLACE OF MANAGEMENT BUT RATHER IT IS TOOL MANAGEMENT.
5. IT IS ESSENTIAL THAT THERE MUST BE SOME CO-RELATION BETWEEN THE COST OF THE SYSTEM AND THE BENEFITS DERIVED FROM IT. IT IS QUITE COMMON TO FIND THAT OPERATION OF BUDGETING BECOMES SO COSTLY THAT SMALL CONCERN CANNOT AFFORD TO ADOPT.

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Q.3. WHAT DO YOU THINK ARE THE ESSENTIALS OF AN EFFECTIVE BUDGETARY CONTROL SYSTEM ?

ANS.: THE FOLLOWING ARE THE REQUIREMENTS OF A GOOD BUDGETING SYSTEM :

1. CO-OPERATION OF TOP MANAGEMENT : BUDGETING MUST HAVE COMPLETE CO-OPERATION OF THE TOP MANAGEMENT.
2. MAXIMUM PROFIT : THE ULTIMATE OBJECT OF RELEASING MAXIMUM PROFIT SHOULD ALWAYS BE KEPT UPPER MOST.
3. BUDGET COMMITTEE : A BUDGET COMMITTEE SHOULD BE ESTABLISHED CONSISTING OF THE BUDGET DIRECTOR, CHIEF EXECUTIVE OFFICER AND EXECUTIVES OF VARIOUS DEPARTMENTS OF THE ORGANIZATION.
4. CONSTANT VIGILANCE : EFFECTIVE SYSTEM OF BUDGETING REQUIRES THAT PERIODIC REPORTS COMPARING BUDGET AND THE ACTUAL RESULT SHOULD BE PREPARED PROMPTLY. AS SOON AS UNFAVOURABLE TRENDS ARE DETECTED IMMEDIATELY REMEDIAL ACTION SHOULD BE TAKEN.
5. REASONABLY ATTAINABLE GOODS : BUDGET FIGURES SHOULD BE REALISTIC AND REPRESENT REASONABLY ATTAINABLE GOALS.
6. ADEQUATE ACCOUNTING SYSTEM : THE ACCOUNTING SYSTEM IN THE BUSINESS SHOULD BE ADEQUATE SUCH AS TO HOLD EACH PART OF THE ORGANIZATION TO ITS RESPONSIBILITIES.

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Q.4. DISTINGUISH BETWEEN FIXED BUDGET AND FLEXIBLE BUDGET. BRIEFLY STATE THE CIRCUMSTANCES IN WHICH FLEXIBLE BUDGETS ARE USED.

ANS.: A FLEXIBLE BUDGET MAY BE DEFINED AS A BUDGET WHICH IS DESIGNED TO CHANGE IN ACCORDANCE WITH THE LEVEL OF ACTIVITY ACTUALLY ATTAINED. THIS IS IN CONTRAST TO A FIXED BUDGET WHICH IS DEFINED AS A BUDGET DESIGNED TO REMAIN UNCHANGED IRRESPECTIVE OF THE LEVEL OF ACTIVITY ACTUALLY ATTAINED.

THE FIGURES USED IN A FLEXIBLE BUDGET ARE MORE ADAPTABLE TO ANY GIVEN SET OF OPERATING CONDITIONS. IT IS MORE ELASTIC, USEFUL AND PRACTICAL. FLEXIBLE BUDGETS ARE NECESSARY FOR CONTROL. THE OBJECT HERE IS TO ASSESS WHAT ANY INDIVIDUAL COST SHOULD HAVE BEEN IN VIEW OF THE LEVEL OF ACTIVITY ACTUALLY ATTAINED.

FIXED BUDGET IS PREPARED KEEPING IN MIND ONE LEVEL OF OUTPUT. IF ACTUAL OUTPUT DIFFERS FROM THE BUDGET OUTPUT, VARIANCE WILL ARISE.

FLEXIBLE BUDGETS ARE NECESSARY FOR CONTROL. A MANAGER'S ACTUAL ACHIEVEMENT CAN ONLY BE COMPARED WITH WHAT HE SHOULD HAVE ACHIEVED IN THE ACTUAL CIRCUMSTANCES PREVAILING, NOT WITH WHAT HE SHOULD HAVE ACHIEVED UNDER QUITE DIFFERENT CIRCUMSTANCES.

UNDER THE FOLLOWING CIRCUMSTANCES, FLEXIBLE BUDGETS SHOULD BE USED :

1. THOSE COMPANIES SHOULD USE FLEXIBLE BUDGETING WHICH KEEP ON INTRODUCING NEW PRODUCTS OR MAKE FREQUENT CHANGES IN THE PRODUCT DESIGN. IN SUCH COMPANIES IT IS RATHER DIFFICULT TO FORECAST SALES WITH ACCURACY.
2. INDUSTRIES WITH SEASONAL FLUCTUATIONS IN SALES AND/OR PRODUCTION LIKE ICE CREAM, SOFT DRINKS, *ETC.* SHOULD ALSO USE FLEXIBLE BUDGETS.
3. INDUSTRIES WHICH ARE MORE PRONE TO CHANGES IN FASHION, LIKE REDY MADE GARMENTS SHOULD ALSO USE FLEXIBLE BUDGETS.
4. INDUSTRIES WHICH ARE ENGAGED IN MADE TO ORDER BUSINESS LIKE SHIP BUILDING SHOULD USE FLEXIBLE BUDGETS.

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Q.5. WHAT IS ZERO BASE BUDGETING ? WHAT ARE THE ADVANTAGES OF ZERO BASE BUDGETING?

ANS.: GENERALLY BUDGETS ARE PREPARED BY TAKING PREVIOUS YEAR'S BUDGET AS THE BASE. ADJUSTMENT ARE MADE IN THE BUDGET OF THE LAST YEAR FOR ANY CHANGES THAT ARE LIKELY TO TAKE PLACE IN THE BUDGET PERIOD.

ZERO BASE BUDGETING (ZBB) IS A NEW CONCEPT IN PREPARATION OF BUDGETS. IN ZBB, INSTEAD OF TAKING PREVIOUS YEAR'S FIGURES AS THE BASE, EVERY ITEM HAS TO JUSTIFY ITS INCLUSION IN THE BUDGET. ZBB IS DEFINED AS A SYSTEM WHEREBY EACH BUDGET ITEM, REGARDLESS OF WHETHER IT IS NEW OR EXISTING, MUST BE JUSTIFIED IN ITS ENTIRETY EACH TIME A NEW BUDGET IS PREPARED. UNDER ZBB THERE IS CONTINUOUS RE-EVALUATION OF THE ACTIVITIES OF THE ORGANIZATION TO ASCERTAIN THAT ACTIVITIES ARE ABSOLUTELY NECESSARY FOR THE ORGANIZATION. ZBB IN A WAY TO LOCATE THOSE ACTIVITIES WHICH ARE NOT ESSENTIAL.

THE ADVANTAGE OF ZBB ARE AS FOLLOWS :

1. IN ZBB ALL ACTIVITIES INCLUDED IN THE BUDGET ARE JUSTIFIED ON COST BENEFIT CONSIDERATION WHICH PROMOTES MORE EFFECTIVE ALLOCATION OF RESOURCES.
2. ZBB DISCARDS THE ATTITUDE OF ACCEPTING THE CURRENT POSITION IN FAVOUR OF AN ATTITUDE OF QUESTIONING AND CHALLENGING EACH ITEM OF BUDGET.
3. IT IS AN EDUCATIONAL PROCESS AND CAN PROMOTE A MANAGEMENT TEAM OF TALENTED AND SKILLFUL PEOPLE WHICH LEND TO PROMPTLY RESPOND TO CHANGES IN THE BUSINESS ENVIRONMENT.
4. IT IS AN EDUCATIONAL IDENTIFICATION OF INEFFICIENT AND UNNECESSARY ACTIVITIES AND AVOID WASTEFUL EXPENDITURE.

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Q.6. WHAT DO YOU UNDERSTAND BY PERFORMANCE BUDGETING ? WHAT STEPS ARE REQUIRED TO BE TAKEN FOR PREPARING PERFORMANCE BUDGETS ?

ANS.: PERFORMANCE BUDGETING IS A RELATIVELY NEW CONCEPT WHICH FOCUSES ON FUNCTIONS, PROGRAMMES AND ACTIVITIES. PERFORMANCE BUDGETS ARE ESTABLISHED

IN SUCH A MANNER THAT EACH ITEM OF EXPENDITURE RELATED TO SPECIFIC RESPONSIBILITY CENTER IS CLOSELY LINKED WITH THE PERFORMANCE OF THAT CENTER.

THE PERFORMANCE BUDGETING LAYS STRESS ON ACTIVITIES AND PROGRAMMES. IT TRIES TO ANSWER QUESTION LIKE – WHAT IS TO BE ACHIEVED ? *ETC.*

#### STEPS IN PERFORMING BUDGETING

1. ESTABLISHMENT OF RESPONSIBILITY CENTERS : FIRST OF ALL, RESPONSIBILITY CENTERS ARE ESTABLISHED. A RESPONSIBILITY CENTER IS A SEGMENT OF AN ORGANIZATION WHERE AN INDIVIDUAL MANAGER IS HELD RESPONSIBLE FOR THE PERFORMANCE OF THE SEGMENT.
2. ESTABLISHMENT OF PERFORMANCE TARGETS : FOR EACH RESPONSIBILITY CENTER, TARGETS ARE SET IN TERMS OF PHYSICAL PERFORMANCE TO BE ACHIEVED. FOR EXAMPLE, FOR SALES DEPARTMENT, WHICH IS A RESPONSIBILITY CENTER, TARGETS MAY BE SET IN TERMS OF NUMBER OF UNITS TO BE SOLD DURING THE BUDGET PERIOD. FOR PRODUCTION DEPARTMENT, THE TARGET WOULD THEN BE THE NUMBER OF UNITS TO BE PRODUCED.
3. ESTIMATING FINANCIAL REQUIREMENT : IN THIS STEP, THE FINANCIAL SUPPORT NEEDED TO ACHIEVE THE PHYSICAL TARGETS IS ESTIMATED. IN OTHER WORDS, THE AMOUNT OF EXPENDITURE INVOLVED UNDER VARIOUS HEADS TO MEET THE PHYSICAL PERFORMANCE IS FORECASTED.
4. COMPARISON OF ACTUAL WITH BUDGETED PERFORMANCE : THIS IS AN USUAL STEP IN BUDGETARY CONTROL TO EVALUATE THE ACTUAL PERFORMANCE.
5. REPORTING AND ACTION : VARIANCE FROM BUDGETED PERFORMANCE ARE ANALYSED AND REPORTING FOR CORRECTIVE ACTION TO BE TAKEN.

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Q.7. WHAT ARE BUDGET REPORTS ? WHAT ARE ITS ESSENTIAL CHARACTERISTICS ?

ANS.: ESTABLISHING BUDGETS IN ITSELF IS OF NO USE UNLESS THERE IS A CONTINUOUS FLOW OF BUDGET REPORTS SHOWING COMPARISON OF ACTUAL AND BUDGET FIGURES. BUDGET REPORTS SHOULD BE PREPARED AT REGULAR INTERVALS SHOWING THE REASONS FOR THE DIFFERENCES BETWEEN ACTUAL AND BUDGET FIGURES. THE REPORTS SHOULD BE PREPARED IN SUCH A WAY THAT THEY ESTABLISH THE RESPONSIBILITY FOR THE VARIANCE. REPORTS SHOULD ALSO REVEAL WHETHER A VARIANCE IS FAVOURABLE OR UNFAVOURABLE AND ALSO WHETHER A VARIANCE IS CONTROLLABLE OR UNCONTROLLABLE.

ESSENTIALS OF A BUDGET REPORT – THE FOLLOWING ESSENTIALS SHOULD BE KEPT IN MIND WHILE PREPARING BUDGET REPORTS :

- (a) THE BUDGET REPORTS SHOULD BE SIMPLE AND SUITABLE FOR THE LEVEL OF UNDERSTANDING OF THE USER.
- (b) REPORTS SHOULD BE PRESENTED PROMPTLY.
- (c) REPORTS SHOULD BE ACCURATE.
- (d) THE REPORT SHOULD CONTAIN ONLY ESSENTIAL INFORMATION ACCORDING TO THE NEEDS OF THE USER.

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Q.8. DEFINE FUNCTIONAL BUDGETS, MASTER BUDGET, LONG-TERM BUDGET, SHORT-TERM BUDGET, BASIC BUDGET AND CURRENT BUDGET.

ANS.: FUNCTIONAL BUDGET : BUDGETS WHICH RELATE TO THE INDIVIDUAL FUNCTIONS IN AN ORGANIZATION ARE KNOWN AS FUNCTIONAL BUDGETS. FOR EXAMPLE, PURCHASE BUDGET; SALES BUDGET; PRODUCTION BUDGET; PLANT-UTILISATION BUDGET AND CASH BUDGET.

MASTER BUDGET : IT IS A CONSOLIDATED SUMMARY OF THE VARIOUS FUNCTIONAL BUDGETS. IT SERVES AS THE BASIS UPON WHICH BUDGETED P & L A/C. AND FORECASTED BALANCE SHEET ARE BUILT UP.

LONG-TERM BUDGETS : THE BUDGETS WHICH ARE PREPARED FOR PERIODS LONGER THAN A YEAR ARE CALLED LONG-TERM BUDGETS. SUCH BUDGETS ARE HELPFUL IN BUSINESS FORECASTING AND FORWARD PLANNING. CAPITAL EXPENDITURE BUDGET AND RESEARCH AND DEVELOPMENT BUDGET ARE EXAMPLES OF LONG-TERM BUDGETS.

SHORT TERM BUDGETS : BUDGETS WHICH ARE PREPARED FOR PERIODS LESS THAN A YEAR ARE KNOWN AS SHORT-TERM BUDGETS. CASH BUDGET IS AN EXAMPLE OF SHORT-TERM BUDGET. SUCH TYPES OF BUDGETS ARE PREPARED IN CASES WHERE A SPECIFIC ACTION HAS TO BE IMMEDIATELY TAKEN TO BRING ANY VARIATION UNDER CONTROL, AS IN CASH BUDGETS.

BASIC BUDGETS : A BUDGET WHICH REMAINS UNALTERED OVER A LONG PERIOD OF TIME IS CALLED BASIC BUDGET.

Current Budgets : A budget which is established for use over a short period of time and is related to the current conditions is called current budget.

#### Q.9 Distinguish between Standard Costing and Budgetary Control?

Ans.: Budget control and Standard costs have the common objective of cost control by establishing pre-determined costs. There are certain basic principles which are common to both budgetary control and standard costing. These are being given below:

- Establishment of pre-determined targets of performance.
- The measurement of actual performance.
- The comparison of actual performance with the predetermined performance.
- Analysis of the difference between actual and predetermined performance.
- To take remedial steps where necessary.

In spite of these points of similarity, there are some important differences between budgetary control and standard costing:

1. Budgets are prepared for different functions of the organization like sales, purchases, production etc. This classification like sales, purchases, production etc. This classification is as per financial records. In standard costing, on the other hand, costs are compiled by classifying, recording and allocating expenses.
2. Budget costs are used for forecasting requirements of different functions like finance, sales etc., whereas standard costs do not tell what the costs are expected to be but

what the costs should be, if certain performances are achieved. These can not be used for forecasting requirements.

3. In budgetary control, variances are not revealed through accounts. Variances are used only as statistical information for exercising control. But under standard costing system, variances are revealed through different accounts.

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**Q.10 Distinguish between conventional budgeting and zero base budgeting**

**Ans.:** Zero Base Budgeting (ZBB) is an alternative budget system in which while preparing budgets, previous year's budget is not taken as base. Conventional budgeting in any organization is mostly done in such a way that each year all departments are given a maximum amount to spend. No justification is required on the part of any department for spending the budgeted amount. This may be because the amount spent might be equal to the last year's budget. The main disadvantage of such budgeting is that the inefficiencies of the previous years creep into this year's budget. In such a budget, justification is to be given only for new or additional funds required.

In ZBB, each item in the budget is required to be justified each year. In presenting the budget, the manager of each department is asked to justify the needs of the department according to his perception. The budget committee considers the requests of all the departments and makes budget allocations according to the available sources. A ZBB may be defined as a system whereby each budget item, whether it is new or existing, has to be justified in its entirety. ZBB discards the attitude of accepting the existing position blindly. However, ZBB is a costly system of budgeting as it requires high volume of paper work.

- Q1:** The budgeted output of a factory specializing in the production of single product at the optimum capacity of 6,400 units per annum amounts to Rs.1,76,048 as detailed below:

	Rs.	Rs.
Fixed Cost		20,688
Variable costs:		
Power	1,440	
Repairs etc.	1,700	
Miscellaneous	540	
Direct materials	49,280	
Direct labour	1,02,400	1,55,360
	-----	-----
		1,76,048
		-----

Having regard to possible impact on sales turnover by market trends, the company decides to have a flexible budget with a production of 3,200 and 4,800 units (the actual quantity proposed to be produced being left to a later date before commencement of budget period.) Prepare a flexible budget for production levels at 50% and 75%. Assuming the sale per unit is maintained at Rs.40 as at present, indicate the effect on net profit.

Administration, selling and distribution expenses continue at Rs.3,600.

## Control Ratios

Ratios are used to determine the production efficiency and the costs. It tells the ratio of actual level of activity attained, degree of efficiency attained and the actual capacity utilized during a budgeted period. Three important ratios are commonly used by the management to find out whether the deviations of actuals from budgeted results are favourable or otherwise.

These ratios are expressed in terms of percentages. They are:

- (a) Activity Ratios. It is a measure of the level of activity attained over a period. This ratio expresses relationship between standard hours for actual production and budgeted hours. The formula is:

$$\text{Activity Ratio} = \frac{\text{Standard hours for actual output}}{\text{Budgeted Standard Hours}} \times 100$$

- (b) Capacity Ratio: This ratio indicates whether and to what extent budgeted hours of activity are actually utilized. The object is to show whether or not the available hours are being fully utilized.

The formula is :

$$\text{Capacity Ratio} = \frac{\text{Actual Hours Worked}}{\text{Budgeted Hours}} \times 100$$

- (c) Efficiency Ratio or Productivity Ratio: The ratio is an important measure of the level of efficiency attained by the productive processes. This ratio indicates the efficiency attained in producing a stated output. The formula is

$$\text{Efficiency Ratio} = \frac{\text{Standard Hrs for Actual Production}}{\text{Actual Hours Worked}} \times 100$$

The results of the above ratios are interpreted as below:

Result	Interpretation
100%	No deviation
Above 100%	Favourable Deviation
Below 100%	Unfavourable Deviation

#### Calendar Ratio

This ratio indicates if the actual working days have been equal to more than or less than the budgeted number of days in the period under study. The formula is:

$$\text{Calendar Ratio} = \frac{\text{Actual working days in the period}}{\text{Working days on the basis of Budget during the period}} \times 100$$

Q2: A factory manufactures two types of products X and Y. Product X takes 5 hours to make and Y requires 10 hours. In a month of 25 effective days of 8 hours a day, 1,000 units of X and 600 units of Y were produced. The company employs 50 workers in the production department. The budgeted hours are 1,02,000 for the year. Calculate capacity ratio, Activity ratio and efficiency ratio.

Q3: Narang Ltd. Produces two commodities, Good and Better, one of its department. Each unit takes 5 hours and 10 hours as production time respectively. 1,000 units of Good and 600 units of Better were produced during March. Actual Man-hours spent in this

production were 10,000. Yearly budgeted hours are 96,000. Compute the various control ratios.

- Q4: Prepare a flexible budget for overheads on the basis of the following data. Ascertain the overhead rates at 50%, 60% and 70% capacity.

	At 60% Capacity
Variable overheads:	Rs.
Indirect material	6,000
Indirect labour	18,000
Semi-variable overheads:	
Electricity (40% fixed 60% variable)	30,000
Repairs (80% fixed 20% variable)	3,000
Fixed Overheads:	
Depreciation	16,500
Insurance	4,500
Salaries	15,000
Total Overheads	93,000
Estimated direct labour hours	1,86,000

- Q5: A company working at 50% capacity manufactures 10,000 units of a product. At 50% capacity the product cost is Rs.180 and sale price Rs.200. The break up of the cost is as below:

	Cost per unit
	Rs.
Material	100
Wages	30
Factory overheads	30 (40% fixed)
Administration overheads	20 (50% fixed)



At 60% working raw material cost goes up by 2% and sales price falls by 2%. At 80% working the raw material cost increases by 5% and sale price decreases by same percentage i.e. 5%.

Prepare a statement to show profitability at 60% and 80% capacity.

Q6: For the production of 10,000 electric automatic irons; the following the budgeted expenses:

		Per unit
		Rs.
Direct Material		60
Direct Labour	30	
Variable overhead		25
Fixed overhead (Rs.1,50,000)		15
Variable expenses (direct)	5	
Selling expenses (10%) fixed	15	
Administration expenses (Rs.50,000		
Rigid for all levels of production)	5	
Distribution expenses (20%) fixed	5	
The total cost of sale per unit		160

Prepare a budget for the production of 6,000 and 7,000 and 8,000 irons, showing distinctly the marginal cost and the total cost.

Q7: S.M. Ltd. Produces two products and budget for 60% level of activity for the year gives the following information.

Particulars	Product A	Product B
	Rs.	Rs.

Raw material cost per unit	7.50	3.50
Direct labour cost per unit	4.00	3.00
Variable overhead per unit	2.00	1.50
Fixed overheads per unit	6.00	4.50
Selling price per unit	20.00	15.00
Production and sales	4,000 units	6,000 units

The Managing Director, not being satisfied with the projected results as stated above, referred the Budget to the Marketing Director for improvement of performance. The Marketing Director proposed that the sales quantities of products A and B could each be increased by 50% provided the selling price were reduced by 5% in case of product A and 10% in the case of product B. The price reduction should be made applicable to the entire quantity of sales of each of the products.

1. Present the overall profitability under the original Budget and the revised budget after taking the increased sales into consideration.
2. Find that overall Break-even sales under original budget and the revised budget.

Q8: A factory engaged in manufacturing plastic buckets is working at 40% capacity and produces 10,000 buckets per month.

The present cost break-up for one bucket is as under:

Material Rs.10

Labour Rs.3

Overheads Rs.5 (60% fixed)

The selling price is Rs.20 per bucket. If it is desired to work the factory at 50% capacity the selling price falls by 3%. At 90% capacity the selling price falls by 5% accompanied by a similar fall in the price of material.

You are required to prepare a statement showing the profit at 50% and 90%, capacities and also calculate the break-even points at this capacity production.

1. Sales Budget. Generally, sales factor becomes a key-factor in the majority of cases, and therefore, it is the starting point. This is the most important budget, as it is usually the most difficult to forecast. It is prepared by the sales manager. In the preparation, the sales manager should consider the following points:
  - (a) Analysis of the sales of the previous year.
  - (b) Salesman's assessment.
  - (c) General trade conditions.
  - (d) Availability of raw materials.
  - (e) Availability of funds.
  - (f) Plant capacity.
  - (g) Seasonal fluctuations.
  - (h) Restrictions imposed by the government.
  - (i) Competition and consumer's preference.
  - (j) Efficiency of advertising.

Sales budget must show in terms of finished products, quantities and price; and it is prepared according to products, territories, periods, types of customer or salesman etc.

2. Production Budget. It is budget prepared by the production manager, showing the forecast of output. The objective is to determine the quantity of production for a budgeted period. It is an quantity of units to be produced during the budget period. It is based on the sales budget. It is in two parts – one part contains the volume of production and the other part shows the cost of production. Apart from the sales budget, optimum utilization of plant, availability of raw materials, labour etc. Are to be considered. It must avoid overwork in rush reasons. It must maintain a minimum stock of finished goods.

Cost of Production Budget is divided into material cost budget, labour cost budget and overhead cost budget, because cost of production includes materials, labour and overheads. Therefore, separate budgets are required for each item.

3. Material Budget. To carry out the production satisfactorily regular supply of materials during the budget period is ensured by preparing a budget. In this, the decision regarding the quantity of materials as shown at different items during that period is followed. Only direct materials are taken into account; indirect materials are not taken into account and they are considered under overheads. The material budget helps

proper planning of purchases. It shows the estimated quantities as well as the cost of raw materials, required for production budget.

4. Labour Budget. It is a part of the production budget. The budget is prepared by the personnel department and it shows an estimate of the requirements of labour to meet the production target, on the basis of previous records and budgeted production. This budget gives detailed information relating to the number of workers, rates of wages and cost of labour hours to be employed.
5. Works Overload Budget. It sets out the estimated costs of indirect materials, indirect labour and indirect factory expenses, during the budget period in order to achieve the target. This is classified into fixed, variable and semi-variable. This facilitates preparation of budgets and further department-wise sub-division to have effective control. The overheads; and budget targets are verified for variable expenses, which are bound to change with the change of output.

Q10: From the following particulars, prepare a Production Budget of a Company for the year ended June 30, 1994.

Product	Sales (units)	Estimated Stock (units)	
	(as per sales	1 <sup>st</sup> July 1993	30 <sup>th</sup> June 1994
	Budgets)		
A	1,50,000	14,000	15,000
B	1,00,000	5,000	14,500
C	70,000	8,000	8,000

Q11: Draw a material procurement budget (quantitative) from the following information:

Estimated sales of a product 40,000 units. Each unit of the product requires 3 units of material A and 4 units of material B.

Estimated opening balances at the commencement of the next year:

	Units
Finished Products	5,000
Material A	12,000

Material B	20,000
------------	--------

Material on order:

Material A	7,000
------------	-------

Material B	11,000
------------	--------

The desirable closing balances at the end of the next year:

Finished product	7,000
------------------	-------

Material A	15,000
------------	--------

Material B	25,000
------------	--------

Material on order

Material A	8,000
------------	-------

Material B	10,000
------------	--------

Q12: The Sales Director of a manufacturing Company reports that next year he expects to sell 50,000 units of a particular product:

The Production Manager consults the store-keeper and casts his figures as follows:

Two kinds of raw materials A and B are required for manufacturing the products.

Each unit of the product requires 2 units of A and 3 units of B.

The estimated opening balances at the commencement of the next year:

Finished Products :	10,000 units
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Material A	12,000 “
------------	----------

Material B	15,000 “
------------	----------

The desirable closing balances at the end of the next year are:

Finished Products :	14,000 units
Material A	13,000 “
Material B	16,000 “

Draw up a quantitative chart showing materials purchase budget for the next year.

Q13: The budget manager of Cosmetics Limited is preparing a budget for the accounting year starting from 1<sup>st</sup> July 1994.

As part of the budget operations, some items of factory overhead costs have been estimated by him under specified conditions of volume as follows:

Volume of Production (Units)	1,20,000	1,50,000
	Rs.	Rs.
Expenses:		
Indirect Materials	2,64,000	3,30,000
Indirect labour	1,50,000	1,87,500
Maintenance	84,000	2,02,000
Supervision	1,98,000	2,34,000
Engineering Service	94,000	94,000

Calculate the cost of factory overhead items given above at 1,40,000 units of production.

6. (a) *Administration Overheads Budget.* This budget covers the Expenditure of administrative office and management salaries. It is prepared with the help of past experiences and expected changes in future. The administration cost of each budget centre is drawn separately and incorporated in administrative cost budget.
- (b) *Selling and Distribution Overhead Budget.* This budget relates to selling and distribution of products for the budget period and is based of sales

budget. It is generally prepared territory-wise by the sales manager of each territory. The costs are divided into fixed variable and semi-variable and estimate is taken on the basis of past records.

7. **Capital Expenditure Budget.** This budget shows the estimated expenditure on fixed assets – land, building, plant, machinery etc. It is a long-term budget. The capital expenditure is necessitated on account of replacement of old machines, increased demand of products, expansion of industry, adoption of new technological progresses etc.
8. **Cash Budget.** This budget represents the amount of cash receipts and payments, and a balance during the budgeted period. It is prepared after monthly or weekly giving the following hints
  - (1) It ensures sufficient cash for business requirements.
  - (2) It proposes arrangements to be made overdraft to meet any shortage of cash.
  - (3) It reveals the surplus amount, and the effect of the seasonal fluctuations on cash position. The objective of cash budget is the proper co-ordination of total working capital, sale, investment and credit.

Q14: From the following forecasts of income and expenditure prepare a cash budget for the three months commencing 1<sup>st</sup> June, when the bank balance was Rs.1,00,000.

	Sales	Purchases	Wages	Factory Expenses	Admin. & Selling Expenses
	Rs.	Rs.	Rs.	Rs.	Rs.
April	80,000	41,000	5,600	3,900	10,000
May	76,500	40,500	5,400	4,200	14,000
June	78,500	38,000	5,400	5,100	15,000
July	90,000	37,000	4,800	5,100	17,000
August	95,000	35,000	4,700	6,000	13,000

A sales commission of 5 per cent on sales, due two months after sales, is payable in addition to selling expenses. Plant value at Rs.65,000 will be purchased and paid in August, and the dividend for the last financial year of Rs.15,000 will be paid in July. There is a two month credit period allowed to customers and received from suppliers.

Q15: A department of Company X attains sales of Rs.6,00,000 at 80% of its normal capacity and its expenses are given below:

Administration Costs:

Office Salaries	Rs.90,000
General expenses	2% of sales
Depreciation	Rs.7,500

Rates and Taxes	Rs.8,750
-----------------	----------

Selling Costs:

Salaries	8% of sales
Traveling expenses	2% of sales
Sales office	1% of sales
General expenses	1% of sales

Distribution Costs:

Wages	Rs.15,000
Rent	1% of sales
Other expenses	4% of sales

Draw up flexible administration, selling and distribution costs budget, operating at 90%, 100% and 110% of normal capacity.

Q16: A company expects to have Rs.37,500 cash in hand on 1<sup>st</sup> April, and requires you to prepare an estimate of cash position during the three months, April, May and June. The following information is supplied to you:

	Sales	Purchases	Wages	Factory Expenses	Office Expenses	Selling Expenses
		Rs.	Rs.	Rs.	Rs.	Rs.
Feb	75,000	45,000	9,000	7,500	6,000	4,500
March	84,000	48,000	9,750	8,250	6,000	4,500
April	90,000	52,500	10,500	9,000	6,000	5,250
May	1,20,000	60,000	13,500	11,250	6,000	6,570
June	1,35,000	60,000	14,250	14,000	7,000	7,000

Other Information:

- (1) Period of credit allowed by suppliers 2 months.
- (2) 20% of sales is for cash and period of credit allowed to customers for credit is one month.
- (3) Delay in payment of all expenses – 1 month.
- (4) Income tax of Rs.57,500 is due to be paid on June 15<sup>th</sup>.
- (5) The company is to pay dividends to shareholders and bonus to workers of Rs.15,000 and Rs.22,000 respectively in the month of April.
- (6) Plant has been ordered to be received and paid in May. It will cost Rs.1,20,000.

Q17: Prepare a Cash Budget for the three months ending 30<sup>th</sup> June from the following information:

(a)

Month	Sales	Materials	Wages	Overheads
	Rs.	Rs.	Rs.	Rs.
February	14,000	9,600	3,000	1,700



March	15,000	9,000	3,000	1,900
April	16,000	9,200	3,200	2,000
May	17,000	10,000	3,600	2,200
June	18,000	10,400	4,000	2,300

- (b) Credit terms are:  
Sales/Debtors – 10% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month.
- (c) Creditors :   Materials, 2 months  
                          Wages,  $\frac{1}{4}$  month  
                          Overheads,  $\frac{1}{2}$  month
- (d) Cash and Bank Balance on 1<sup>st</sup> April is expected to be Rs.6,000.
- (e) Other relevant information's are:  
 (1) Plant and Machinery will be installed in February at a cost of Rs.96,000. The monthly instalments of Rs.2,000 are payable from April onwards.  
 (2) Dividend @ 5% on Preference share capital of Rs.2,00,000 will be paid on 1<sup>st</sup> June.  
 (3) Advance to be received for sale of vehicles Rs.9,000 in June.  
 (4) Dividends from investments amounting to Rs.1,000 are expected to be received in June.  
 (5) Income-tax (advance) to be paid in June is Rs.2,000.

Q18: A Glass Manufacturing Company requires you calculate and present the budget for the next year from the following information:

Sales :

Toughened Glass                      Rs.3,00,000  
 Bent Toughened Glass                Rs.5,00,000  
 Direct materials cost :                60% of sales  
 Direct wages :                            20 workers @ Rs.1.50 per month  
 Factory Overheads:  
 Indirect labour :  
 Works Manager : Rs.500 per month.  
 Foreman : Rs.400 per month.  
 Stores and spares : 2½% on sales  
 Depreciation on machinery : Rs.12,600  
 Light and power : Rs.8,000  
 Repairs and maintenance : Rs.8,000  
 Other sundries : 10% on direct wages.  
 Administration, selling and distribution expenses : Rs.14,000 p.a.

Zero Base Budgeting

In common practice building the functional budgets is to base the budget year's figures on the previous year's budget. Taking the previous figures as the base, the required adjustments are made for the impact of inflation proposed increased or decreased level of activity etc. In the light of experience. Thus, in the traditional budgeting system, budgets are based on trends or historical level of expenditure. Thus, a budget is developed on the concept of incremental basis. Mostly, what is done is to add some percentage to the figures of previous year to determine the budget figures. That is, under the incremental basis. Mostly, what is done is to add some percentage to the figures of previous year to determine the budget figures. That is, under the incremental system, the figures of the previous budget, on the basis of which future budget is drawn, are considered to be acceptable. It is the experience of many, particularly in the government departments and public undertakings that the actual expenditure should be in line with the budgeted amount otherwise the higher authorities will reduce the future budgeted and allocated amounts. The managers justify the need to spend more than that of the previous budget. But they do not review their past activities and thus expenditure and inefficiencies are brought forward to the subsequent period i.e. The incremental budgeting perpetuates inefficiency instead of promoting operational efficiency.

In order, therefore, to streamline the allocation, to curb this tendency of equalizing the expenditure with budgeted figures and to control the costs, a new technique is called "Zero Base Budgeting" or "Zero Based Budgeting" emerged. Under this technique, no special budget is prepared but the approach is changed.

The use of Zero Base Budgeting (ZBB) as a managerial tool has become increasingly popular since the early 1970's. It first came into being when Ex-President Jimmy Carter of the United States of America introduced it as a means of controlling state expenditure. The underlying idea of ZBB is that there is no given base figure for a budget. A fresh budgeted figure is to be determined keeping the circumstances and requirements. The basic concept of ZBB is simple: budgeting starts from scratch or zero. That is, every activity in an organization must be examined and justified, any alternatives must be considered and the results evaluated. It is a method whereby all activities are re-valued each time when a budget is formulated.

It implies that:

- (1) Every budget starts with a zero base.
- (2) No previous figure is to be taken as a base figure for adjustments.
- (3) Each activity is to be examined afresh.
- (4) Every budget allocation is to be justified in the light of anticipated circumstances.
- (5) Alternatives are to be given due consideration.

#### Benefits

1. Effective cost control can be exercised.
2. Careful planning is facilitated.

3. Management by objectives becomes a reality.
4. Uneconomical activities are identified.

## BUDGETARY CONTROL PROBLEM AND SOLUTION

### Sales Overhead Budget

Q.1 Prepare a Sales Overhead Budget for the month of January, February and March from the estimates given below:

Advertisement	Rs.2,500
Salaries of the Sales Department	5,000
Expenses of the Sales Department	1,500
Counter Salesmen's Salaries and Dearness Allowance	6,000

Counter salesmen's commission is 1% on their sales. Travelling salesmen's commission at 10% on their sales and expenses at 5% on their sales. The sales during the period were estimated as follows:

Month	Counter Sales	Travelling Salesmen's
January	Rs.80,000	Rs.10,000
February	1,20,000	15,000
March	1,40,000	20,000

Solution: Sales Overhead Budget (For the month January, February and March)

Month	January	February	March
Variable Overheads:			
Commission to counter salesmen @ 1% on their sales	Rs.800	Rs.1,200	Rs.1,400
Travelling salesmen's commission @ 10% on their sales	1,000	1,500	2,000
Travelling salesmen's expenses @ 5% on their sales	500	750	1,000
1. Total variable overheads	2,300	3,450	4,400
Fixed Overheads			

Advertisement	2,500	2,500	2,500
Salaries of Sales Dept.	5,000	5,000	5,000
Expenses of Sales Dept.	1,500	1,500	1,500
Salaries etc. of counter salesmen	6,000	6,000	6,000
2. Total fixed overheads	15,000	15,000	15,000
3. Total sales overheads (1+2)	17,300	18,450	19,400

#### Production Budget

Q.2 Prepare a Production Budget for the 3 months ending March 31, 2005, for a factory producing four products, on the basis of the following information:

Type of Products	Estimated Stock on Jan. 1, 2005 (units)	Estimated Sales during Jan. – March 2005 (units)	Desired Closing Stock on March 31. 2005 (Units)
W	4,000	20,000	6,000
X	6,000	30,000	10,000
Y	8,000	26,000	6,000
Z	6,000	24,000	4,000

Solution: Production Budget for three months to March 31. 2005

Products	W	X	Y	Z
Estimated Sales (Units)	20,000	30,000	26,000	24,000
(+) Desired Closing Stock (Units)	6,000	10,000	6,000	4,000
(-) Estimated Opening Stock (Units)	(4,000)	(6,000)	(8,000)	(6,000)
Estimated Production (Units)	22,000	34,000	24,000	22,000

Q.3 From the following data, prepare a production budget for the ABC Co. Ltd.:

Stocks for the budgeted period:
---------------------------------

Product	As on 1 <sup>st</sup> January	As on 30 <sup>th</sup> June
A	8,000	10,000
B	9,000	8,000
C	12,000	14,000
Normal loss in production: Requirements to fulfill sales programmer:		
A	4%	A 60,000 units
B	2%	B 50,000 units
C	6%	C 80,000 units

Solution: Production Budget for six months ending 30<sup>th</sup> June

Details	Products		
	A	B	C
	Units	Units	Units
Budgeted Sales	60,000	50,000	80,000
Add: Closing Stock	10,000	8,000	14,000
Total required stock	70,000	58,000	94,000
Less: Opening Stock	8,000	9,000	12,000
Net production	62,000	49,000	82,000
Add: Normal Loss in production	2,583	1,000	5,234
Gross production	64,583	50,000	87,234

$$A - (4 \div 96) \times 62,000 = 2,583;$$

$$B - (2 \div 98) \times 49,000 = 1,000;$$

$$C - (6 \div 94) \times 82,000 = 5,234$$

### Production & Raw Material Purchase Budget

Q.4 The following are the estimated sales of a company for eight months ending 30.11.2007:

Months	Estimated Sales (units)
April 2007	12,000

May	2007	13,000
June	2007	9,000
July	2007	8,000
August	2007	10,000
September	2007	12,000
October	2007	14,000
November	2007	12,000

As a matter of policy, the company maintains the closing balance of finished goods and raw materials as follows:

Stock item	Closing balance of a month
Finished Goods	50% of estimated sales for the next month
Raw Materials	Estimated consumption for the next month.

Every unit of production requires 2 kg. of raw material costing Rs5 per kg.

Prepare Production Budget (in units) and Raw Material Purchase Budget (in units and cost) of the company for the half year ending 30 September, 2007.

**Solution: Production Budget (Units) for the half-year ending 30<sup>th</sup> September. 2007**

Month	Sales (in units)	Closing Balances 50% of the estimated Sales for the next month	Opening Balances	Production
1	2	3	4	5 = (2) + (3) – (4)
2007				
April	12,000	6,500	6,000	12,500
May	13,000	4,500	6,500	11,000
June	9,000	4,000	4,500	8,500
July	8,000	5,000	4,000	9,000
August	10,000	6,000	5,000	11,000

September	12,000	7,000	6,000	13,000
	64,000			65,000

**Purchase Budget (Cost & Units) for the year ending 30<sup>th</sup> September, 2007**

Month	Production in units	Consumption (kg.) @ 2 kg. per units	Closing Balance	Opening Balance	Purchase in kg.	Rate Rs.	Amount Rs.
2007							
April	12,500	25,000	22,000	25,000	22,000	5	1,10,000
May	11,000	22,000	17,000	22,000	17,000	5	85,000
June	8,500	17,000	18,000	17,000	18,000	5	90,000
July	9,000	18,000	22,000	18,000	22,000	5	1,10,000
August	11,000	22,000	26,000	22,000	26,000	5	1,30,000
September	13,000	26,000	26,000	26,000	26,000	5	1,30,000
	65,000	1,30,000					6,55,000

**Manufacturing overhead budget**

Q.5 From the following average figures of previous quarters, prepare a manufacturing overhead budget for the quarter ending on March 31, 2005. The budgeted output during this quarter is 4,000 units.

	Rs.
Fixed overheads	20,000
Variable overheads	10,000 (varying @ Rs.5 per unit)
Semi-Overheads	10,000 (40% fixed and 60% varying @ Rs.3 per unit)

**Solution: Manufacturing Overheads Budget for the quarter ending on March 31, 2005**

	Rs.
Fixed overheads	20,000
Variable overheads (Rs.5 × 4,000 units)	20,000

Semi-variable overheads	
Fixed	4,000
Variable (Rs.3 × 4,000 units)	16,000
<u>12,000</u>	
Total Overhead Costs	56,000

### Production cost Budget

Q.6 Production costs of a factory for a year are as follows:

	Rs.
Direct Wages	80,000
Direct Materials	1,20,000
Production Overheads, Fixed	40,000
Production Overheads, Variable	60,000

During the forthcoming year it is anticipated that:

- (a) The average rate for direct labour remuneration will fall from Rs.3 per hour to Rs.2.50 per hour;
- (b) Production will remain unchanged.
- (c) Direct labour hours will increase by 33 1/3%.

The purchase price per unit of direct materials and other materials and services which comprise overheads will remain unchanged. Draw up a budget and compute a factory overhead rate, the overheads being absorbed on a direct wage basis.

Solution:

Existing Direct Labour Hours =  $\frac{80,000}{3} = 26,667$

3

Expected Direct Labour Hours =  $26,667 \times 133 \frac{1}{3}\%$

= 35,556 hrs.

Direct Wages = 35,556 hrs. X Rs.2.50 hrs.

= Rs.88,890

Direct Material	1,20,000
(+) Direct Wages	88,890



Prime Cost	2,08,890
(+) Factory Overhead	
Fixed Production Overheads	40,000
Variable Production Overheads	60,000
Factory Cost	3,08,890

Factory overhead absorption rate on Direct Wages =  $\frac{\text{Factory overhead}}{\text{Direct Wages}} \times 100$

Direct Wages

=  $\frac{1,00,000}{88,890} \times 100 = 112.5\%$

88,890

### Flexible Budget

Q.7 A department of Company X attains sale of Rs.6,00,000 at 80 percent of its normal capacity and its expenses are given below:

Administration costs:	Rs.
Office salaries	90,000
General expenses	2 percent of sales
Depreciation	7,500
Rates and taxes	8,750
Selling costs:	
Salaries	8 percent of sales
Travelling expenses	2 Percent of sales
Sales office expenses	1 percent of sales
General expenses	1 percent of sales
Distribution costs:	
Salaries	15,000
Rent	1 percent of sales
Other expenses	4 percent of sales

Draw up flexible administration, selling and distribution costs budget, operating at 90 percent, 100 percent and 110 percent of normal capacity.

**Solution: Flexible budget of Department ....of Company 'X'**

**Rs.**

Expenses		Basis			
		Level of activity			
		80%	90%	100%	110%
(1)	(2)	(3)	(4)	(5)	(6)
Sales		6,00,000	6,75,000	7,50,000	8,25,000
Administration costs:					
Office salaries	Fixed	90,000	90,000	90,000	90,000
General expenses	2% of sales	12,000	13,500	15,000	16,500
Depreciation	Fixed	7,500	7,500	7,500	7,500
Rates & taxes	Fixed	8,750	8,750	8,750	8,750
Total administration costs		1,18,250	1,19,750	1,21,250	1,22,750
Selling costs:					
Salaries	8% of sales	48,000	54,000	60,000	66,000
Travelling expenses	2% of sales	12,000	13,500	15,000	16,500
Sales office expenses	1% of sales	6,000	6,750	7,500	8,250
General expenses	1% of sales	6,000	6,750	7,500	8,250
Total selling costs:		72,000	81,000	90,000	99,000
Distribution costs:					
Wages	Fixed	15,000	15,000	15,000	15,000
Rent	1% of sales	6,000	6,750	7,500	8,250
Other expenses	4% of sales	24,000	27,000	30,000	33,000

sales				
Total Distribution Cost	45,000	48,750	52,500	56,2520
Total Admn., Selling & Dist. Costs	2,35,250	2,49,500	2,63,750	2,78,000

Note: In the absence of information it has been assumed that office salaries, depreciation, rates and taxes and wages remain the same at 110% level of activity also.

Q.8 Prime Printing Co. Private Limited ended with the following Profit/Loss during the year 2004:

		(All figures inn lakhs of Rs.)
Sales		35.58
Less Expenses: Raw Materials	7.42	
Stores	4.88	
Expenses	20.40	
Interest	2.00	
Depreciation	2.00	36.70
Loss for the year		(1.12)

The press had been working at 60% of capacity during 2004. Of the expenses of Rs.20.40 lakhs, 25% is variable. In 2005 production/sales volume at 80% of capacity is expected to be achieved. Fixed cost is however expected to increase by Rs.1.20 lakhs. Draw the 2005 Budget.

**Solution: Budget for 2005**

**(Rs. In lakhs)**

Sales	$[35.58 \times 80]$	47.44
60		
(-) Variable Expenses		
(a) Raw Material	$[7.42 \times 80]$	(9.89)
60		
(b) Stores	$[4.88 \times 80]$	(6.51)
60		

(c) Other expenses	$[5.1 \times \frac{80}{60}]$	(6.80)
(-) Fixed Expenses		
(a) Expenses	$(20.4 \times 75\%)$	(15.3)
(b) Interest		(2.0)
(c) Depreciation		(2.0)
(d) Additional Fixed Cost		(1.20)
Profit		3.74

Q.9 The cost of an article at a capacity level of 5,000 units is given under A below:

	Amount	Cost behavior
Material Cost	Rs.25,000	100% varying
Labour cost	15,000	100% varying
Power	1,250	80% varying
Repairs and maintenance	2,000	75%
Stores	1,000	100%
Inspection	500	20%
Depreciation	10,000	100%
Administration Overhead	5,000	25%
Selling Overhead	3,000	50%
	Rs.62,750	
Cost per unit	Rs.12.55	

Find the unit cost of the product under each individual expense at production levels of 4,000 units and 6,000 units.

Solution: Particulars	5,000 units	4,000 units	6,000 units
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Material cost (Variable)		25,000	20,000	30,000
Labour cost (Variable)		15,000	12,000	18,000
Power:	(Variable)	1,000	800	1,200
	(Fixed)	250	250	250
Repairs & Maintenance	(Variable)	1,500	1,200	1,800
	(Fixed)	500	500	500
Stores	(Variable)	1,000	800	1,200
Inspection	(Variable)	100	80	120
	(Fixed)	400	400	400
Dep.	(Variable)	10,000	8,000	12,000
Administration Overheads	(Variable)	1,250	1,000	1,500
	(Fixed)	3,750	3,750	3,750
Selling Overheads	(Variable)	1,50	1,200	1,800
	(Fixed)	1,50	1,500	1,500
		62,750	51,480	74,020
No. of units		5,000	4,000	6,000
Cost Per unit		12.55	12.87	12.34

Q.10 Genini Steel Ltd. manufactures a single product for which market demand exists for additional quantity. Present sales of Rs.60, 000 per month utilizes only 60% capacity of the plant. Marketing Manager assures that with the reduction of 10% in the price he would be in a position to increase the sale by about 25% to 30%.

The following data are available:

- (i) Selling price Rs.10 per unit
- (ii) Variable cost Rs.3 per unit
- (iii) Semi-variable cost Rs.6,000 fixed + 50 paise per unit
- (iv) Fixed cost Rs.20,000 at present level estimated to be Rs.24,000 at 80% output.

You are required to prepare the following statements:

- (1) The operating profit at (a) 60%, (b) 70% and (c) 80% levels at current selling prices, and
- (2) The operating profits at proposed selling price at the above levels.

<b>Solution: Sales volume</b>	6,000 units	7,000 units	8,000 units
Sales Value (Rs.10 per unit) (A)	60,000	70,000	80,000
Variable Cost (Rs.3 per unit)	18,000	21,000	24,000
Semi-variable Cost			
- Fixed Cost	6,000	6,000	6,000
- Variable Cost	3,000	3,500	4,000
Fixed Cost	20,000	20,000	24,000
Total Cost (B)	47,000	50,500	58,000
(1) Profit (A) - (B)	13,000	19,500	22,000
(2) Reduction in profits due to reduction in SP	(6,000)	(7,000)	(8,000)
Revised profits	7,000	12,500	14,000

Q.11 A Limited company is engaged in the business of manufacturing standard toys. It has prepared a six-monthly budget, which shows the following particulars:

Sales	80,000 units @ Rs.20 per unit
Variable Cost: Manufacturing	Rs.6 per unit
Selling	Re.1 per unit
Distribution	Re.0.25 per unit
Semi-Variable costs:	Rs.
Manufacturing	60,000
Selling	30,000
Administration	16,000
Fixed Costs:	
Manufacturing	60,000
Selling	40,000
Administration	80,000

It is decided to provide a plastic tray along with sales of toys. It is estimated this gesture on the part of the Company would boost up the sales from 80,000 units to 1,00,000 units.

The above proposal would involve an additional expenditure. The same is estimated as under:

Semi-variable cost:	Rs.
Manufacturing	4,000
Selling	4,000
Administration	2,000
Fixed Costs:	
Manufacturing	10,000

You are required to prepare a statement showing comparative Profitability.

Solution:

Particulars	80,000 units	1,00,000 units
<b>Sales (A)</b>	16,00,000	20,00,000
Variable cost		
Manufacturing	4,80,000	6,00,000
Selling	80,000	1,00,000
Distribution	20,000	25,000
(1)	5,80,000	7,25,000
<b>Semi-variable Cost</b>		
Manufacturing	60,000	64,000
Selling	30,000	34,000
Distribution	16,000	18,000
(2)	1,06,000	1,16,000
<b>Fixed Cost</b>		
Manufacturing	60,000	70,000
Selling	40,000	40,000

Distribution	80,000	80,000
(3)	1,80,000	1,90,000
<b>Total Cost [(1) + (2) + (3)] (B)</b>	8,66,000	10,31,000
<b>Profit (A) - (B)</b>	7,34,000	9,69,000

Q.12 Figures regarding sales, cost and profit at 50% capacity are given below:

	Rs.
Sales	20,00,000
Direct cost	8,00,000
Factory	4,00,000
Office overheads	2,00,000
Selling overheads	3,00,000
Profit	3,00,000

Every 10% increase in sales beyond 50% capacity is possible only after reducing the price by 1% on the base level of 50% capacity. Direct material cost is 25% of the total direct cost at 50% capacity. With every 10% increase in capacity above this level, the price of direct material comes down by 2%. 50% of the factory overheads are fixed and the rest are fully variable. Office overheads are of step character. Every 10% increase in output results in 2% increase in office overheads over 50% capacity. Selling overheads increase in proportion of sales value. Prepare a flexible budget at 80% capacity.

Solution: Budget for 80% capacity (Rs.)

<b>Sales Value</b>	<b>(A)</b>	31,04,000
$\frac{[20,00,000 \times \frac{80\%}{50\%}] \times \frac{97}{100}}{100}$		
Direct Material Cost		3,00,800
$\frac{[25\% \text{ of } 8,00,000] \times \frac{80\%}{50\%} \times \frac{94}{100}}{100}$		
Other Direct Cost		9,60,000



$\{75\% \text{ of } 8,00,000 \times \underline{80\%}\}$	
50%	
Variable Factory Overheads	3,20,000
$\{2,00,000 \times \underline{80\%}\}$	
50%	
Selling Overhead	4,65,600
$\{3,00,000 \times \underline{31,04,000}\}$	
20,00,000	
<b>Total Variable Cost (B)</b>	20,46,400
<b>Step Cost</b>	
Office Overheads $[2,00,000 \times 106\%]$ (C)	2,12,000
<b>Fixed Overheads</b>	
Factory $[50\% \text{ of factory overheads}]$ (D)	2,00,000
<b>Profit = A – B – C – D</b>	6,45,600

Q.13 The following data are available in a manufacturing company for a half-yearly period:

	Rs.	Rs.
	(lakhs)	(lakhs)
Fixed Expenses:		
Wages and Salaries	8.40	
Rent, Rates and Taxes	5.60	
Depreciation	7.00	
Sundry Administration Expenses	<u>8.90</u>	29.90
Semi-Variable Expenses: (at 50% of capacity)		
Maintenance and Repairs	2.50	
Indirect Labour	9.90	
Sales Dept. Salaries etc.	<u>2.90</u>	17.90

Sundry Administrative Expenses	
Variable Expenses: (at 50% of capacity)	
Materials	24.00
Labour	25.60
Other Expenses	3.80
53.40	

Assume that the fixed expenses remain constant for all levels of production, semi-variable expenses remain constant between 45% and 65% of capacity increasing by 10% between 65% and 80% capacity, and by 20% between 100% capacity.

Sales at the various levels are: (Rs. Lakhs)

60% Capacity	100.00
75% Capacity	120.00
90% Capacity	150.00
100% Capacity	170.00

Prepare a flexible budget for the half year and forecast the profits at 60%, 75%, 90% and 100% of capacity.

Solution:

Production level	60%	75%	90%	100%
<b>Variable Expenses</b>				
Material	28.80	36.00	43.20	48.00
Labour	30.7222	38.40	46.08	51.20
Other Expenses	4.56	5.70	6.84	76.00
<b>(A)</b>	64.08	80.10	96.12	106.80
<b>Semi-variable Expenses</b>				
Maintenance Expenses	2.50	2.75	3.00	3.00
Indirect labour	9.90	10.89	11.88	11.88
Sales Department Expenses	2.90	3.19	3.48	3.48

Administration Expenses	2.60	2.86	3.12	3.12
<b>(B)</b>	17.90	19.69	21.48	21.48
<b>Fixed Expenses</b>				
Wages	8.40	8.40	8.40	8.40
Rent	5.60	5.60	5.60	5.60
Depreciation	7.00	7.00	7.00	7.00
Administration Expenses	8.90	8.90	8.90	8.90
<b>(C)</b>	29.90	29.90	29.90	29.90
<b>T.C. (A) + (B) + (C)</b>	111.88	129.69	147.50	158.18
<b>Profit/Loss</b>	(11.88)	(9.69)	2.50	11.82
<b>Sales</b>	100.00	120.00	150.00	170.00

Q.14 A newly established manufacturing company has an installed capacity to produce 1,00,000 units of a consumer product annually. However its practical capacity is only 90%. The actual capacity utilization may be substantially lower, as the firm is new to the market and demand is uncertain. The following budget has been prepared for 90% capacity utilization:

Cost per units		
	Rs.	
Direct Materials	12	
Direct Labour	8	
Direct Expense	5	
Production Overheads	10	(40% variable)
Administrative Overheads	5	(100% fixed)
Selling and Distribution	6	(50% variable)

You are required to prepare budgets at 60%, 70% and 80% levels of capacity utilization given clearly the unit variable cost; the unit fixed cost and the total costs under various heads at all the above levels.

<b>Solution:</b>	<b>90%</b>	<b>60%</b>	<b>70%</b>	<b>80%</b>
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<b>Units</b>		90,000	60,000	70,000	80,000
Direct Material	Rs.12	10,80,000	7,20,000	8,40,000	9,60,000
Direct Labour	Rs.8	7,20,000	4,80,000	5,60,000	6,40,000
Direct Expenses	Rs.5	4,50,000	3,00,000	3,50,000	4,00,000
Variable Production Overhead	Rs.4	3,60,000	2,40,000	2,80,000	3,20,000
Variable Selling Overhead	Rs.3	2,70,000	1,80,000	2,10,000	2,40,000
<b>Total Variable Cost</b>		28,80,000	19,20,000	22,40,000	25,60,000
<b>Variable Cost per unit</b>		Rs.32	Rs.32	Rs.32	Rs.
Fixed Production Overheads		5,40,000	5,40,000	5,40,000	5,40,000
Fixed Administrative Overheads		4,50,000	4,50,000	4,50,000	4,50,000
Fixed Selling Overheads		2,70,000	2,70,000	2,70,000	2,70,000
<b>Total Fixed cost</b>		12,60,000	12,60,000	12,60,000	12,60,000
<b>Fixed Cost Per unit</b>		Rs.14	Rs.21	Rs.18	Rs.15.75
<b>Total Cost Per unit</b>		Rs.46	Rs.53	Rs.53	Rs.47.75

#### Functional Budgets:

Q.15 A single product company estimated its sales for the next year quarter wise as under:

<b>Quarter</b>	<b>Sales (Units)</b>
I	30,000
II	37,500
III	41,250
IV	45,000

The opening stock of finished goods is 10,000 units and the company expects to maintain the closing stock of finished goods at 16,250 units at the end of the year. The production pattern in each quarter is based on 80% of the sales of the current quarter and 20% of the sales of the next quarter.

The opening stock of raw materials in the beginning of the year is 10,000 kg. And the closing stock at the end of the year is required to be maintained at 5,000 kg. Each unit of finished output requires 2 kg. Of raw materials. The company proposes to purchase the entire annual

requirement of raw materials in the first three quarters in the proportion and at the prices given below:

<b>Quarter</b> <b>Annual requirement in quantity</b>	<b>Purchase of raw materials % to total</b>	<b>Price per kg.</b> <b>Rs.</b>
I	30%	2
II	50%	3
III	20%	4

The value of the opening stock of raw materials in the beginning of the year is Rs.20,000. You are required to present the following for the next year, quarter wise:

- (i) Production budget (in units).
- (ii) Raw material consumption budget (in units).
- (iii) Raw material purchase budget (in quantity and value).

Solution: Working Note: Total Annual Production (in units)

Sales in 4 quarters	1,53,750
Add: Closing Stock of Finished Goods	16,250
	1,70,000
Less: Opening Stock of Finished Goods	(10,000)
Total number of units to be produced in the next year	1,60,000

**(i) Production Budget (in units)**

	<b>Quarters</b>				
	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>Total</b>
	<b>Units</b>	<b>Units</b>	<b>Units</b>	<b>Units</b>	<b>Units</b>
Sales	30,000	37,500	41,250	45,000	1,53,750
Production in current quarter (80% of the sale of current quarter)	24,000	30,000	33,000	36,000	
Production for next quarter (20% of the sale of next quarter)	7,500	8,250	9,000	12,250*	
Total production	31,500	38,250	42,000	48,250	1,60,000

\* Difference figure.

(ii)

**Raw material consumption budget in quantity**

	Quarters				Total
	I	II	III	IV	
Units to be produced in each quarter: (A)	31,500	38,250	42,000	48,250	1,60,000
Raw material consumption p.u. (kg.) (B)	2	2	2	2	2
Total raw material consumption (kg.) (A+B)	63,000	76,500	84,000	96,500	3,20,000

(iii)

**Raw material purchase budget (in quantity)**

Raw material required for production (kg.)	3,20,000
Add: Closing balance of raw material (kg.)	5,000
Less: Opening balance (kg.)	(10,000)
Raw Material to be purchased (kg.)	3,15,000

**Raw material purchase budget (in value)**

Quarters	% of annual requirement (Qty.) for purchasing raw material	Quantity of raw material to be purchased	Rate per kg.	Amount
	(Kg)		(Rs.)	(Rs.)
(1)	(2)	(3)	(4)	(5)=(3)×(4)
I	30	94,500 (3,15,000 kg × 30%)	2	1,89,000
II	50	1,57,500 (3,15,000 kg × 50%)	3	4,72,500
III	20	63,000 (3,15,000 kg × 20%)	4	2,52,000
Total		3,15,000		9,13,500

Sales Budgets:

Q.16 XYZ & Co. Ltd. Manufactures two products X and Y and sells them through two divisions East and West. For the purpose of submission of sales budget to the budget committee the following information has been made available:

Budgeted sales for the current year were:

Product	East	West
X	400 at Rs.9	600 at Rs.9
Y	300 at Rs.21	500 at Rs.21

Actual sales for the current year were:

Product	East	West
X	500 at Rs.9	700 at Rs.9
Y	200 at Rs.21	400 at Rs.21

Adequate market studies reveal that Product X is popular but under-priced. It is observed that if price of X is increased by Re.1, it will find a ready market. On the other hand Y is over-priced to customers and market could absorb more if sales price of Y be reduced by Re.1. The management has agreed to give effect to the above price changes.

From the information based on these price changes and reports from salesmen, the following estimates have been prepared by divisional managers:

Percentage increase in sales over budget is:

Product	East	West
X	+10%	+5%
Y	+20%	+10

With the help of an intensive advertisement campaign the following additional sales above the estimated sales of divisional managers are possible:

Product	East	West
X	60	70
Y	40	50

You are required to prepare a Budget for sales incorporating the above estimates and also show the budgeted and actual sales of the current year.

Solution: Sales Budgets

Division	Product	Budget for future period			Budget for current period			Actual Sales for current period		
		Qty.	Price	Value	Qty.	Price	Value	Qty.	Price	Value
East	X	500	Rs. 10	Rs. 5,000	400	Rs. 9	Rs. 3,600	500	Rs. 9	Rs. 4,500
	Y	400	20	8,000	300	21	6,300	20	21	4,200
Total		900		13,000	700		9,900	700		8,700
West	X	700	10	7,000	600	9	5,400	700	9	6,300
	Y	600	20	12,000	500	21	10,500	400	21	8,400
Total		1,300		19,000	1,100		15,900	1,100		14,700

TOTAL	X	1,200	10	12,000	1,000	9	9,000	1,200	9	10,800
	Y	1,000	20	20,000	800	21	16,800	600	21	12,600
Total		2,200		32,000	1,800		25,800	1,800		23,400

#### Cash Budget

Q.17 Prepare a Cash Budget for the three months ending 30<sup>th</sup> June, 2006 from the information given below:

(a) Month	Sales	Materials	Wages	Overheads
February	Rs.14,000	Rs.9,600	Rs.3,000	Rs.1,700
March	15,000	9,000	3,000	1,900
April	16,000	9,200	3,200	2,000
May	17,000	10,000	3,600	2,200
June	18,000	10,400	4,000	2,300

(b) Credit terms are:-

Sales/Debtor – 10% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month.

Creditors' — Materials 2 months



— Wages	¼ month
— Overheads	½ month

(c) Cash and Bank balance on 1<sup>st</sup> April, 2006 is expected to be Rs.6,000.

(d) Other relevant information is:

(i) Plant and Machinery will be installed in February 2006 at a cost of 96,000. The monthly installments of 2,000 is payable from April onwards.

(ii) Dividend @ 5% on Preference Share Capital of 2,00,000 will be paid on 1<sup>st</sup> June.

(iii) Advance to be received for sale of vehicles 9,000 in June.

(iv) Dividends from investments amounting to 1,000 are expected to receive in June.

(v) Income tax (advance) to be paid in June is 2,000.

**Solution: Cash Budget (April – June 2006)**

	April	May	June	Total
1. Balance b/f	6,000	3,950	3,000	6,000
2. <b>Receipts:</b> Sales (Note 1)				
Dividend	14,650	15,650	16,650	46,950
Advance against vehicle			1,000	1,000
<b>Total</b>			9,000	9,000
3. <b>Payments:</b> Creditors*	20,650	19,600	29,650	62,950
Wages*	9,600	9,000	9,200	27,800
Overhead*	3,150	3,500	3,900	10,550
Capital Expenditure	1,950	2,100	2,250	6,300
Dividend on preference shares	2,000	—	2,000	6,000
Income tax advance			10,000	10,000
<b>Total</b>			2,000	2,000
4. Balance c/f	16,700	16,600	29,350	62,650
	3,950	3,000	300	300

**Working Notes:**

**Collection from Debtors**

Month	Calculation	April (Rs.)	May (Rs.)	June (Rs.)
Feb.	(14,000 – 10%) of (14,000) × 50%	6,300		
March	(15,000 – 10% of 15,000) × 50%	6,750	6,750	
April	10% of 16,000 (16,000 – 10% of 16,000) × 50%	1,600	7,200	7,200
May	10% of 17,000 (17,000 – 10% of 17,000) × 50%		1,700	7,650
June	10% of 18,000	————	——— <u>1,800</u>	
		<u>14,650</u>	<u>15,650</u>	<u>16,650</u>

\*Payments for creditors, wages and overhead have been computed on the same pattern.

Q.18 Based on the following information prepare a cash budget for ABC Ltd.

	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>th</sup> Quarter
Opening cash balance	Rs.10,000			
Collection from customers	1,25,000	Rs.1,50,000	Rs.1,60,000	Rs.2,21,000
Payment:				
Purchase of materials	20,000	35,000	35,000	54,200
Other expenses	25,000	20,000	20,000	17,000
Salary and wages	90,000	95,000	95,000	1,09,200
Income tax	5,000	—	—	—
Purchase of machinery	—	—	—	20,000

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

Solution:

#### Cash budget

Particulars	1 <sup>st</sup> quarter	2 <sup>nd</sup> quarter	3 <sup>rd</sup> quarter	4 <sup>th</sup> quarter
Opening cash balance	10,000	15,000	15,000	15,325
Receipts:				
Collection from Customers	1,25,000	1,50,000	1,60,000	2,21,000
(A)	1,35,000	1,65,000	1,75,000	2,36,325
Payments:				
Purchase of materials	20,000	35,000	35,000	54,200
Other expenses:	25,000	20,000	20,000	17,000
Salary and wages	90,000	95,000	95,000	1,09,200
Income Tax	5,000	.....	.....	.....
Purchase of machinery	-----	.....	.....	20,000
(B)	1,40,000	1,50,000	1,50,000	2,00,400
(A) – (B)	(5,000)	15,000	25,000	35,925
Add: Loan taken	20,000	.....	.....	.....
*Less: Loan Repaid	.....	.....	(9,000)	(11,000)
*Payment of interest	.....	.....	(675)	(1,100)
Closing balance	15,000	15,000	15,325	23,825

\*9,000 X 10% X 9/12

Q.19. From the following information relating to a departmental store for the three months period ending 31<sup>st</sup> January, 1987, you are required to prepare the following:

Monthly cash budget on receipts and payments basis, and

It is anticipated that the working capital items 1<sup>st</sup> November, 1986 will be a follows:

	<b>Rs. 0000's</b>
Cash in hand and at bank	545
Short-term investments	300
Debtors	2,570
Stock	1,300
Trade Creditors	2,110
Other Creditors	200
Dividend due	485
Tax Due	320

**Budgeted Profit Statement**

	<b>Rs. 000's</b>		
	<b>November</b>	<b>December</b>	<b>January</b>
Sales	2,100	1,800	1,700
Cost of Sales	1,635	1,405	1,330
Gross profit	465	395	370
Administrative, Selling and Distribution Expenses and Interest	315	270	255
Net profit prior to tax	150	125	115

**Budgeted Balances at the end of each month**

	<b>Rs. 000,s</b>		
	<b>30<sup>th</sup> November</b>	<b>31<sup>st</sup> December</b>	<b>31<sup>st</sup> January</b>
Short Term Investments	700	---	200
Debtors	2,600	2,500	2,350
Stock	1,200	1,100	1,000
Trade Creditors	2,000	1,950	1,900
Other Creditors	200	200	200

Dividend Due	485	---	---
Tax Due	320	320	320

Depreciation amounting to Rs. 60,0000 is included in the budgeted expenditure for each month. Capital expenditure amounting to Rs. 8,00,000 is expected to be incurred is during December 1986 and proceeds from the sale of plant and equipment of Rs. 50,000 is expected is January, 1987.

Solution:

### Cash Budget

Particulars	November	December	January
Opening cash balance	545	315	65
Receipts:			
Sales of short term investment		700	
Cash received from debtors	2,070	1,900	1850
(See working note1)			50
Sales proceeds of plant & equipment	_____		
	(A) 2,615	2,915	1,965
Payments :			
Purchases of investment	400	----	200
Cash paid to suppliers	1,645	1,355	1,280
Payment of dividend	----	485	----
Payment of overhead (excluding Depreciation)			
Capital expenditure	255	210	195
		800	
Closing balance	315	65	290

Working notes: (i)

Computation of cash received from debtors

Particulars	November		December
	January		
Opening debtors	2.570	2,600	2,500
Add: credit sales	2.100	1,800	1,700
Less: Closing debtors	(2,600)	(2,500)	(2,350)
	2,070	1,900	1,850

(2)

### Computation of purchases

Particulars	November	December	
	January		
Cost of sales	1,635	1,405	1,330
Add: closing stock	1,200	1,100	1,000
Less: opening stock	(1,300)	(1,200)	(1,100)
Purchases	1,535	1,305	1,230
Add: opening creditors	2,110	2,000	1,950
Less: Closing Creditors	(2000)	(1950)	(1,900)
Cash paid to suppliers	16,45	1,355	1,280

Control Ratios

Q.20. Activity ratio of a company is 80% and its capacity ratio is 120%. Find out its efficiency ratio

Solution: Activity Ratio = Capacity × Efficiency Ratio

$$80 = 120 \times X$$

$$120X = 80$$

$$X = \frac{80}{120} = \frac{2}{3} = \text{or } 66.67\%$$

$$120 \quad 3$$

Q.21. A factory manufactures two types of articles – X and Z. Article X takes 10 hours to make and article Y requires 20 hours. In a month (25 days or 8 hours each) 500 units of X and 300 units of Y are produced. The budgeted hours are 8,500 per month. The factory employs 60 men in the department concerned. Compute Activity Ratio, Capacity Ratio and Efficiency Ratio.

Solution: Hrs.

Standard hours for actual production

X 500 units × 10 5,000

Y 300 units × 20 6,000

11,000

Budgeted Hours 8,500

Actual Hours Worked  $60 \times 8 \times 25 = 12,000$

Activity Ratio =  $\frac{\text{Standard hours for actual production}}{\text{Budgeted hours}} \times 100$

$$= \frac{11,000}{8,500} \times 100 = 129\%$$

Capacity Ratio =  $\frac{\text{Actual hours worked}}{\text{Budgeted hours}} \times 100$

$$= \frac{12,000}{8,500} \times 100 = 141\%$$

Efficiency Ratio =  $\frac{\text{Standard hours for actual production}}{\text{Actual hours worked}} \times 100$

$$= \frac{11,000}{12,000} \times 100 = 92\%$$

Q.22 Calculate Efficiency and Capacity ration from the following figures:

Budgeted production 80 units

Actual production 60 units

Standard time per unit 8 hours

Actual hours worked 500

Solution: Efficiency ratio =  $\frac{\text{Std. hours for actual production}}{\text{Actual hours worked}} \times 100$

$$\begin{aligned}
 & \text{Actual hours worked} \\
 &= \frac{8 \text{ hours} \times 60 \text{ units}}{500 \text{ hours}} \times 100 \\
 &= 96\%
 \end{aligned}$$

$$\begin{aligned}
 \text{Capacity ratio} &= \frac{\text{Actual hours worked}}{\text{Budgeted working hours}} \times 100 \\
 &= \frac{500 \text{ hours}}{8 \text{ hours} \times 80 \text{ units}} \times 100 \\
 &= 78.125\%
 \end{aligned}$$

Q.23 Calculate efficiency and activity ratio from the following data:

Capacity ratio	=	75%
Budgeted output	=	6,000 units
Actual output	=	5,000 units
Standard Time per unit	=	4 hours

Solution:

$$\begin{aligned}
 \text{Capacity Ratio} &= \frac{\text{Actual Hours (AH)}}{\text{Budgeted Hours}} \times 100 \\
 75\% &= \frac{\text{AH}}{6000 \text{ units} \times 4 \text{ hour per unit}}
 \end{aligned}$$

$$\begin{aligned}
 75 &= \frac{\text{AH}}{24000 \text{ Hours}}
 \end{aligned}$$

$$\text{AH} = 18000 \text{ Hours}$$

$$\begin{aligned}
 \text{Efficiency Ratio} &= \frac{\text{Standard hours for actual output}}{\text{Actual Working Hours}} \times 100 \\
 &= \frac{5000 \text{ units} \times 4 \text{ hours per unit}}{18000 \text{ Hours}} \times 100
 \end{aligned}$$



$$\begin{aligned}
 & \frac{18000 \text{ Hours}}{20000 \text{ Hours}} \times 100 = 111.11\% \\
 & \frac{18000 \text{ Hours}}{\frac{\text{Standard Hours for actual output}}{\text{Budgeted hours}}} \times 100 \\
 & = \frac{20000 \text{ units}}{6000 \text{ units} \times 4 \text{ hours per unit}} \times 100 \\
 & = \frac{20000 \text{ units}}{24000 \text{ units}} \times 100 = 83.33\%
 \end{aligned}$$

Q.24 A factory produces two products P and Q. P takes 10 hours to produce and Q requires 16 hours as per the budget. A month has 25 budgeted days of 8 hours each. During the month 500 units of P and 400 units of Q were produced. The factory employs 50 workers. They actually worked for 9 hours daily for 24 days because there was an unexpected holiday for one day. Calculate: (i) Efficiency Ratio (ii) Capacity Ratio (iii) Efficiency Ratio (iv) Calendar Ratio.

Solution: Total budgeted man-hours in the month =  $50 \times 8 \times 25 = 10,000$  hours

Total actual man-hours worked during the month =  $50 \times 9 \times 24 = 10,800$  hours

Budgeted hours for actual output =  $10 \times 500 + 16 \times 400 = 11,400$  hours

(i) Efficiency Ratio =  $\frac{\text{Budgeted Hours for Actual Output}}{\text{Actual Hours Worked}} \times 100 = \frac{11,400}{10,800} \times 100 = 105.55\%$

Actual Hours Worked 10,800

(ii) Capacity Ratio =  $\frac{\text{Actual Hours Worked}}{\text{Budgeted Hours}} \times 100 = \frac{10,800}{10,000} \times 100 = 108\%$

Budgeted Hours 10,000

(iii) Activity Ratio =  $\frac{\text{Budgeted Hours for Actual Output}}{\text{Actual Hours Worked}} \times 100 = \frac{11,400}{10,800} \times 100 = 114\%$

Budgeted Hours 10,800

Also, Activity Ratio = Efficiency ratio  $\times$  Capacity ratio =  $105.55 \times 108 = 114\%$

(iv) Calendar Ratio =  $\frac{\text{Actual days working in the month}}{\text{Budgeted days in the month}} \times 100 = \frac{24}{25} \times 100 = 96\%$

Budgeted days in the month 25



# MARGINAL COSTING

**Marginal Costing** is not a method of cost ascertainment like job costing or contract costing. Marginal costing is a technique of costing, which may be used with other methods of costing, viz., job or process. For decision – making, it is more helpful to the management. The other names for marginal costing are direct costing, differential costing, incremental costing and comparative costing.

In marginal costing, only variable items of costs are taken into account. These variable costs will change in direct relation to the change in the volume of production or change in the production by one unit. As such, variable costs are called product costs and are charged to production. Fixed costs are not allocated to cost unit; and these are charged directly to profit and loss account during the period and are called as period costs or capacity costs.

## Definition of marginal cost and marginal costing

Marginal cost means the same thing as variable cost. The term is not a new one. The accountants' concept of marginal cost differs from economists' of producing one additional unit. This shall include an element of fixed cost also. Moreover, the economists' marginal cost per unit cannot be uniform with the additional production since the law of diminishing or increasing returns is applicable; whereas the accountants' marginal cost shall be constant per unit of output with the additional production.

The Institute of Cost and Works Accountants of India defined marginal cost as, “the amount at any given volume of output by which aggregate costs are changed, if the volume of output is increased or decreased by one unit.” Here, a unit may be a single article, a batch of articles, an order, a stage of production capacity, a process or a department. To ascertain the marginal cost, we need the following elements of cost:

- (a) Direct materials
- (b) Direct labour
- (c) Other direct expenses, and
- (d) Total variable overheads.

That is,  $\text{Marginal Cost} = \text{Prime Cost} + \text{Total variable overheads}.$

OR

$$\text{Marginal Cost} = \text{Total Cost} - \text{Fixed Cost}$$

Marginal costing is defined by the ICWA as, “the ascertainment by differentiating between fixed costs, and variable costs of marginal costs and of the effect on profit of changes in volume or type of output.” According to Dr. Joseph, “Marginal costing is a technique of determining the amount of change in the aggregate costs due to an increase of one unit over the existing level of production. As such, it arises from the production of additional increments of output.

Batty defines Marginal Costing as “a technique of cost accounting which pays special attention to the behaviour of costs with changes in the volume of output.”

Example:

	Rs.
Variable cost 8,000 @ Rs.55	40,000
Fixed cost	10,000
	-----
Total cost	50,000

If the production is increased by one unit, the following expenditure will be necessary:

	Rs.
Variable cost 8,002 x Rs.5	40,005
Fixed costs	10,000
	-----
Total cost	50,005
Less: Total cost of 8,000 units	50,000
	-----
Marginal cost of one unit:	5

$$\text{Marginal cost} = \frac{\text{Increase in total cost}}{\text{Increase in total units}}$$

It may be remembered that marginal cost takes into account only variable cost and exclude the fixed cost.

The following example will clarify the above point:

---

Unit	Total cost	Fixed cost	Variable cost	Marginal cost
<hr/>				
1	400	200	200	200
2	600	200		200
3	800	200		200

---

In the above example, marginal cost is Rs.200 per unit. (Total cost – fixed cost = Variable cost). The marginal cost of 3 units is Rs.600 (Rs.200 x 3). It is added to fixed cost, Rs.200. Then the total cost is Rs.800.

The definition of fixed cost given by the I.C.M.A. London, is “a cost which accrues in relation to the passage of time and which, within certain output or turnover limits, tends to be unaffected by fluctuations in volume of output or turnover. Examples are rent, insurance and executive and salaries.”

Fixed cost is one which tends to be unaffected by variation in volume of output. Fixed cost does not change with the increase or decrease in production with a certain range. Period cost is another name for fixed cost, as it is related to periods.

Variable cost is one which tends to vary directly with the volume of output. Variable cost changes with the increase or decrease in production. In direct costing variable cost is known as direct.

# Main Features of Marginal Costing

1. Marginal costing is a technique or working of costing, which is used in conjunction with other methods of costing (process or job).
2. Fixed and variable costs are kept separate at every stage. Semi – variable costs are also separated into fixed and variable.
3. As fixed costs are period costs, they are excluded from product cost or cost of production or cost of sales. Only variable costs are considered as the cost of the product.
4. When evaluation of finished goods and work-in-progress are taken into account, they will be only variable costs.
5. As fixed costs are period costs, they are charged to profit and loss account during the period in which they are incurred. They are not carried forward to the next year's income.
6. Marginal income or marginal contribution is known as the income or the profit.
7. The difference between the contribution and fixed costs is the net profit or loss.
8. Fixed costs remain constant irrespective of level of activity.
9. Sales price and variable cost per unit remain the same.
10. Cost volume profit relationship is fully employed to reveal the state of profitability at various levels of activity.

## Advantages:

1. **Constant in nature.** Variable cost fluctuate from time to time, but in the long run, marginal costs are stable. Marginal costs remain the same, irrespective of the volume of production.
2. **Effective cost control.** It divides cost into fixed and variable. Fixed cost is excluded from product. As such, management can control marginal cost effectively.
3. **Treatment of overheads simplified.** It reduces the degree of over or under – recovery of overheads due to the separation of fixed overheads from production cost.
4. **Uniform and realistic valuation.** As the fixed overhead costs are excluded from product cost, the valuation of work – in – progress and finished goods becomes more realistic.
5. **Helpful to management.** It enables the management to start a new line of production which is advantageous. It is helpful in determining which is profitable whether to buy or manufacture a product. The management can take decision regarding pricing and tendering.
6. **Helps in production planning.** It shows the amount of profit at every level of output with the help of cost volume profit relationship. Here the break-even chart is made use of.
7. **Better results.** When used with standard costing, it gives better results.
8. **Fixation of selling price.** The differentiation between fixed costs and variable costs is very helpful in determining the selling price of the products or services.

Sometimes, different prices are charged for the same article in different markets to meet varying degree of competition.

9. **Helpful in budgetary control.** The classification of expenses is very helpful in budgeting and flexible budget for various levels of activities.
10. **Preparing tenders.** Many business enterprises have to compete in the market in quoting the lowest price. Total variable cost, when separately calculated, becomes the 'floor price'. Any price above this floor price may be quoted to increase the total contribution.
11. **"Make or Buy" decision.** Sometimes a decision has to be made whether to manufacture a component or a product or to buy if ready made from the market. The decision to purchase it would be taken if the price is paid recovers some of the fixed expenses.
12. **Better presentation.** The statements and graphs prepared under marginal costing are better understood by management executives. The break-even analysis presents the behaviour of cost, sales, contribution etc. in terms of charts and graphs. And, thus the results can easily be grasped.

### **Disadvantages**

1. **Difficulty to analyse overhead.** Separation of costs into fixed and variable is a difficult problem. In marginal costing, semi-variable or semi-fixed costs are not considered.
2. **Time element ignored.** Fixed costs and variable costs are different in the short run; but in the long run, all costs are variable. In the long run all costs change at varying levels of operation. When new plants and equipments are introduced, fixed costs and variable costs will vary.
3. **Unrealistic assumption.** Assumption of sale price will remain the same at different levels of operation. In real life, they may change and give unrealistic results.
4. **Difficulty in the fixation of price.** Under marginal costing, selling price is fixed on the basis of contribution. In case of cost plus contract, it is very difficult to fix price.
5. **Complete information not given.** It does not explain the reason for increase in production or sales.
6. **Significance lost.** In capital-intensive industries, fixed costs occupy major portions in the total cost. But marginal costs cover only variable costs. As such, it loses its significance in capital maintenance.
7. **Problem of variable overheads.** Marginal costing overcome the problem of over and under-absorption of fixed overheads. Yet there is the problem in the case of variable overheads.
8. **Sales-oriented.** Successful business has to go in a balanced way in respect of selling production functions. But marginal costing is criticized on account of its attaching over-importance to selling function. Thus it is said to be sales – oriented. Production function is given less importance.
9. **Unreliable stock valuation.** Under marginal costing stock of work-in-progress and finished stock is valued at variable cost only. No portion of fixed cost is

added to the value of stocks. Profit determined, under this method, is depressed.

10. **Claim for loss of stock.** Insurance claim for loss or damage of stock on the basis of such a valuation will be unfavourable to business.
11. **Automation.** Now-a-days increasing automation is leading to increase in fixed costs. If such increasing fixed costs are ignored, the costing system cannot be effective and dependable.

Marginal costing, if applied alone, will not be much use, unless it is combined with other techniques like standard costing and budgetary control.

### Absorption costing and Marginal Costing

Absorption costing is the practice of charging all costs, both fixed and variable to operations, process or products. In marginal costing, only variable costs are charged to productions.

The Institute of Cost and Management Accountants (U.K.) defines it as, “the practice of charging all costs, both variable and fixed to operations, process or products.” This explains why this technique is also called full costing. Administrative, selling and distribution overheads as much form part of total cost as prime cost and factory burden.

The following sample illustrates the difference between the two techniques.

## PROFIT VOLUME RATIO

### Profit Volume Ratio

Profit volume ratio, which is popularly known as P/V Ratio, expresses the relationship of contribution – sales ratio or marginal – income ratio or variable profit ratio. The ratio, expressed as a percentage, indicates the relative profitability of different products.

The formula for computing the P/V ratio is given below:

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} \quad \text{C} \quad \text{S} \quad \text{----- (or) -----}$$



$$\text{Or} \quad = \quad \frac{\text{Fixed cost + Profit}}{\text{Sales}} \quad (\text{or}) \quad \frac{F + P}{S}$$

$$\text{Or} \quad = \quad \frac{\text{Sales - Variable cost}}{\text{Sales}} \quad (\text{or}) \quad \frac{S - V}{S}$$

The profit of a business can be increased by improving P/V ratio. As such management will make efforts to improve the ratio. A higher ratio means a greater profitability and vice versa. So management will increase the P/V ratio:

- (a) by increasing sales price per unit.
- (b) By decreasing variable costs.
- (c) By increasing the production of products which is having a high P/V ratio and vice versa.

### Q 1

Marginal cost Rs.2,400

Selling price Rs.3,000

Calculate P/V ratio.

### Q 2

The sales turnover and profits during two periods are as under:

Period I : Sales Rs.20 lakhs; Profit Rs.2 lakhs

Period II : Sales Rs.30 lakhs; Profit Rs.4 lakhs

Calculate P/V ratio.

## **BREAK EVEN EBIT UNITS & REVENUE**

## Break Even Analysis

The break-even analysis point and break even chart are two by – products of break even analysis. In a narrow sense, it is concerned with the break – even point in a broad sense, it is concerned with break – even chart. Break – even analysis is also known as cost volume profit analysis. The analysis is a tool of financial analysis whereby the impact on profit of the changes in volume, price and costs and mix can be estimated with reasonable accuracy. Break – even point is equilibrium point or balancing point of no – profit no loss. This is a profit at which loss ceases and profit begins. This is a point where income is exactly equal to expenditure.

## Break – Even Point

Break – even point is a point where the total sales are equal to total cost. In this point there is no profit or loss in the volume of sales. The formula to calculate break – even point is:

$$\begin{aligned} \text{B.E.P. (in units)} &= \frac{\text{Total fixed cost}}{\text{Contribution per unit}} \\ &= \frac{\text{Fixed cost}}{\text{Selling price per unit} - \text{Variable cost per unit}} \end{aligned}$$

B.E.P. can be calculated, by using the formula:

$$\text{B.E.P. (Sales volume)} = \frac{\text{Fixed cost}}{\text{P/V ratio}} \quad \text{(or)} \quad \frac{F}{\text{P/V ratio}}$$

2. Fixed cost = B.E.P. x P/V ratio.

From the following particulars calculate the break – even point:

Variable cost per unit	Rs.12
Fixed expenses	Rs.60,000
Selling price per unit	Rs.18

**Q 4**

From the following particulars, find out the selling price per unit of B.E.P. is to be brought down to 9,000 units.

Variable cost per unit	Rs.75
Fixed expenses	Rs.2,70,000.
Selling price per unit	Rs.100

**Q 5.**

The following data are obtained from the records of a company:

	First year	Second year
	Rs.	Rs.
Sales	80,000	90,000
Profit	10,000	14,000

Calculate the break – even point.

## **SALES FOR DESIRED PROFIT**

**Q 6.**

Sales	10,000 units @ Rs.25 per unit
Variable cost	Rs.15 per unit.
Fixed costs	Rs.1,00,000.
Find out the sales for earning a profit of	Rs.50,000.

# MARGINE OF SAFETY

Margin of Safety is an important concept in Marginal Costing approach. Total sales minus the sales at break – even point is known as the Margin of Safety (M/S). That is, Margin of Safety is the excess of normal or actual sales over sales at break – even point. In other words, sales over and above break even sales are known as Margin of Safety. The margin of safety refers to the amount by which sales revenue can fall before a loss is incurred. That is, it is the difference between the actual sales and sales at the break – even point. Break – even point can be compared to a Red Signal Point. If the Margin of Safety is large, it is a sign of soundness of the business and vice versa. The margin of safety serves as a guide, is a reliable indicator of the business strength and soundness. Margin of safety can be expressed in absolute sales amount or in percentage.

High margin of safety indicates the soundness of a business because even with substantial fall in sale or fall in production, some profit shall be made. Small margin of safety on the other hand is an indicator of the weak position of the business and even a small reduction in sale or purchase will adversely affect the profit position of the business.

Margin of safety can be increased by:

- (a) Decreasing the fixed cost;
- (b) Decreasing the variable cost;
- (c) Increasing the selling price;
- (d) Increasing output and sales;
- (e) Changing to a product mix that improves P/V Ratio.

Margin of Safety : Actual Sales – Sales at BEP

$$\begin{aligned} & \text{Profit} \\ \text{(OR)} &= \frac{\text{-----}}{\text{P/V Ratio}} \\ \\ \text{(OR)} &= \frac{\text{Profit}}{\text{-----}} \\ & \text{Contribution} \end{aligned}$$

$$\text{Margin of Safety} \\ \text{As a percentage} = \frac{\text{-----}}{\text{Total Sales}} \times 100$$

### Q 7

From the following details find out

- (a) profit volume ratio,
- (b) B.E.P.,
- (c) Margin of Safety

Rs.

Sales	1,00,000
Total costs	80,000
Fixed costs	20,000
Net profit	20,000

### Q 8

The following information was obtained from a Company in a certain year:

Sales	Rs.1,00,000
Variable costs	Rs. 60,000
Fixed costs	Rs. 30,000

Find the P/V Ratio, break – even point and margin of safety.

## COMPOSITE BREAK EVEN POINT

### Q. 9

Raj Ltd. manufactures three products X, Y and Z. The unit selling prices of these products are Rs.100, Rs.160 and Rs.75 respectively. The corresponding unit variable costs are Rs.50, Rs.80 and Rs.30. The proportions (quantity wise) in which these products are manufactured and sold are 20%, 30% and 50% respectively. The total fixed costs are Rs.14,80,000.

Calculate overall break – even quantity and the product wise break up of such quantity.

### **MISLANIUS QUESTIONS BASED ON COST VOLUME PROFIT ANALYSIS**

#### **Q 10**

A company earned a profit of Rs.30,000 during the year 2006-07. If the marginal cost and selling price of a product are Rs.8 and Rs.10 per unit respectively, find out the amount of 'margin of safety'.

#### **Q 11:**

X Ltd. has earned contribution of Rs.2,00,000 and net profit of Rs.1,50,000 on sales of Rs.8,00,000. What is its margin of safety?

#### **Q 12:**

If margin of safety is Rs.2,40,000 (40% of sales) and P/V ratio is 30% of AB Ltd., calculate its:

- (1) Break – even sales
- (2) Amount of profit on sales of Rs.9,00,000.

#### **Q 13:**

The ratio of variable cost to sales is 70%. The break – even point occurs at 60% of the capacity sales. Find the capacity sales when fixed costs are Rs.90,000. Also compute profit at 75% of the capacity sales.

#### **Q 14:**

The profit volume ratio of X Ltd. is 50% and the margin of safety is 40%.

You are required to calculate the net profit if the sales volume is Rs.1,00,000.

#### **Q 15:**

(i)	Ascertain profit, when	(ii)	Ascertain sales, when
Sales	= Rs.2,00,000	Fixed cost	= Rs.20,000
Fixed cost	= Rs.40,000	Profit	= Rs.10,000
BEP	= Rs.1,60,000	BEP	= Rs.40,000

**Q 16:**

A Company sells its product at Rs.15 p.u. In a period if it produces and sells 8,000 units, it incurs a loss of Rs.5 p.u. If the volume is raised to 20,000 units it earns a profit of Rs.4 p.u.

Calculate break – even point both in terms of rupees as well as in units.

**Q 17:**

Two firms A & Co. and B & Co. sell the same type of product in the same market. Their budgeted Profit and Loss Account for the year ending 31<sup>st</sup> March, 2007 are as follows:

<b>(Rs.)</b>				
	A & Co.		B & Co.	
Sales		5,00,000		6,00,000
Variable costs	4,00,000		4,00,000	
Fixed costs	30,000	4,30,000	70,000	4,70,000
Net Profit		70,000		1,30,000

Required:

- (1) Calculate at which sales volume of both the firms will earn equal profit.
- (2) State which firm is likely to earn greater profits in condition of:
  - (i) Heavy demand for the product;
  - (ii) Low demand for the product. Give reasons.

**Q 18:**

A company has three factories situated in North, East and South with its Head Office in Mumbai. The Management has received the following summary report on the operations of each factory for a period.

(Rs.'000)

	Sales		Profit	
	Actual	Over/ (under) Budget	Actual	Over/ (Under) Budget
North	1,100	(400)	135	(180)
East	1,450	150	210	90
South	1,200	(200)	330	(110)

Calculate for each factory and for the company as a whole for the period:

- (i) fixed costs,
- (ii) break – even sales.

**Q 19:**

A, B and C are three similar plants under the same management who want them to be merged for better operation. The details are as under:

(Rs. lakhs)

-----			
Plant	A	B	C
Capacity operated	100%	70%	50%
-----			
Turnover	300	280	150
Variable Cost	200	210	75
Fixed cost	70	50	62
-----			



Find out:

- (i) The capacity of the merged plant for break – even.
- (ii) The profit at 75% capacity of the merged plant.
- (iii) The turnover from the merged plant to give a profit of Rs.28 lakhs.

**Q 20:**

The comparative profit statement of two quarters of a firm is as under:

**(Rs.)**

	Quarter I	Quarter II
Units sold	2,500	3,750
Direct materials	87,500	?
Direct wages	62,500	?
Fixed and variable factory overheads	75,000	95,000
Sales	2,75,000	?
Profit	50,000	66,250

In the second quarter, the direct material price has increased by 20%. There was a saving of Rs.5,000 in fixed overheads in the second quarter. The other costs and selling price remained the same.

Determine the quantity that should have been sold in the second quarter to maintain the same amount of profit per unit as in the first quarter.

**Q 21:**

A company had incurred fixed expenses of Rs.4,50,000 with sales of Rs.15,00,000 and earned a profit of Rs.3,00,000 during the first half year. In the second half, it suffered a loss of Rs.1,50,000.

Calculate:

- (i) The profit – volume ratio, break – even point and margin of safety for the first half year.

- (ii) Expected sales – volume for the second half year assuming that selling price and fixed expenses remained unchanged during the second half year.
- (iii) The break – even point and margin of safety for the whole year.

**Q 22:**

PQR Ltd. has furnished the following data for the two year:

Particulars	2007	2008
Sales	Rs.8,00,000	?
Profit/Volume ratio (P/V ratio)	50%	37.5%
Margin of safety sales as % of		
Total sales	40%	21.875%

There has been substantial savings in the fixed cost in the year 2008 due to the restructuring process. The company could maintain its sales quantity level of 2007 in 2008 by reducing selling price.

You are required to calculate the following:

- (i) Sale for 2008 in Rs.
- (ii) Fixed cost for 2008.
- (iii) Break-even sales for 2008 in Rs.

**Q 23:**

A single product company sells its products at Rs.60 per unit. In 2007, the company operated at a margin of safety of 40%. The fixed costs amounted to Rs.3,60,000 and the variable cost ratio to sales was 80%.

In 2008, it is estimated that the variable cost will go up 10% and the fixed costs will increase by 5%. Find the selling price required to be fixed in 2008 to earn the same P/V ratio as in 2007.

Assuming the same selling price of Rs.60 per unit in 2008, find the number of units required to be produced and sold to earn the same profit as in 2007.

**Q 24:**

An Automobile manufacturing company produces different models of cars. The budget in respect of model 118 for the month of September, 2007 is as under:

(Rs. lakhs)		
-----		
Budgeted output	40,000 units	
-----		
Variable costs:		
Materials	264	
Labour	52	
Direct expenses	124	440.00
	-----	
Fixed costs:		
Specific fixed costs	90.00	
Allocated fixed costs	112.50	202.50
	-----	-----
Total costs		642.50
Add: Profit		57.50
		-----
Sales		700.00

Calculate:

- (i) Profit with 10% increase in selling price with a 10% reduction in sales volume.
- (ii) Volume to be achieved to maintain the original profit after a 10% rise in material costs, at the originally budgeted selling price per unit.

**Q 25:**

A company manufactures a single product with a capacity of 1,50,000 units per annum. The summarized profitability statement for the year is as under:

**(Rs. lakhs)**

-----

Sales: 1,00,000 units @ Rs.15 p.u.	15,00,000
------------------------------------	-----------

Cost of sales:

Direct materials	3,00,000	
Direct labour	2,00,000	
Production overhead: Variable	60,000	
Fixed	3,00,000	
Administrative overheads (fixed)	1,50,000	
Selling and distribution overheads:		
Variable	90,000	
Fixed	1,50,000	12,50,000
	-----	-----
		2,50,000

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You are required to evaluate the following options:

- (i) What will be the amount the sales required to earn to target profit of 25% on sales, if the packing is improved at a cost of Re.1 per unit?
- (ii) There is an offer from a large retailer for purchasing 30,000 per annum, subject to providing a packing with a different brand name at a cost of Rs.2 per unit. However, in this case there will be no selling and distribution expenses. Also this will not, in any way, affect the company's existing business. What will be the break – even price for this additional offer ?
- (iii) If an expenditure of Rs.3,00,000 is made on advertising, the sales would increase from the present level of 1,00,000 units to 1,20,000 units at a price of Rs.18 per unit. Will that expenditure be justified ?
- (iv) If the selling price is reduced by Rs.2 per unit, there will be 100% capacity utilization. Will the reduction in selling price be justified?

**Q 26:**

A company has prepared the following budget of sales:

Product	Sales (Rs.)	PV ratio (%)
A	6,00,000	40
B	9,00,000	30
C	10,00,000	25

The fixed costs amount to Rs.80,000.

You are required to revise the sales mix to ensure a profit of Rs.10,000 in such a way that not more than Rs.8,00,000 of sales of Product A is possible and that the present total value of sales should be altered.

**Q 27:**

A Company, which manufactures and sells three products, furnished the following retails for a month:

Products	A	B	C
No. of units budgeted	1,00,000	38,000	46,000
Selling price per unit (Rs.)	50	80	60
Variable costs per unit (Rs.)	34	52	24

It has been proposed that an intensive advertisement campaign involving an expenditure of Rs.1,20,000 per month and reduction of selling prices will increase the sales of Product C as under:

- (i) If the selling price is reduced to Rs.55 per unit, the sales will increase to 59,000 units per month.
- (ii) If the selling price is reduced to Rs.51 per unit, the sales will increase to 65,000 units per month.

The fixed costs of the company amount to Rs.34,20,000 per month.

Required:

- (i) Calculate the current monthly break – even sales value of the company.
- (ii) Evaluate the two proposals and advise which of the proposals should be implemented.
- (iii) Calculate the sales units required per month of Product C to justify the expenditure on advertisement in respect of your decision in (ii) above.

### Q 28

A Company produces single product which sells for Rs. 20 per unit. Variable cost is Rs. 15 per unit and fixed overhead for the year is Rs. 6, 30,000.

Required:

- (a) Calculate sales value needed to earn a profit of 10% on sales.
- (b) Calculate sales price per unit to bring BEP down to 1, 20,000 units.
- (c) Calculate margin of safety sales if profit is Rs. 60,000.

**Ans :- Rs. 42,00,000 ; Rs. 20.25; 25%**

### Q 29:

A Company has fixed cost of Rs. 90,000, Sales Rs. 3, 00,000 and Profit of Rs. 60,000.

Required:

- (1) Sales volume if in the next period, the company suffered a loss of Rs. 30,000.
- (2) What is the margin of safety for a profit of Rs. 90,000? (MAY 2008)

**Ans: P/V Ratio = 50%. (1) 1, 20,000 (2) 1, 80,000.**

### Q 30:

PQ Ltd. reports the following cost structure at two capacity levels:

**(100% capacity)**

	2,000 units'	1,500 units
Production overhead I	Rs. 3 per unit	Rs. 4 per unit
Production overhead II	Rs. 2 per unit	Rs. 2 per unit

If the selling price, reduced by direct material and labour is Rs. 8 per unit, what would be its break-even point?

**Ans: 1,000units.**

**Q 31:**

Maximum product capacity of JK Ltd. is 5,20,000 units per annum Details of estimated cost of production are as follows :

- ◆ Direct material Rs. 15 per unit .
- ◆ Direct wages Rs. 9 per unit (subject to a minimum of Rs. 2,50,000 per month
- ◆ Fixed overheads Rs. 9,60,000 per annum .
- ◆ Variable overheads Rs. 8 per unit
- ◆ Semi variable overheads are Rs. 5,60,000 per annum up to 50 percent capacity and additional Rs. 1,50,000 per annum for every 25 percent increase in capacity or part of it .
- ◆ JK Ltd. worked at 60 percent capacity for the first three months during the year 2008 but it is excepted to work at 90 percent capacity for the remaining nine months .
- ◆ The selling price per unit was Rs. 44 during the first three months .

You are required :

What selling price per unit should be fixed for the remaining nine months to yield a total profit of Rs. 15,62,500 for the whole year .

**Ans :- Rs. 39 per unit .**

**Q 32:**

Following information is available for the first and second quarter of the year 2008-09 of ABC Limited:

	Production (in units)	Semi-variable cost (Rs.)
Quarter I	36,000	2, 80,000
Quarter II	42,000	3, 10,000

You are required to segregate the semi-variable cost and calculate:

(a) Variable cost per unit; and

(b) Total fixed cost.

**Ans: variable cost p.u: 5, fixed cost: 1, 00,000.**

**Q 33:**

Product Z has a profit volume ratio of 28% .Fixed operating costs directly attributable to product Z during the quarter II of the financial year 2009 -2010 will be Rs. 2,80,000

Calculate the sales revenue required to achieve a quarterly profit of Rs. 70,000.

**Ans :- 12,50,000.**

**Q 34:**

The following information is available

	<b>1<sup>st</sup> April ,2008 to 30<sup>th</sup> June 2008</b>	<b>1<sup>st</sup> July ,2008 to 31<sup>st</sup> March 2009</b>
Output	10,000 units	35,000 units
Total overheads	Rs. 40,000	Rs. 1,35,000

You are required to calculate the amount of variable overhead per unit and amount of total fixed overheads for whole the year 2008-09

**Q 35:**

Following informations are available for the year 2008 and 2009 of PIX 3 Limited :

Year	2008	2009
Sales	Rs. 32,00,000	Rs. 57,00,000
Profit / (Loss)	(Rs. 3,00,000)	Rs. 7,00,000

Calculate – (1) P/V ratio, (2) Total fixed cost, and (3) Sales required to earn a Profit of Rs. 12,00,000.

**Ans :- 40% , Rs. 15,80,000**

**Q 36:**

MNP ltd. Sold 2, 75,000 units of its product at Rs. 37.50 per unit. Variable costs are Rs. 17.50 per unit. (Manufacturing cost of Rs. 14 and selling cost of Rs. 3.50 per unit).fixed cost are incurred uniformly throughout the year and amount to Rs. 35, 00,000 (including depreciation of Rs. 15, 00,000). There are no beginning and ending inventories.



Required:

- (1) Estimate break even sales level quantity and cash break even sales level quantity.
- (2) Estimate the P/V ratio.
- (3) Estimate the number of units that must be sold to earn an income (EBIT) of Rs. 2, 50,000.
- (4) Estimate the sales level to achieve an after tax income (PAT) of Rs. 2, 50,000. Assume 40% corporate income tax rate.

**Ans: (1) 1, 75,000 units. 1, 00,000 units. (2) 53.33%. (3) 1, 87,500 units. (4) 73, 44,210.**

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## APPLICATION OF MARGINAL COSTING

### 1. Profit planning

There are four ways in which profit performance of a business can be improved:

- (a) by increasing volume;
- (b) by increasing selling price;
- (c) by decreasing variable costs; and
- (d) by decreasing fixed costs.

Profit planning is the planning of future operations to attain maximum profit or to maintain a specified level of profit. The contribution ratio (which is the ratio of marginal contribution to sales) indicates the relative profitability of the different sectors of the business whenever there is a change in selling price, variable costs or product mix. Due to the merging together of fixed and variable costs, absorption costs fail to bring out correctly the effect of any such change on the profit of the concern.

**Q 37:**

A toy manufacturer earns an average net profit of Rs. 2.50 per piece on a selling price of Rs. 14.30 by producing and selling 60,000 pieces at 60% of the potential capacity. His cost of sale is :

Direct Material	Rs. 3.50
Direct wages	Rs. 1.25
Works overhead	Rs. 6.25 (50% fixed)
Sales overhead	Rs. 0.80 (25% variable )

During the current year, he anticipates that his fixed charges will go up by 10% while rates of direct material and direct labour will increase by 6%. And 8% respectively .But he has no option of increasing the selling price .

Under this situation he obtains an offer for an order equal to 20% of his capacity .The concerned customer is a special customer .

What minimum price will you recommend for accepting to ensure the manufacturer an overall profit of Rs. 1,67,300 ?

**Ans :- Rs. 11.297**

**Q 38:**

The following data relate to a manufacturing company :

Plant capacity : 4,00,000 units per annum

Present utilization : 40%

Actuals for the year were :

Selling Price	Rs.50 per unit
Materials Cost	Rs.20 per unit
Variable Manufacturing Cost	Rs.15 per unit
Fixed Costs	Rs.27 lakhs

In order to improve capacity utilization the following proposals are considered :

Reduce Selling Price by 10%

Spend additionally Rs.3 lakhs on Sales Promotion

How many units should be made and sold to earn a profit of Rs.5 lakhs per year in both the proposals.

**[Ans. 3,50,000 units]**

## 2. Evaluation of Performance

The various section of a concern such as a department, a product line, or a particular market or sales division, have different revenue earning potentialities. A company always concentrates on the departments or product lines which yield more contribution than others. The performance of each such sector can be brought out by means of cost volume-profit analysis or the contribution approach. The analysis will help the company to take decision that will maximise the profits.

**Q 39:**

A business produces three products A, B and C for which the standard variable costs and budgeted selling price are as follows :

	A	B	C
	Rs.	Rs.	Rs.
Direct materials	3	6	8
Direct wages	4	4	10
Variable overheads	3	5	7
Selling price	18	25	48

In two successive periods sales are as follows :

	A	B	C
	Units	Units	Units
Period 1	10,000	10,000	10,000
Period 2	20,000	13,000	5,000

The budgeted fixed overheads amounted to Rs. 1,35,000 for each period .in spite of increased sales the profit for the second period has fallen below that of the 1<sup>st</sup> period .

Present figures to management to show why this fall in profit should ,or should not have occurred .

## **Make or Buy Decisions**

When the management is confronted with the problem whether it would be economical to purchase a component or a product from outside sources, or to manufacture it internally, marginal cost analysis renders useful assistance in the matter. Under such circumstances, a misleading decision would be taken on the basis of the total cost analysis. In case the proposal is to buy from outside then, what is already being made, and the price quoted by the outsider should be lower than the marginal cost. If the proposal is to make something what is being purchased outside, the cost of making should include all additional costs like depreciation on new plant, interest on capital involved and that cost should be compared with the purchase price.

**Q 40:**

A T.V. manufacturing co. finds that while it costs Rs. 6.25 to make component R-518, the same is available in the market at Rs. 5.75 each, with an assurance of continued supply. The break-down of the cost is:

	Rs.
Materials	2.75 each
Labour	1.75 each
Other variables	0.50 each
Depreciation and other fixed costs	<u>1.25 each</u>
	<u>6.25</u> .

- (a) Should you make or buy? [Ans. Make]  
(b) What would be your decision, if the supplier offered the component at Rs. 4.85 each? [Ans. Buy]

### **Closure of a Department or Discontinuance of a Product**

As discussed earlier, marginal costing technique helps in deciding the profitability of a product. It provides the information in a manner that tells us how much each product contributes towards fixed cost and profit; the product or department that gives least contribution should be discarded except for a short period. If the management is to choose some product out of the given ones, then the products giving the highest contribution should be chosen and those giving the least should be discontinued.

### **Maintaining a Desired Level of Profit**

A company has to cut prices of its products from time to time because of competition, Government regulations and other compelling reasons. The contribution per unit on account of such cutting is reduced while the industry is interested in maintaining a minimum level of its profits. In case the demand for the company's product is elastic, the maximum level of profits can be maintained by pushing up the sales. The volume of such sales can be found out by marginal costing techniques.

**Q 41:**

S.Ltd. manufactures and markets a single product. The following information is available

	Rs. Per unit
Materials	8.00
Conversion costs (variable)	6.00
Dealer's margin	2.00
Selling Price	20.00
Fixed Cost : Rs.2,50,000	
Present sales 80,000 units	
Capacity utilization : 60 per cent	

There is acute competition. Extra efforts are necessary to sell. Suggestions have been made for increasing sales :

(a) By reducing selling price by 5 per cent.

(b) By increasing dealer's margin by 25 per cent over the existing rate.

Which of the two suggestions you would recommend if the company desires to maintain the present profit ? Give reasons.

**[Ans.: (a) 1,16,111 units; (b) 1,02,857 units]**

## **Offering Quotations**

One of the best ways for sales promotion is to offer quotations at low rates. A company is producing 80,000 units (80% of capacity) and making a profit of `2,40,000. Suppose the Punjab Government has given a tender notice for 20,000 units. It is expected that the units taken by the Government will not affect the sale of 80,000 units which the company is already selling and the company also wishes to submit the lowest possible quotation. The company may quote any amount above marginal cost, because it will give an additional marginal contribution and hence profit.

## **Accepting an Offer or Exporting below Normal Price**

Sometimes the volume of output and sales may be increased by reducing the normal prices of additional sale. In this case the concern should be cautious enough to see that the sale below

normal price in additional markets should not affect the normal market. To be on the safe side the product may be sold under the label of a different brand. If there is additional sale because of export orders, goods may be sold at a price below the normal.

**Q 42:**

The cost of manufacturing company for the product is :

	Rs.
Materials	12.00
Labour	9.00
Variables expenses	6.00
Fixed expenses	<u>18.00</u>
Total	45.00

The unit of product is sold for Rs. 51.00

The company 's normal capacity is 1,00,000 units .The figures given above are for 80,000 units .The company has received an offer for Rs 20,000 units @ Rs. 36 per unit from a foreign customer .

Advise the manufacturer on whether the order should be accepted .Also give you advice if the order if from a local merchant .

## **Alternative Use of Production Facilities**

### **Problem of Key Factor**

The product giving the greatest contribution will be the most profitable. To maximise profit, resources should be mobilised towards that product which gives the maximum contribution. But contribution is not the only criterion for deciding profitability. In real life, there may be several factors which may put a limit on the number of units to be produced even if the products give a high contribution. These factors are equally important for arriving at managerial decisions because these factors limit the volume of output at a particular point of time or over a period. these are called key factors, scarce factors, limiting factors, principal budget factors or governing factors. The limiting factors may be sale, raw material, labour, plant capacity and availability of capital e.g., for a concern established in a relatively new town, labour may be a key factor or the concern may find it difficult to acquire an unlimited quantity of raw material because of scarcity or the quota system, etc. In the later case material will be the key factor. The extent of influence of these factors should be carefully examined before arriving at a particular decision. Contribution

per unit of key factor should be considered and that course of action should be adopted which gives the highest contribution per unit of key factor.

**Q 43:**

You are given the following information in respect of products X and Y of Beecee Co. Ltd.

	Product X	Product Y
Selling price	Rs. 42	Rs. 33
Direct material	Rs. 15	Rs. 15
Labour hours (50 paise per hour )	18 hours	9 hours
Variable overheads	50% of Direct wages	

Show which product is more profitable during labour shortage .

Ans :- X= 0.75 Y= 1.25

**Q 44:**

The following particulars are taken from the records of a company engaged in manufacturing two products, A and B, from a certain material:

Particulars	Product A	Product B
Sales	2,500	5,000
Material cost (Rs.50 per kg)	500	1,250
Direct labour (Rs.30 per hr)	750	1,500
Variable overhead	250	500
Total fixed overheads : Rs.10,00,000		

Comment on the profitability of each product when:

- Total sales in value is limited.
- Raw materials is in short supply.

- (iii) Production capacity is the limiting factor.
- (iv) Total availability of raw materials is 20,000 kgs. and maximum sales potential of each product is 1,000 units, find the product mix to yield maximum profits.

## Selection of a Suitable Product Mix

A concern, which manufactures more than one product, may have to decide in what proportion should these products be produced or sold. The technique of marginal costing helps to a great extent in the determination of most profitable product or sales mix. The best product mix is that which yields the maximum contribution. In the absence of key factor, contribution under various mix will be found out and the mix which gives the highest contribution will be selected for production

### Q 45:

A company engaged in plantation activities has 200 hectares of virgin land which can be used for growing jointly or individually tea, coffee and cardamom .The yield per hectare of the different crops and their selling price per kg,. are as under .

	Yield (Kgs.)	Selling price (Rs. Per Kg.
Tea	2,000	20
Coffee	500	40
Cardamom	100	250

The relevant cost data are given below :

- (a) variable cost per KG.

Tea (Rs.)	Coffee (Rs.)	Cardamom (Rs.)
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Labour charges	8	10	120
Packing materials	2	2	10
Other costs	<u>4</u>	<u>1</u>	<u>20</u>
Total costs	<u>14</u>	<u>13</u>	<u>150</u>

Rs.

Cultivation and growing cost	10,00,000
Administrative cost	2,00,000
Land revenues	50,000
Repairs and maintenance	2,50,0000
Other costs	<u>3,00,000</u>
Total cost	<u>18,00,000</u>

The policy of the company is to produce and sell all the three kinds of products and the maximum and minimum area to be cultivated per product is as follows :

	Maximum Area (hectares )	Minimum Area Hectares
Tea	160	120
Coffee	50	30
Cardamom	30	10

Calculate the priority of production ,the most profitability product mix and the maximum profit which can be achieved .

**Ans :- Rs. 6,55,00**

## **MARGINAL AND ABSORPTION COSTING**

**Q 46:**

ABC Ltd. can produce 4,00,000 units of a product per annum at 100% capacity. The variable production costs are Rs. 40 per unit and the variable selling expenses are Rs. 12 per sold unit.

The budgeted fixed production expenses were Rs. 24,00,000 per annum and the fixed selling expenses were Rs. 16,00,000. During the year ended 31st March, 2008, the company worked at 80% of its capacity. The operating data for the year are as follows:

Production 3,20,000 units

Sales @ Rs. 80 per unit 3,10,000 units

Opening stock of finished goods 40,000 units

Fixed production expenses are absorbed on the basis of capacity and fixed selling expenses are recovered on the basis of period.

You are required to prepare Statements of Cost and Profit for the year ending 31st March, 2008:

(i) On the basis of marginal costing

(ii) On the basis of absorption costing.

**Ans :- 47,40,00**

**Q 47:**

Mega Company has just completed its first year of operations. The unit costs on a normal costing basis are as under:

	Rs.
Direct material 4 kg @ Rs.4 =	16.00
Direct labour 3 hrs @ Rs.18 =	54.00
Variable overhead 3 hrs @ Rs.4=	12.00
Fixed overhead 3 hrs @ Rs.6 =	<u>18.00</u>
	100.00

Selling and administrative costs:

Variable Rs.20 per unit

Fixed Rs.7,60,000

During the year the company has the following activity:

Units produced = 24,000

Units sold = 21,500

Unit selling price = Rs.168

Direct labour hours worked = 72,000

Actual fixed overhead was Rs.48,000 less than the budgeted fixed overhead. Budgeted variable overhead was Rs.20,000 less than the actual variable overhead. The company used an expected actual activity level of 72,000 direct labour hours to compute the predetermine overhead rates.

Required :

(i) Compute the unit cost and total income under:

(a) Absorption costing

(b) Marginal costing

(ii) Under or over absorption of overhead.

(iii) Reconcile the difference between the total income under absorption and marginal costing.

**Ans :- (i) Rs. 2,55,000 ; (ii) Rs. 28,000 (iii) Rs. 45,000**

## **PROBLEM ANS SOLUTION**

### **Practical Problem**

#### **SOLVED QUESTIONS**

##### **Q.1**

Product Z has a profit-volume ratio of 28%. Fixed operating costs directly attributable to product Z during the quarter II of the financial year 2009-10 will be Rs. 2, 80,000.

Calculate the sales revenue required to achieve a quarterly profit of Rs. 70,000.

Solution;

P/V ratio = 28%

Quarterly fixed Cost = Rs.2,80,000

Desired Profit = Rs.70,000

Sales revenue required to achieve desired profit

$$= \text{Fixed Cost} + \text{Desired Profit}$$

P/V ratio

$$= \frac{2,80,000 + 70,000}{40} = \text{Rs.12,50,000}$$

28%

Q.2. Quality Products Ltd. Manufactures and markets a single product. The following data are available:

	Rs. Per unit
Materials	16
Conversion costs (variable)	12
Dealer's margin (10% of sales)	4
Selling price	40
Fixed cost: Rs.5 lakhs	
Present sales: 90,000 units	
Capacity utilization: 60 percent.	

There is acute competition. Extra efforts are necessary to sell. Suggestions have been made for increasing sales:

- a) By reducing selling price by 5 percent.
- b) By increasing dealer's margin by 25 percent over the existing rate.

Which of these two suggestions you would recommend, if the company desires to maintain the present profit? Give reasons.

Solution:

Present variable cost per unit: Rs.

Materials 16

Conversion costs 12

Dealer's margin 4

Total 32

Contribution per unit = Selling price – Variable cost

$$= \text{Rs.}40 - \text{Rs.}32$$

$$= \text{Rs.}8$$

Total Contribution =  $\text{Rs.}8 \times 90,000 \text{ units} = \text{Rs.}7,20,000$

In both the suggestions, fixed costs remain unchanged. Therefore, the present profit of Rs.2,20,000 (i.e. Rs.7,20,000 - Rs.5,00,000) can be maintained by maintaining the total contribution at the present level i.e. Rs.7,20,000.

(a) Reducing selling price by 5%:

New sales price =  $(\text{Rs.}40 - \text{Rs.}2)$  or Rs.38

New dealer's margin = 10% of Rs.38 or Rs.3.80

New variable cost =  $\text{Rs.}16 + \text{Rs.}12 + \text{Rs.}3.80 = \text{Rs.}31.80$

New contribution per unit =  $\text{Rs.}38 - \text{Rs.}31.80$

$$= \text{Rs.}6.20$$

Sales (in units) required to maintain present level of profit:

$$= \frac{\text{Total Contribution}}{\text{Contribution per unit}}$$

$$= \frac{\text{Rs.}7,20,000}{\text{Rs.}6.20}$$

$$= \underline{\text{Rs.}7,20,000} \text{ or } 1,16,129 \text{ units}$$

$$\text{Rs.}6.20$$

(b) Increasing dealer's margin by 25%

New margin will be  $(\text{Rs.}4 + 25\% \text{ of Rs.}4)$  i.e. Rs.5

New variable cost =  $\text{Rs.}16 + \text{Rs.}12 + \text{Rs.}5$  or Rs.33

Contribution =  $\text{Rs.}40 - \text{Rs.}33 = \text{Rs.}7$

Sales (in units) =  $\underline{\text{Rs.}7,20,000} \text{ or } 1,02,857 \text{ units}$

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The second proposal is recommended because the contribution per unit is higher; and the sales (in units) are lower. Lower sales efforts and less finance would be required in implementing (b) proposal. The company can earn higher profits by increasing its sales, as an alternative.

Q.3. The following data relate to a manufacturing company:

Plant capacity: 4,00,000 units per annum

Present utilization: 40%

Actuals for the year 1994 were:

Selling price	Rs.50 per unit
Materials Cost	Rs.20 per unit
Variable Manufacturing Cost	Rs.15 per unit
Fixed Costs	Rs.27 lakhs

In order to improve capacity utilization the following proposals are considered:

- (i) Reduce Selling Price by 10%
- (ii) Spend additionally Rs.3 lakhs on Sales Promotion.

How many units should be made and sold to earn a profit of Rs.5 lakhs per year.

Solution:

Revised Selling Price (Rs.50 less 10%) Rs.45 per unit

Variable Cost

Material Cost Rs.20

Variable Manufacturing Cost Rs.15

Total variable Cost Rs.35 per unit

Contribution Rs.10 per unit

(i) Sales (Units) = 27 lakhs + 5 lakhs

10

= 3.2 lakhs

(ii) Fixed Cost = 27 lakhs + 3 lakhs = 30 lakhs

Sales (Units) = 30 lakhs + 5 lakhs

50-35

= 35 lakhs

15

= 2,33,333 units

### **Determination of Sales Value and Margin of Safety**

#### **Q.4**

A company has fixed cost of Rs. 90,000, Sales Rs.3, 00,000 and profit of Rs.60, 000

Required:

- (i) Sales volume if in the next period, the company suffered a loss of Rs. 30,000
- (ii) What is the margin of safety for a profit of Rs. 90,000?

Solution:

P/V ratio =  $\frac{\text{Contribution}}{\text{Sales}} \times 100$

$$= \frac{1,50,000}{3,00,000} \times 100 = 50\%$$

- (i) If in the next period company suffered a loss of Rs.30, 000 then

$$\begin{aligned}\text{Contribution} &= \text{Fixed Cost} \pm \text{Profit} \\ &= \text{Rs.90, 000} - \text{Rs.30, 000} \text{ (as it is a loss)} \\ &= \text{Rs.60, 000}.\end{aligned}$$

Then Sales =  $\frac{\text{Contribution}}{\text{P/V ratio}}$  or  $\frac{60,000}{.50} = \text{Rs.1,20,000}.$

$$\text{P/V ratio} \quad .50$$

So, there will be loss of Rs.30,000 at sales of Rs.1,20,000.

- (ii) Margin of safety =  $\frac{\text{Profit}}{\text{P/V ratio}}$  or  $\frac{90,000}{.50} = \text{Rs.1, 80,000}$

$$\text{P/V ratio} \quad .50$$

#### **Alternative solution of this part:**

Break-even Sales =  $\frac{\text{Fixed Cost}}{\text{P/V ratio}} = \frac{90,000}{.50} = \text{Rs.1,80,000}$

P/V ratio .5

Sales at profit of Rs.90,000 = Fixed Cost + Profit

PV Ratio

= 90,000 + 90,000

.5

= 1,80,000

.5

= Rs.3,60,000

Margin of Safety = Sales – Break- even Sales

= 3,60,000- 1,80,000

= Rs.1,80,000.

#### **Determination of BEP and Margin of Safety**

Q.5 From the following data, compute break-even sales and margin of safety:

Sales	Rs.10,00,000
Fixed cost	3,00,000
Profit	2,00,000

Solution:

Contribution = Fixed Cost + Profit = 5 lakhs

= P/V Ratio = 50%

= Break Even Sales = Fixed Cost = 3 lakhs

P/V ratio          50%

= 6 lakhs

Margin of safety = Actual Sales – Break Even Sales

= 10 lakhs – 6 lakhs = 4 lakhs



## Determination of P/V Ratio, EBP, Net Profit, Sales Value and Margin of Safety

### Determination of BEP and profit

Q.6 From the following data, calculate break-even point (BEP):

Selling price per unit	20
Variable cost per unit	15
Fixed overheads	20,000

If sales are 20% above BEP, determine the net profit.

Solution:

Break Even Point =  $\frac{\text{Fixed Cost}}{\text{Contribution per unit}}$  =  $\frac{20,000}{5}$  = 4,000 units

Contribution per unit = 5

Sales Value (4800×20)	96,000
Less: Variable Cost (4800×15)	(72,000)
contribution	24,000
Less: Fixed Cost	(20,000)
Profit	4,000

Q.7 (i) Ascertain profit, when Sales = Rs. 2,00,000

Fixed Cost = Rs. 40,000

BEP = Rs. 1,60,000

(ii) Ascertain sales, when Fixed Cost = Rs. 20,000

Profit = Rs. 10,000

BEP = Rs. 40,000

Solution: (i) BEP (Rs.) =  $\frac{\text{Fixed Cost}}{\text{P/V Ratio}}$

P/V Ratio

Rs.1,60,000 =  $\frac{\text{Rs.40,000}}{\text{P/V Ratio}}$

P/V Ratio

P/V Ratio = 25%

Sales	2,00,000
(-) VC (@ 75%)	1,50,000
Contribution	50,000
(-) FC	40,000
Profit	10,000

$$(ii) \text{ BEP (Rs.)} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}}$$

$$\text{Rs.40,000} = \frac{\text{Rs.20,000}}{\text{P/V Ratio}}$$

P/V Ratio

$$\text{P/V Ratio} = 50\%$$

$$\text{Sales} = \frac{\text{Fixed Cost} + \text{Profit}}{\text{P/V Ratio}} = \frac{20,000 + 10,000}{50\%} = \text{Rs.60,000}$$

Determination of Net Profit

**Q.8** The profit/volume ratio of X Ltd. Is 50% and the margin of safety is 40%. You are required to calculate the net profit if sale volume is Rs.1,00,000.

Solution: Sales = Rs.1,00,000

Margin of Safety = Rs.40,000

Break Even Sales = Rs.60,000

Break Even Sales = Fixed Cost/P/V ratio

Or Fixed Cost = Rs.30,000

If P/V ratio is 50%, variable cost ratio is 50% of sales.

Sales	Rs.1,00,000
-------	-------------

Variable cost 50%	50,000
Contribution	50,000
Less Fixed Cost	30,000
Profit	20,000

#### Determination of Sales for Desired Profit

**Q.9** Ray pens Ltd., manufacturer's only pens where the marginal cost of each pen is Rs.3. It has fixed costs of Rs.25,000 per annum. Present production and sales of pens is 50,000 units and selling price per pen is Rs.5. Any sale beyond 50,000 pens is possible only if the company reduces 20% of its current selling price.

However, the reduced price applies only to the additional units. The company wants a target profits of Rs.1,00,000. How many pens to company must produce and sell if the target profit is to be achieved?

Solution:

Additional units = X

Sales 4

(-) Variable Cost (3)

Contribution 1

Total contribution =  $(5 - 3) \times 50,000 + 1 \times X$

(-) Fixed Cost = 25,000

Profit = 1, 00,000

$1, 00,000 + X - 25,000 = 1, 00,000$

$X = 25,000$  units

Total Production = 50,000 units + 25,000 units = 75,000 units

**Q.10** A single product company sells its products at Rs.60 per unit. In 2006, the company operated at a margin of safety of 40%. The fixed costs amounted to Rs.3,60,000 and the variable cost ratio to sales was 80%.

In 2007, it is estimated that the variable cost will go up by 10% and the fixed costs will increase by 5%.

Find the selling price required to be fixed in 2007 to earn the same P/V ratio as in 2006.

Assuming the same selling price of Rs.60 per unit in 2007, find the number of units required to be produced and sold to earn the same profit as in 2006.

Solution:

### Working notes

1. P/V Ratio in 2006:

$$\text{P/V Ratio} = \frac{\text{Selling price per unit} - \text{Variable per unit}}{\text{Selling Price per unit}} \times 100$$

$$= \frac{\text{Rs.60} - \text{Rs.48}}{\text{Rs.60}} \times 100 = \frac{\text{Rs.12}}{\text{Rs.60}} \times 100 = 20\%$$

2. Number of units sold (in 2006)

$$\text{Break-even Point} = \frac{\text{Fixed cost}}{\text{Contribution per unit}} = \frac{\text{Rs.3,60,000}}{\text{Rs.12}} = 30,000$$

The margin of safety is 40%, hence break even point is at 60% of units sold.

$$\text{Or, No. of units sold} = \frac{\text{Break-even-point}}{60\%} = \frac{30,000 \text{ units}}{60} \times 100 = 50,000 \text{ units}$$

3. Profit earned in 2006

$$\begin{aligned} \text{Profit} &= \text{Units sold in 2006} \times \text{contribution per unit} - \text{Fixed costs} \\ &= 50,000 \text{ units} \times \text{Rs.3,60,000} \\ &= \text{Rs.6,00,000} - \text{Rs.3,60,000} = \text{Rs.2,40,000} \end{aligned}$$

Fixation of Selling Price in 2007

$$\text{Variable Cost per unit in 2007} = \text{Rs.48} + \text{Rs.4.80} = \text{Rs.52.80}$$

$$\text{Fixed Cost in 2007} = \text{Rs.3,60,000} + \text{Rs.18,000} = \text{Rs.3,78,000}$$

$$\text{P/V Ratio in 2006} = 20\%$$

Since P/V Ratio is 20%

Hence, Variable Cost is 80%

$$\text{Hence, the required selling price} = \frac{\text{Rs.52.80}}{80\%} = \text{Rs.66}$$

80%

Number of units to be produced and sold in 2007 to earn the same profit as in 2006

Profit in 2006 = Rs.2, 40,000

Fixed Cost in 2007 = Rs.3, 78,000

Desired contribution in 2007

(Rs.2,40,000 + Rs.3,78,000 = Rs.6,18,000

Contribution per unit in 2007 = Selling price per unit – Variable cost per unit

= Rs.60 - Rs.52.80 = Rs.7.20

Number of units to be produced

And sold in 2007 =  $\frac{\text{Fixed cost in 2007}}{\text{Contribution per unit in 2007}}$

= Rs.6,18,000 = 85,833 units.

Rs.7.20

**Q.11** If fixed costs are Rs.4,000, variable costs Rs.32,000 and break-even point Rs.20,000, find:

(1) Profit-volume ratio

(2) Sales

(3) Net profit

(4) Margin of safety.

**Solution**

**(1) Profit volume ratio:**

Since, Break-even point (Rs.) = Fixed costs

P/V ratio

Therefore, P/V ratio =  $\frac{\text{Fixed cost}}{\text{Break-even point}} \times 100$

= Rs.4,000 × 100

Rs.20,000

= 20%

**(2) Sales:** If P/V ratio is 20%, the variable cost to sales would be 80%.

Therefore, sales =  $\frac{\text{Variable cost}}{80} \times 100$

80

=  $\frac{\text{Rs.32,000} \times 100}{80}$

80

= Rs.40,000

**(3) Net profit** = Sales – Variable cost – Fixed cost

= Rs.40,000 - Rs.32,000 - Rs.4,000

= Rs.4,000

**(4) Margin of safety** = Sales – Break even point

= Rs.40,000 - Rs.20,000

= Rs.20,000

Q.12 Solo Company produces a single article. Following cost data is given about its product:-

Selling price per unit	Rs.200
Marginal cost per unit	Rs.120
Fixed cost per annum	Rs.8,000

Calculate:

(a) P/V ratio,

(b) Break-even sales,

(c) Sales to earn a profit of Rs. 10,000, (d) Profit at sales of Rs. 60,000

(e) New break-even sales, if sales price is reduced by 10%.

Solution:

- (a)  $P/V \text{ Ratio} = \text{Contribution} / \text{Sales} \times 100$   
 $= (200 - 120) / 200 \times 100 = 80/200 \times 100 = 40\%$
- (b)  $\text{Break-even sales} = \text{Fixed Cost} / P/V \text{ Ratio}$   
 $= (8,000 \times 100) / 40 = \text{Rs.}20,000 \text{ (or 100 units)}$
- (c) Sales to earn a profit of Rs.10,000  
 $\text{Desired Contribution} = 8,000 + 10,000$   
 $\text{Desired Sales} = \text{Rs.}18,000 \times 100/40 = \text{Rs.}45,000 \text{ (or 225 units)}$
- (d)  $\text{Profit} = \text{Rs.}60,000 \times 40/100 - \text{Rs.}8,000 = 24,000 - 8,000 = \text{Rs.}16,000$
- (e)  $\text{New Sales Price} = \text{Rs.}200 - \text{Rs.}20 = \text{Rs.}180$   
 $\text{Marginal cost} = \text{Rs.}120$   
 $\text{Contribution} = \text{Rs.}60$   
 $P/V \text{ Ratio} = \text{Contribution} / \text{Sales}$   
 $= 60/180 \times 100 = 33\frac{1}{3} \%$   
 $\text{New Break-even sales} = \text{Rs.}8,000 / 33\frac{1}{3} \% = \text{Rs.}24,000.$

Q.13 From the following data, find out (i) sales: and (ii) new break-even sales, if selling price is reduced by 10%

	Rs.
Fixed cost	4,000
Break-even sales	20,000
Profit	1,000
Selling price per unit	20

Solution:

$$\text{Break Even Sales} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}} \times \text{Sale Price per unit}$$

$$20,000 = \frac{4,000}{\text{Contribution per unit}} \times 20$$

Contribution = Rs.4

(i) Desired Sales =  $\frac{\text{Fixed Cost} + \text{Profit}}{\text{Contribution per unit}} \times \text{Sale Price per unit}$

$$\begin{aligned} & \text{Contribution per unit} \\ & = \frac{4,000 + 1,000}{4} \times 20 = 25,000 \end{aligned}$$

(ii) If Sale Price per unit is reduced by 10% = New Sales Price per unit = 18

New Contribution = 4 – (20 - 18)

$$\begin{aligned} \text{New Break Even Sales} &= \frac{4,000}{2} \times 18 = 36,000 \end{aligned}$$

Q.14 From the data given below find out:

(a) P/V Ratio,

(b) Sales, and

(c) Margin of Safety

Fixed cost	Rs.2,00,000
Profit	Rs.1,00,000
B.E. Pont	Rs.4,00,000

Solution:

(a) P/V Ratio = Fixed Cost / Break even sales

$$\text{P/V Ratio} = \text{Rs.2,00,000} / 4,00,000 \text{ or } 50\%$$

(b) Sales = Contribution/P/V Ratio

$$= (\text{Rs.2,00,000} + \text{Rs.1,00,000}) / 50\%$$

$$= (3,00,000 \times 100) / 50 = \text{Rs.6,00,000}$$

(c) Margin of Safety = Sales – E.B. Sales

$$= \text{Rs.6,00,000} - \text{Rs.4,00,000} = \text{Rs.2,00,000}$$

Q.15 If fixed costs are Rs.24,000, margin of safety Rs.40,000 and break-even 80,000, find out:



- (1) Sales
- (2) Profit-volume ratio
- (3) Net profit
- (4) Variable costs

Solution:

**(1) Sales**

Sales: Break-even sales + Margin of safety

$$= \text{Rs.}80,000 + \text{Rs.}40,000$$

$$= \text{Rs.}1,20,000$$

**(2) Profit-volume ratio**

P/V ratio:  $\frac{\text{Fixed cost}}{\text{Break-even sales}} \times 100$

Break-even sales

$$= \frac{\text{Rs.}24,000}{\text{Rs.}80,000} \times 100$$

$$= 30\%$$

**(3) Net profit**

Net profit: Contribution – Fixed costs

$$= (\text{Rs.}1,20,000 \times 30\%) - \text{Rs.}24,000$$

$$= \text{Rs.}12,000$$

**(4) Variable costs**

Variable costs: Sales – Contribution

$$= \text{Rs.}1,20,000 - \text{Rs.}36,000$$

$$= \text{Rs.}84,000$$

Q.16 Profit/ Volume ratio of a company is 50%, while its margin of safety is 40%. If sales value of the company is Rs.50 lakhs, find out its (i) break-even point and (ii) Net profit.

Solution:

Margin of Safety =  $\frac{\text{Actual Sales} - \text{Break Even Sales}}{\text{Actual Sales}} \times 100$

Actual Sales

$$40\% = \frac{50 \text{ Lakhs} - \text{BES}}{50 \text{ Lakhs}}$$

50 Lakhs

Break Even Sales = 30 Lakhs

$$\text{Break Even Sales} = \frac{\text{Fixed Cost}}{\text{P/V Ratio}}$$

P/V Ratio

$$30 \text{ Lakhs} = \frac{\text{Fixed Cost}}{50\%}$$

50%

Fixed Cost = 15 Lakhs

Sales	50L
(-) Variable Cost @ 50%	(25L)
Contribution	25L
(-) Fixed Cost	(15L)
Profit	10L

Q.17 A Ltd. Maintains a margin of safety of 37.5% with an overall contribution to sales ratio of 40%. Its fixed costs amount to Rs.5 lakhs.

Calculate the following:

(i) Break-even sales:

(ii) Total sales:

(iii) Total variable cost:

(iv) Current profit:

(v) New margin of safety" if the sales volume is increased by 7½%.

Solution:

$$(i) \text{ Break Even Sales} = \frac{5,00,000}{40\%} = \text{Rs.}12,50,000$$

40%

(ii) Total sales

$$37.5 = \frac{\text{Actual sales} - 12,50,000}{12,50,000} \times 100$$

Actual sales

$$37.5 \text{ Actual sales} = 100 \text{ Actual sales} - 12,50,000 \times 100$$

$$12,50,000 \times 100 = 62,50,000 \text{ Actual sales}$$

$$\text{Actual sales} = \frac{125 \times 100}{625} = 20 \text{ lakhs}$$

625

(iii) Total Variable Cost = 60% of 20 lakhs = 12 lakhs

(iv) Current Profit = Contribution – Fixed Cost

$$8 \text{ lakhs} - 5 \text{ lakhs} = 3 \text{ lakhs}$$

(v) New MOS if Actual Sales = 21.5 lakhs

$$\text{NOS} = 21.5 \text{ lakhs} - 12.5 \text{ lakhs} = 9 \text{ lakhs}$$

$$\text{Margin of Safety (\% age)} = \frac{9 \text{ lakhs}}{21.5 \text{ lakhs}} = 41.86\%$$

Q.18 The trading results of PJ Ltd. For the two years have been:

Year	Sales Rs.	Profits Rs.
2002	5,40,000	12,000
2003	6,00,000	30,000

Compute the following:

- (i) P/V ratio;
- (ii) Fixed costs;
- (iii) Break-even sales;
- (iv) Margin of safety at a profit of Rs.48,000;
- (v) Variable costs during the two year.

Solution:

$$(i) \text{ P/V Ratio} = 30\% (18,000/60,000)$$

$$(ii) \text{ Variable Cost} = 70\%$$

$$\text{Sales (2003)} \quad 6,00,000$$

$$(-) \text{ Profit} \quad \underline{30,000} \text{ (given)}$$

$$\text{Total Cost} \quad 5,70,000$$

(-) Variable Cost                      4,20,000

Fixed Cost                      1,50,000

(iii) B.E.P. (Rs.)                      = 1,50,000 = 5,00,000

30%

(iv) Margin of safety = 48,000 = 1,60,000

30%

(v) Variable Cost = 70% of Sales

2002 = Rs.3,78,000

2003 = Rs.4,20,000

Q.19 Following figures relating to the performance of a company of the year 2006 and 2007 are available. Assuming that (i) The ratio of variable cost to sales and (ii) the fixed costs are the same for both the years, ascertain:

(i) The profit-volume ratio, (ii) the amount of the fixed costs, (iii) the Break-even Point, and (iv) the budgeted profit for the year 2008, if the budgeted sales for that year are Rs.1 crore .

	<b>Total Sales</b> <b>(Rs. In '000)</b>	<b>Total Costs</b> <b>(Rs. In '000)</b>
Year 2006	7,000	5,800
Year 2007	9,000	6,600

Solution:

(i)      P/V Ratio =  $\frac{\text{Change in Profit} \times 100}{\text{Change in Sales}}$

=  $\frac{24,00,000 - 12,00,000}{20,00,000} \times 100$

= 60%

(ii)      Sales    70,00,000  
            (-) Variable Cost (40%)                      (28, 00,000)

Contribution (60%)	42, 00,000
(-) Profit	<u>(12, 00,000)</u>
Fixed Cost	<u>30, 00,000</u>
(iii) $BEP = \frac{\text{Fixed Cost}}{\text{P/V Ratio}} = \frac{30,00,000}{60\%} = 50,00,000$	
(iv) Sales = 1,00,00,000 = Contribution @ 60%	60,00,000
(-) Fixed Cost	<u>(30, 00,000)</u>
Profit	<u>30, 00,000</u>

**Q.20** Following information's are available for the year 2008 and 2009 of PIX Limited:

Year	2008	2009
Sales	Rs. 32, 00,000	Rs. 57,00,000
Profit/(Loss)	(Rs.3,00,000)	Rs. 7,00,000

Calculate – (a) P/V ratio, (b) Total fixed cost, and (c) Sales required to earn a Profit of Rs. 12,00,000.

Solution:

(a)  $P/V \text{ Ratio} = \frac{\text{Change in profit}}{\text{Change in sales}} \times 100$

$$\begin{aligned}
 &= \frac{7,00,000 + 3,00,000}{57,00,000 - 32,00,000} \times 100 \\
 &= \frac{10,00,000}{25,00,000} \times 100 \\
 &= 40\%
 \end{aligned}$$

(b) Total fixed cost = Total contribution – Profit

$$\begin{aligned}
 &= (\text{Sales} \times P/V \text{ ratio}) - \text{Profit} \\
 &= (\text{Rs.} 57,00,000 \times 40\%) - \text{Rs.} 7,00,000
 \end{aligned}$$

$$= \text{Rs.}22,80,000 - \text{Rs.}7,00,000$$

$$= \text{Rs.}15,80,000$$

(b) Contribution required to earn a profit of Rs.12,00,000 = Total fixed cost + Profit Required

$$= \text{Rs.}15,80,000 + 12,00,000 = \text{Rs.}27,80,000$$

$$\text{Required Sales} = 27,80,000 = \text{Rs.}69,50,000$$

Q.21 From the following data, calculate

(i) P/V Ratio.

(ii) Profit when sales are Rs.20,000 and

(iii) New Break-even-point if selling price is reduced by 20%.

Fixed expenses Rs.4,000

Break-even point Rs. 10,000

Solution:

$$(i) \quad \text{Break-even Point} = \frac{\text{Fixed Expenses}}{\text{P/V Ratio}}$$

$$\begin{aligned} \text{P/V Ratio} &= \frac{\text{Fixed Expenses}}{\text{Break-even point}} \\ &= \frac{\text{Rs.}4,000}{\text{Rs.}10,000} \text{ or } 40\% \end{aligned}$$

$$\begin{aligned} (ii) \quad \text{Profit when sales are Rs.20,000} \\ \text{Profit} &= \text{Sales} \times \text{P/V Ratio} - \text{Fixed Expenses} \\ &= \text{Rs.}20,000 \times 40\% - \text{Rs.}4,000 \\ &= \text{Rs.}8,000 - \text{Rs.}4,000 \\ &= \text{Rs.}4,000 \end{aligned}$$

(iii) New Break-even point if selling price is reduced by 20%:

If the selling price was Rs.100, now, it will be Rs.80.

Variable cost per unit is Rs.60 (i.e. 100 – 40% old P/V Ratio)

$$\text{New P/V Ratio} = \frac{80 - 60}{80} = 25\%$$

80

$$\text{Break-even Point} = \frac{4,000}{25} \times 100 = \text{Rs.16,000}$$

25

Q.22 A company budgets for a production of 1,50,000 units. The variable cost per unit is Rs.14 and fixed cost is Rs.2 per unit. The company fixes its selling price to fetch a profit of 15% on cost.

- a) What is the break-even point?
- b) What is profit-volume ratio?
- c) If it reduces its selling price by 5%, how does the revised selling price affect the break-even point and the profit-volume ratio?
- d) If a profit increase of 10% is desired more than the budget, what should be the sale at the reduced prices?

Solution: Basic Data

Budgeted production (in units)	1,50,000
Variable cost (per unit)	Rs.14.00
Fixed Cost (per unit)	Rs.2.00
Selling price (per unit) (See Note 1)	Rs.18.40
Contribution (per unit)	Rs.4.40
Total fixed cost (1,50,000 units × Rs.2)	3,00,000

$$\begin{aligned} \text{(a) Break-even point} &= \frac{\text{Total fixed cost}}{\text{Contribution per unit}} \\ &= \frac{\text{Rs.3,00,000}}{\text{Rs.4.40}} = 68,181.818 \quad \text{or } 68,182 \text{ (units )} \end{aligned}$$

$$\text{(b) Profit-volume ratio} = \frac{\text{Contribution per unit}}{\text{Selling price per unit}} \times 100$$

$$\begin{aligned} &= \frac{\text{Rs.4.40}}{\text{Rs.18.40}} \times 100 = 23.91\% \end{aligned}$$

Rs.18.40

(c) Break-Even point =  $\frac{\text{Total fixed cost}}{\text{Contribution per unit for}}$

Under revised selling Contribution per unit for

Price (See Note 2) revised selling price

=  $\frac{\text{Rs.3,00,000}}{\text{Rs.3.48}} = 86,206.89$  units or 86,207 units

Rs.3.48

(ii) Profit-Volume Ratio =  $\frac{\text{Revised contribution per unit}}{\text{Revised selling price}} \times 100$

(Under revised selling price) Revised selling price

=  $\frac{\text{Rs.3.48}}{\text{Rs.17.48}} \times 100 = 19.90\%$

Rs.17.48

(d) Budgeted Profit:

1,50,000 units  $\times$  Rs.2.40 Rs.3,60,000

10% increase in profit Rs.36,000

Total Profit Rs.3,96,000

Fixed Cost Rs.3,00,000

Total contribution required Rs.6,96,000

Contribution (per unit) Rs.3.48

(Under revised selling price)

No of units to be sold

(Rs.6,96,000/ Rs.3.48) 2,00,000

Required Sales Rs.34,96,000

#### Working Notes:

1. Total cost of producing a unit Rs.16.00

Add: 15% of profit on Rs.16.00 Rs.2.40

Selling price per unit Rs.18.40



2. Revised Selling price = (Original Selling price less by 5%)

$$= (\text{Rs. } 18.40 - \text{Rs. } 0.92) = \text{Rs. } 17.48$$

Contribution per unit

$$\text{Under revised selling price} = (\text{Rs. } 17.48 - \text{Rs. } 14.00) = \text{Rs. } 3.48.$$

### Determination of Capacity Sales

Q.23 The ratio of variable cost of sales is 70%. The break-even occurs at 60% of the capacity sales. Find the capacity sales when fixed costs are Rs.90,000. Also compute profit at 75% of the capacity sales.

Solution:

$$\text{P/V Ratio} = 100\% - 70\% = 30\%$$

$$\text{B.E.P. (in Rs.) } \frac{90,000}{30\%} = \text{Rs. } 3,00,000$$

$$30\%$$

$$\text{B.E.P. (in Rs.) (60\% of the capacity sales)} = \text{Rs. } 3,00,000$$

$$\text{Capacity sales} = \text{Rs. } 3,00,000 / 60\% = \text{Rs. } 5,00,000$$

$$75\% \text{ of the capacity sales} = \text{Rs. } 3,75,000$$

$$\text{Profit} = \text{Rs. } 3,75,000 \times 30\% - 90,000 = \text{Rs. } 22,500$$

### Determination of Fixed Expenses and Variable Expenses

Q.24 The following figures are extracted from the books of a manufacturing concern for 2007-08:

Direct material	Rs.2,05,000
Direct labour	75,000
Fixed overheads	60,000
Variable overheads	1,00,000
Sales	5,00,000

Calculate the break-even point (B.E.P.). What will the effect on B.E.P. of an increase of 10% be in: (i) fixed expenses: (ii) variable expenses?

Solution:

Break Even Point = Fixed Cost

P/V Ratio

P/V Ratio = (Sales – Variable cost) / Sales = (Rs.5, 00,000 – 3, 80,000) / 5, 00,000 = 24%

B.E.P. = Rs.60, 000/24% = Rs.2, 50,000

(i) 10% increase in fixed expenses  
B.E.P. = 66,000 / 24% = 2, 75,000

(ii) 10% increase in variable expenses  
Revised variable expenses = Rs.3, 80,000 + 38,000 = Rs.4, 18,000

Revised P/V Ratio = (Rs.5, 00,000 – 4, 18,000) / 5, 00,000 = 16.4%

Q.25. From the following data, calculate:

- (i) Break-even point expressed in amount of sales in rupees;
- (ii) Number of units that must be sold to earn a profit of Rs. 60,000 per year.
- (iii) How many units must be sold to earn a net income of 10% of sales?

	Rs.
Sales price	20 per unit
Variable manufacturing costs	11 per unit
Variable selling costs	3 per unit
Fixed factory overheads	Rs. 5,40,000 per year
Fixed selling costs	Rs. 2,52,000 per year

Solution: (i) BEP = 7, 92,000 × 20 = Rs. 26, 40,000

6

(ii) 7.92 lakhs + 60,000 = 1, 42,000 units

6

(iii) If sales X = profit = x / 10

X = 7, 92,000 × X /10 × 20

6

$$6X = 7, 92,000 \times 20 + 2X$$

$$X = 39, 60,000$$

$$39.6 \text{ lakhs} \times \frac{1}{20} = 1, 98,000 \text{ units}$$

20

Q.26. Snowwhite Company Ltd. A retail dealer in garments is currently selling 24,000 shirts annually. It supplies the following details for the year ended 31<sup>st</sup> March;

Selling price per shirt	Rs.400
Variable cost per shirt	250
Fixed cost:	
Staff salaries for the year	12,00,000
General office costs for the year	8,00,000
Advertising costs for the year	4,00,000

As a Cost Accounting of the firm you are required to answer the following each part independently:

- Calculate the break-even point and margin of safety in sales revenue and number of shirt sold.
- Assume that 20,000 shirts were sold in a year. Find out the net profit of the firm.
- If it is decided to introduce selling commission of Rs. 30 per shirt, how many shirts would and to be sold in a year to earn a net income of Rs. 1,50,000
- Assuming that for the year 1992 an additional staff salary of Rs. 3, 30,000 is anticipated, and price of a shirt is likely to be increased by 15%, what should be the break-even point in number of shirts and sales revenue?

Solution: (i) Break Even point (in units) = Fixed Costs ÷ Contribution per unit

$$\text{B.E sales} = 16,000 \times \text{Rs. } 400 = \text{Rs. } 64, 00,000$$

$$\text{Total sales} = 24,000 \times \text{Rs. } 400 = \text{Rs. } 96, 00,000$$

$$\text{Margin of Safety} = \text{Sales} - \text{B.E. Sales} = \text{Rs. } 96, 00,000 - 64,00,0000 = \text{Rs. } 32, 00,000$$

$$\text{Margin of Safety (in units)} = \text{Rs. } 32, 00,000 \div \text{Rs. } 400 = 8,000 \text{ shirts. \}$$

$$(ii) \text{ Contribution per unit} = \text{Rs. } 400 - 250 = \text{Rs. } 150$$

$$\text{No. of shirts sold} = 20,000 \text{ shirts}$$

$$\text{Total contribution} = 20,000 \times \text{Rs. } 150 = 30, 00,000$$

$$\text{Less Fixed cost} \quad \quad \quad \underline{24, 00000}$$

Net profit 6, 00,000

(iii) Sales commission of Rs. 30 per shirt is available cost and, therefore revised variable cost will be Rs. 280 per shirt.

Contribution per unit = Rs.400 – Rs.280 – Rs.120

Fixed Cost = Rs.24, 00,000

Desired profit = Rs.1, 50,000

Total contribution 25, 50,000

Required sales in units = Total Contribution ÷ Contribution per unit  
= Rs.25, 50,000 ÷ Rs120 = 21,250 shirt

(iv) Revised Fixed Cost = Rs.24,00,000 + Rs.3,30,000 = Rs.27,30,000

Revised selling price = (R.400 + 15% of Rs.400) = Rs.460

Revised contribution = Rs.460 – 250 = Rs.210 per shirt.

B.E. point = Revised fixed costs ÷ Contribution per unit  
= Rs.27,30,000 ÷ Rs.210 = 13,000 shirts

B.E. sales value = 13,000 × Rs.460 = Rs.59, 80,000

Q.27. Indian plastics male plastic buckets. An analysis of their accounting reveals:

Variable cost per bucket Rs.20

Fixed cost Rs.50,000 for the year

Capacity 2,000 buckets per year

Selling price per bucket Rs. 70

Required:

- (i) Find the break-even point.
- (ii) Find the number of buckets to be sold to get a profit of Rs. 30,000
- (iii) If the company can manufacture 600 buckets more per year with an additional fixed cost of Rs. 2,000, what should be the selling price to maintain the profit per bucket as at (ii) above?

Solution: Contribution per unit = Rs. 70 – Rs. 20 = Rs. 50

(i) Break Even point = Fixed Cost ÷ Contribution per unit = Rs. 50,000 ÷ Rs. 50 = 1,000

(ii) Desired profit	Rs. 30,000
Fixed cost	<u>50,000</u>
Total contribution	<u>80,000</u>

Sales (quantity) = Total contribution ÷ Contribution per bucket  
= Rs. 80,000 ÷ 50 = 1,600 buckets

(iii) Profit per bucket = RS. 30,000 ÷ 1,600 = Rs. 18.75

Revised sales = 2,000 buckets ÷ 600 buckets = 2,600 buckets

Revised fixed cost = Rs. 52,000

Revised profit = 48,750

(2,600 × 18.75)

Revised contribution 1, 00,750

Contribution per unit = Rs. 1, 00,750 ÷ 2,600 = Rs. 38.75

Sale – Variable cost = Contribution

S – 20 = 38.75 or S = Rs. 58.75

Revised Selling price = Rs. 58.75 per unit.

Q.28. Green Valley Hotel has annual fixed costs applicable to rooms of Rs. 15, 00,000 for a 300 room's hotel with average daily room rates of Rs. 400 and average variable costs of Rs. 60 for each room rented. The hotel operates 365 days per year. It is subject to an income tax rate of 30 per cent. You are required to:

(i) Calculate the number of rooms the Hotel must rent to earn a net income after taxes of Rs. 10,00,000 and

(ii) Compute the break-even point in terms of number of rooms rented.

Solution: (i) Suppose income before tax	100
Income tax	<u>30</u>
Income after tax	<u>70</u>

Income before tax corresponding to Rs.10, 00,000 income after tax = (100 ÷ 70) × 10, 00,000

$$= \text{Rs. } 14,28,571$$

Fixed cost per annum	Rs. 15,00,000
Income before tax	<u>14,28,571</u>
Total desired contribution	<u>29,28,571</u>

Daily contribution per room day Rs. 400 – 60 = Rs. 340

Total sales value = Total contribution ÷ P/V ratio

$$= \text{Rs. } 29,28,571 \div (340 / 400) = \text{Rs. } 34,45,378$$

No. of rooms days = Rs. 34,45,378 ÷ Rs. 400 = 8614 Approx.

The Hotel must rent out 23.6 rooms per day (8614 ÷ 365 days) to derive a total contribution Rs. 29,28,571, this will give the Hotel after – tax profit of Rs. 10,00,000

(ii) B.E. Sales = Fixed ÷ Daily contribution per room

$$= \text{Rs. } 15,00,000 \div \text{Rs. } 340 = 4,412 \text{ room days or } 12.09 \text{ rooms per day}$$

Q.29. Reprographics Ltd. Manufactures a document reproducing machine which has a variable cost structure as follows:

	Rs.
Material	40
Labour	10
Overhead	4

And a selling price of Rs. 90

Sales during the current year are expected to be Rs. 13,50,000 and Fixed Overhead Rs. 1,40,000. Under a wage agreement an increase of 10% is payable to all direct workers from the beginning of the forthcoming year, whilst Material Cost are expected to increase by Variable Overhead Cost by you are required to calculate:

- The new selling price if the Current Profit/Volume Ratio is to be maintained;
- The quantity to be sold during the forthcoming year to yield the same amount of profit as the current year assuming the selling price to remain as Rs.90.

Solution: (a) New Selling Price

Type of cost	Variable Cost structure of current year	Cost increases	Variable Cost structure of forthcoming year

	Rs.	7½	Rs.
Material	40.00	10%	43.00
Labour	10.00	5%	11.00
Overhead	4.00		4.20
	54.00		58.00

Selling price (current year) = Rs.90.00

Contribution (current year) = Rs.36.00

P/V Ratio =  $\frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Rs.36}}{\text{Rs.90}} \times 100 = 40\%$

Sales Rs.90

The current year's marginal cost is 60% of the selling price, viz, Rs.90. To maintain the current Profit/Volume ratio of 40% in the forthcoming year, the new marginal cost should be equal to 60% of selling price.

Hence, the New Selling Price =  $\frac{\text{Rs.58.20} \times 100}{60} = \text{Rs.97.00}$

60

(b) Quantity to be sold during the forthcoming year at Rs.90 to yield the amount of profit as the current year.

Profit of current year:

Rs.

Contribution 5,40,000

(40% of Rs.13,50,000)

Less: Fixed Cost 1,40,000

Profit 4,00,000

Forthcoming year quantity:

Rs.

Profit required 4,00,000

(as per current year)

Fixed Overhead Cost 1,44,200

(Rs.1,40,000 + 3% × Rs.1,40,000) ———

Contribution required 5,44,200

Unit Contribution = Selling price – Variable Cost

= Rs.90 - Rs.58.20 = Rs.31.80

Sale quantity required = Contribution required

Unit Contribution

= Rs.5,44,200

Rs.31.80

= 17,113.2

Q.30 The Laila Shoe Company sells five different styles of Ladies chappals with identical purchase cost and selling prices. The company is trying to find out the profitability of opening another store, which will have the following expenses and revenues:

	Per pair Rs.
Selling Price	30.00
Variable Purchase Cost	19.50
Salesmen's Commission	1.50
Total Variable Cost	21.00
Annual fixed expenses are	
	Rs.
Rent	60,000
Salaries	2,00,000
Advertising	80,000
Other Fixed Expenses	20,000



	3,60,000
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Required:-

- Calculate the annual break-even point in units and in value. Also determine the profit or loss if 35,000 pairs of chappals are sold.
- The sales commissions are proposed to be discontinued, but instead an additional fixed amount of Rs.90,000 is to be incurred in fixed salaries. A reduction in selling price of 5% is also proposed. What will be the break-even point in units?
- It is proposed to pay the store manager 50 paise per pair as further commission. The selling price is also proposed to be increased by 5%. What would be the break-even point in units?
- Refer to the original data. If the store manager were to be paid 30 paise commission on each pair of chappal sold in excess of the break-even point, what would be the store's net profit if 50,000 pairs were sold?

**Note:** Consider each part of the question separately.

Solution:

- Break Even Point (in Units)

Contribution: (per pair of Chappal) = Rs.9

(Selling Price – Variable Cost = (Rs.30 - Rs.21)

B.E.P.(in units) =  $\frac{\text{Fixed cost}}{\text{Contribution per pair of Chappals}}$

$= \frac{\text{Rs.3,60,000}}{\text{Rs.9}} = 40,000 \text{ pair of chappals}$

Break Even Point (in value) = 40,000 pairs × Rs.30 = Rs.12,00,000

Note: Break Even Point (in value) can also be calculated by using P/V ratio.

#### Profit (Loss) on the sale of 35,000 pairs of Chappals

	Rs.	Rs.
A: Total Sales Revenue (35,00 × Rs.30)		10,50,000
B: Total V.C. (35,000 × Rs.21)	7,35,000	
Total F.C	<u>3,60,000</u>	<u>10,95,000</u>
Loss: (B) - (A)		45,000

- Break Even Point (in Units)

(On the abolition of sales commission, reduction in S.P. p.u by

5% and increase in fixed salaries by Rs.90,000)

New Selling Price: Rs.28.50

New Variable Cost (per pair) Rs.19.50

Contribution (per pair) Rs.9

Total Fixed Cost: Rs.4,50,000

B.E.P. (in units) = Rs.4,50,000 = 50,000 pairs of chappals

Rs.9

(c) Break Even Point (in Units)

(When stores manager is paid 0.50p. per pair as commission and

Also S.P. of each pair of Chappal increased by 5%

Rs.

S.P. (per pair) 31.50

Variable Cost (per pair) 21.50

Contribution (per pair) 10.00

B.E.P (in units) = Rs.3,60,000 = 36,000 pairs of chappals.

Rs.10

(d) As per part (a)

B.E.P. (in unit) = 40,000 pair of Chappals.

Total pair of Chappals sold = 50,000

Excess numbers of pair of chappals sold above the B.E.P are 10,000

Sales Revenue (10,000 pairs @ Rs.30) 3,00,000

Total Variable cost 10,000 @ Rs.21.30 2,13,000

Profit 87,000

#### **Segregation of fixed and variable cost in semi variable cost**

**Q.31** Following information is available for the first and second quarter of the year 2008-09 of ABC Limited:

	Production (in units)	Semi-variable cost (Rs.)
Quarter I	36,000	2,80,000
Quarter II	42,000	3,10,000

You are required to segregate the semi-variable cost and calculate:

(i) Variable cost per unit and

(ii) Total fixed cost.

Solution:

	Production (in units)	Semi-variable cost (Rs.)
Quarter I	36,000	2,80,000
Quarter II	42,000	3,10,000
Difference	6,000	30,000

Variable Cost per Unit =  $\frac{\text{Change in Semi Variable Cost}}{\text{Change in Production units}}$

=  $\frac{\text{Rs.30,000}}{6,000 \text{ units}}$

= Rs.5 per unit

Total Fixed Cost = Semi Variable Cost – (Production × Variable Cost per Unit)

Total fixed cost in Quarter I:

= 2,80,000 – (36,000 × 5)

= 2,80,000 – 1,80,000

= 1,00,000

Total fixed cost in Quarter II:

$$= 3,10,000 - (42,000 \times 5)$$

$$= 3,10,000 - 2,10,000 = 1,00,000$$

**Identification of fixed and variable overheads and computation of BEP**

**Q.32** PQ Ltd. reports the following cost structure at two capacity levels:

(100% capacity)

2,000 units 1,500 units

Production overhead I      Rs. 3 per unit      Rs. 4 per units

Production overhead II      Rs. 2 per unit      Rs. 2 per unit

If the selling price reduced by direct material and labour is Rs.8 per unit, what would be its break-even point?

Solution:

Computation of production Overheads

Production on overheads	100% Capacity 2,000 units		75% Capacity 1,500 units	
	Per units	Total	Per units	Total
I	3	6,000	4	6,000
II	2	4,000	2	3,000

Conclusion:- Production overheads I are Fixed Overheads & Production Overheads II are variable overheads.

Contribution per unit = Selling Price as reduced by Direct Material & Labour Cost (-) Variable overheads

$$= \text{Rs.8} - \text{Rs.2}$$

$$= \text{Rs.6 per units}$$

Break Even Point = Fixed Production Overheads

Contribution per unit

$$= \underline{\text{Rs.6,000}}$$

Rs.6 per unit

$$= 1,000 \text{ units}$$

### Cost Break Even Point

Q.33 A company wants to buy a new machine to replace one which is having frequent breakdown. It received offers for two models M1 and M2 .Further details regarding these models are given below:

	M1	M2
Installed capacity (units)	10,000	10,000
Fixed overhead per annum (Rs.)	2,40,000	1,00,000
Estimated profit at the above capacity (Rs.)	1,60,000	1,00,000

The product manufactured using this type of machine (M1 or M2 ) is sold at Rs.100 per unit.

You are required to determine:

- Break-even level of sales for each model.
- The level of sales at which both the models will earn the same profit.
- The model suitable for different levels of demand for the product.

Solution:

	M1	Rs.	M2
Estimated Profit	1,60,000		1,00,000
(+) Fixed overhead	<u>2,40,000</u>		<u>1,00,000</u>
Estimated Contribution	4,00,000		2,00,000
Installed capacity (No. of units)	<u>10,000</u>		<u>10,000</u>
Contribution p.u.	40		20
SP p.u	100		100
(a) BEP (units) = $\frac{\text{Fixed Cost}}{\text{Contribution p.u.}}$	= 6,000 units		
	5,000 units		
(b) Cost BEP (units) =	$\frac{2,40,000 - 1,00,000}{40 - 20} = 1,40,000$		

(c) No. of units	Model to be chosen
Less than 7,000 units	M2
= 7,000 units	Any of the two
More than 7,000 units	M1

Q.34 Two competing companies ABC Ltd. And XYZ Ltd. Produce and sell the same type of product in the same market. For the year ended March, 1995, their forecasted profit and loss accounts are as follows:

Particulars	ABC Ltd.		XYZ Ltd.	
	Rs.	Rs.	Rs.	Rs.
Sales		2,50,000		2,50,000
Less: Variable Cost of Sales	2,00,000		1,50,000	
Fixed Costs	<u>25,000</u>		<u>75,000</u>	
		<u>2,25,000</u>		<u>2,25,000</u>
Forecasted Net operating Profits		25,000		25,000

(1) P/V Ratio.

(2) Break-even Sales.

You are also required to state which company is likely to earn greater profits in conditions of:

- (a) Low demand, and  
(b) High demand.

**Solution: Particulars**

	Rs.	Rs.
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Sales	2,50,000	2,50,000
Contribution (Fixed expenses plus profit)	50,000	1,00,000
P/V Ratio	$\frac{50,000}{2,50,000} \times 100 = 20\%$	$\frac{1,00,000}{2,50,000} \times 100 = 40\%$
Break-even Sales	$\frac{25,000}{20\%} = 1,25,000$	$\frac{75,000}{40\%} = 1,87,500$

Profit situation for ABC Ltd. Will be better than that of XYZ Ltd. In case of low demand since even if sales are halved. ABC Ltd. Will still not incur a loss whereas XYZ Ltd. Has a safety margin of only Rs.62,500. In case the sales drop to Rs.2,00,000, the profit will be as follows:

Particulars	ABC Ltd.	XYZ Ltd.
	Rs.	Rs.
Contribution	40,000	80,000
Fixed Cost	25,000	75,000
Profit	15,000	5,000

In the case of high demand, XYZ Ltd. Will do better than ABC Ltd. Since additional sales will produce profit at the rate of 40% of the sales as against only 20% in the case of the other company. If sales improve to Rs.3,00,000 i.e. Rs.50,000 above the present level, the profit of ABC Ltd. Will be only Rs.35,000, i.e. Rs.25,000 (at present) plus 20% of Rs.50,000. The profit of XYZ Ltd. Will be Rs. 45,000 i.e. Rs.25,000, as at present, plus 40% of Rs.50,000.

### Composite Break Even Point

**Q.35** Raj Ltd. Manufactures three products X,Y and Z. The units selling price of these products are Rs.100, Rs.160 and Rs.75 respectively. The corresponding unit variable costs are Rs.50, Rs.80 and Rs.30. The proportions (quantity wise) in which these products are manufactured and sold are 20%, 30% and 50% respectively. The total fixed costs are Rs.14,80,000.

Calculate (i) overall break even quantity and (ii) the product wise break up of such quantity.

Solution: Total units sold = x

$$X = 0.2x$$

$$Y = 0.3x$$

$$Z = 0.5x$$

	X	Y	X
Contribution per unit	50	80	45
(SP - VC)			
X units sold	<u>0.2 x</u>	<u>0.3 x</u>	<u>0.5 x</u>
Overall Contribution	10 x	24 x	22.5 x

$$= 10x + 24x + 22.5x$$

$$= 56.5x$$

At BEP Total Fixed Cost = Total Contribution

$$14,80,000 = 56.5x$$

$$x = 26,195$$

X	Y	Z
20%	30%	50%
5,239	7,858	13,098

Q.36 A company has a fixed cost of Rs.20, 000. It sells two products – A and B, in the ratio of 2 units of A and 1 unit of B. Contribution is Re. 1 per unit of A and Rs.2 per unit of B. How many units of A and B would be sold at break-even point?

Solution: Let the Break Even Number of units of product B be  $x$  & Product A  $= 2x$

At BEP, Fixed cost = Contribution

$$20,000 = (2x \times 1) + (x \times 2)$$

$$20,000 = 4x$$

$$x = 5,000 \text{ (Product B)}$$

$$2x = 10,000 \text{ (Product A)}$$

Q.37 A Company sells two products, J and K. The sales mix is 4 units of J and 3 units of K. The contribution margins per unit are Rs.40 for J and Rs.20 for K. Fixed costs are Rs.6, 16,000 per month. Computes the break-even point.

Solution

Let  $4x$  = No. of units of J



Then  $3x = \text{No. of units of K}$

BEP in  $x$  units =  $\frac{\text{Fixed cost}}{\text{Contribution}} = \frac{\text{Rs.616000}}{4(40) + 3(20)}$

or  $\frac{616000}{220} = 2800 \text{ units}$

Break even point of Product J =  $4 \times 2800 = 11200 \text{ units}$

Break even point of Product K =  $3 \times 2800 = 8400 \text{ units}$

**Determination of Variable Selling Expenses, Variable Factory Overheads, Contribution, BEP, Factory COGS**

Q.38 The following miscellaneous information regarding the operations of 1994 has been made available from the records of Acme Corporation:

	Rs.
Sales	1,00,000
Direct materials used	40,000
Direct labour	15,000
Fixed manufacturing overhead	20,000
Fixed selling and administration expenses	10,000
Gross profit	20,000
Net loss	5,000

There are no beginnings or ending inventories.

You are required to calculate:

- (i) Variable selling and administration expenses
- (ii) Contribution margin in rupees
- (iii) Variable factory overhead
- (iv) Break-even point in rupee sales
- (v) Factory cost of goods sold.

Solution:

- (i) Net Loss = Gross profit – Fixed Selling & Administration exp. – Variable Selling & Administration Exp.  
 (5,000) = 20,000 – 10,000 – Variable Selling & Administration Exp.  
 Variable Selling & Administration Exp. = 20,000 – 10,000 + 5,000 = 15,000
- (ii) Contribution = Sales – Variable costs  
 = 1,00,000 – (40,000 – 15,000 + 15,000 + 5,000)  
 = 1,00,000 – 75,000  
 = 25,000
- (iii) Cost of Goods Sold = Direct material used + Direct labour + Fixed manufacturing overhead + Variable manufacturing overhead  
 80,000 = 40,000 + 15,000 + 20,000 + Variable manufacturing overhead  
 Variable manufacturing overhead = 5,000
- (iv) 
$$\text{BEP} = \frac{\text{Fixed cost}}{\text{P/V Ratio}}$$
 (in Rs.)  

$$= \frac{20,000 + 10,000}{\frac{25,000}{1,00,000} \times 100}$$

$$= \frac{30,000}{25\%}$$

$$= \text{Rs. } 1,20,000$$
- (v) Cost of Goods Sold = Sales – Gross Profit  
 = 1,00,000 – 20,000  
 = 80,000

#### Determination of Selling Price Per Unit and BEP

Q.39 A Japanese Soft Drink Company is planning to establish a subsidiary company in India produce mineral water. Based on the estimated annual sales of 40,000 bottles of the mineral water, cost studies produced the following estimates for the Indian subsidiary:

	Total Annual costs	Percent of Total Annual Cost which
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		is variable
Material	2,10,000	100%
Labour	1,50,000	80%
Factory Overheads	92,000	60%
Administration Expenses	40,000	35%

The Indian production will be sold by manufacturer's representatives who will receive a commission of 8% of the sale price. No portion of the Japanese office expenses is to be allocated to the Indian subsidiary. Required:

- Compute the sale price per bottle to enable the management to realize an estimated 10% profit on sale proceeds in India.
- Calculate the break-even point in Rupee sales and also in number of bottles for the Indian subsidiary on the assumption that the sale price is Rs.14 per bottle.

**Solution: Working Notes:**

- Commission is 8% of sales revenue.  
Profit is 10% of sales revenue.

Hence Cost of Sales is 82% of sales revenue.

If Cost of Sales is Rs.82 then sales revenue is Rs.100.

$$\begin{aligned} \text{If Cost of Sales is Rs.4,92,000 then sales revenue} &= \frac{\text{Rs.4,92,000} \times \text{Rs.100}}{\text{Rs.82}} \\ &= \text{Rs.6,00,000} \end{aligned}$$

**Computation of the Sale Price per bottle**

$$\begin{aligned} \text{Total Sales Revenue} &= \text{Rs.6,00,000} \\ \text{Number of mineral water bottles sold} &= 40,000 \\ \text{Sales price per bottle} &= \frac{\text{Rs.6,00,000}}{40,000} = \text{Rs.15.} \end{aligned}$$

- (a) Variable Cost

	Total	Per unit
No. of bottles	40,000	1(one)
	Rs.	Rs.

Material	2,10,000	5.25
Labour (80% of Rs.1,50,000)	1,20,000	3.00
Factory Overhead (60% of Rs.92,000)	55,200	1.38
Administration expenses (35% of Rs.40,000)	14,000	0.35
Commission (Rs.14 × 40,000 × 8%)	<u>44,800</u>	<u>1.12</u>
	4,44,000	11.10

(b) Total (annual) Fixed Cost:

= (Fixed Labour Cost + Fixed Factory Overheads + Fixed Admn. Expenses)

= (Rs.1,50,000 × 20% + Rs.92,000 × 40% + Rs.40,000 × 65%)

= Rs.92,800.

(c) P/V ratio =  $\frac{\text{Sales} - \text{Variable Cost}}{\text{Sales}} \times 100 = \frac{\text{Rs.14} - \text{Rs.11.10}}{\text{Rs.14}} \times 100 = 20.714\%$

Sales Rs.14

(d) Contribution per bottle = Sales – Variable Cost

= Rs.14 - Rs.11.10 = Rs.2.90

### Computation of Break-Even-Point

Break-Even-Point (in Rupees sales) =  $\frac{\text{Fixed Cost}}{\text{P/V Ratio}}$

P/V Ratio

=  $\frac{\text{Rs.92,800}}{20.7142\%} = \text{Rs.4,48,000}$

20.7142%

Break-Even-Point (in number of bottles) =  $\frac{\text{Fixed Cost}}{\text{Contribution per bottle}}$

Contribution per bottle

=  $\frac{\text{Rs.92,800}}{\text{Rs.2.90}}$

Rs.2.90

= 32,000 bottles.

**Determination of Sales, Net Profit, Price Indifference Point, BEP**

Q.40 DD amusement park charges Rs.4 each for all rides in the park. Variable costs amount to Re.0.80 per ride and fixed costs are Rs.32,00,000. Last year's net income was Rs.6,40,000. Rising costs have cut sharply into net income for DD for the last 2 year. This year management again expects a cost increase of 25 percent in variable costs and 10 percent in fixed costs. To help offset these increases, the management is considering raising the price of a ride to Rs.5. Required:

- 1) How many rides did DD sell last year?
- 2) If the price increase is not implemented, what is the expected net income for this year assuming the same volume of activity?
- 3) Compute the price indifference point for the new ride price.
- 4) Compute the Break-even point for this year using the old price and the new price.
- 5) Should management raise the price of a ride, if the price increase will reduce ride volume 10 percent from the last years' level? In that situation, what will be expected net income?

**Solution: (1) Rides which DD Amusement park sell last year**

(No. of rides DD sell last year) = Fixed Cost + Net Income last year

Contribution per ride last year

= Rs.32,00,000 + Rs.6,40,000

Rs.3.20

= 12,00,000 rides

**(2) Expected net income for this year if price increase is not implemented**

(assuming the same volume of activity)

	Rs.
Charges per ride	4
Less: Expected Variable cost per ride (Refer to working note 1)	1
Contribution per ride: (A)	3
No. of rides: (B)	12,00,000
Total expected contribution for all rides: (C) = (A) × (B)	36,00,000
Less: Expected fixed costs (Refer to working note (ii))	35,20,000
Expected net income	80,000

**(3) Price indifference point for the new ride price:** Price indifference point is a point at which the expected profits remain the same irrespective of sales price and costs.

	Rs.
Net ride price	5.00
Less; Variable cost	1.00
Contribution per ride	4.00
Fixed costs of this year: (A)	35,20,000
Net income of last year: (B)	6,40,000
Contribution required: (A) + (B)	41,60,000

Price – indifference point =  $\frac{\text{Rs. } 41,60,000}{4} = 10,40,000$  rides

Rs.4

**(4) Break even point for this year using the old price and the new price**

Break even point =  $\frac{\text{Fixed costs}}{\text{Contribution per ride}}$

At old price =  $\frac{\text{Rs. } 35,20,000}{\text{Rs.4} - \text{Rs.1}}$   
= 11,73,334 rides

At new price =  $\frac{\text{Rs. } 35,20,000}{\text{Rs.5} - \text{Rs.1}}$   
= 8,80,000 rides

**(5) Expected net income if the price increase will reduce ride volume by 10% from the last year's levels:**

	Rs.
Charges per ride	5.00
Less: Variable cost	1.00
Contribution per ride: (A)	4.00
No. of rides (12,00,000) : B	10,80,000

Total contribution for all rides: (A) × (B)	43,20,000
Less: Fixed costs	35,20,000
Expected net income	8,00,000

Justification:

Since the increase in price of a ride will increase the net income by Rs.7,20,000 (Rs.8,00,000 - Rs.80,000) the management should raise the price of a ride.

Working Notes: (i)

(i) Expected Variable cost this year	
Variable cost last year	Re.0.80 per ride
Add: Expected increase this year (25% of Re.0.80)	Re.0.020 per ride
Expected variable cost his year	1.00 per ride
(ii) Expected fixed costs this year	
	Rs.
Fixed costs last year	32,00,000
Add: Expected increase this year (10% of Rs.32,00,000)	3,20,000
Expected fixed costs this year	35,20,000

#### Determination of Selling Price Per Unit

Q.41 Novelty Sports Ltd. Has for the past several years produced boxing gloves which are sold at Rs.2,800 per pair. Higher costs in recent years have made management to consider about the adequacy of this selling price.

The labour rate was increased from Rs.175 per hour to Rs.225 per hour and the cost of leather has gone up from Rs.110 to Rs.215 per square foot during the last five years. Fixed expenses have increased 25% from the level of Rs.18,00,000 five years ago. Over the same period variable overhead has increased by 30% or Rs.300 per pair of gloves. Each glove requires 1.5 sq. ft. of leather and one hour of direct labour.

Calculate the selling price the company has to charge under the new cost structure to break-even at the same number of units as five years ago.

Solution:

Past

Present

Direct Material

(3 ft. × Rs. 110 / Rs. 215)	330	645
(+) Direct Labour	350	450
(175 × 2 hrs.)		
(225 × 2 hrs.)		
(+) Variable overhead	<u>1000</u>	<u>1300</u>
Variable Cost per units	<u>168</u>	<u>2395</u>
Fixed Cost	18,00,000	22,50,000
Past Contribution	= 1120	
B.E.P. (units)	= <u>18, 00,000</u>	
	1,120	
	= 1,607 units	
Revised contribution = ?		
1607 units	<u>22, 50,000</u>	
Contribution per unit		
Contribution per unit	<u>22, 50,000</u>	
	1607	
Contribution per unit	4000	
(+) Variable Cost per unit =	<u>2395</u>	
Selling price per unit	<u>3795</u>	

Q.42. The variable cost structure of a product manufactured by a company during the current year is as under

	Rs. Per unit
Material	120
Labour	30
Overheads	12



The selling price per unit is Rs. 270 and the fixed cost and sales during the current year are Rs. 14 lakhs and Rs. 40.5 lakhs respectively.

During the forthcoming year the direct workers will be entitled to a wage increase of 10% from the beginning of the year and the material cost, variable overhead and fixed overhead are expected to increase by 7.5% and 3% respectively.

The following are required to be computed.

- (a) New sale price in the forthcoming year if the current P/V ratio is to be maintained.
- (b) Number of units that would require to be sold during the forthcoming year so as to yield the same amount of profit in the current year, assuming that selling price per unit will not be increase.

Solution:	Old		New
Material	120	+ 7.5%	129
Labour	30	+ 10%	33
Overhead	<u>12</u>	+ 5%	<u>12.6</u>
Variable Cost	<u>162</u>	=	<u>174.6</u>

(a) Existing P/V Ratio =  $\frac{108}{270} \times 100 = 40\%$  & Variable cost ratio = 60%

270

P/V Ratio is to be maintained thus

$$SP = \frac{174.6}{60\%} = 291$$

60%

(b) Current  
40.5 lakhs = 15,000 units

270

Variable Cost p.u.	162
	24,30,0000
(+) Fixed Cost	14,00,000
+ profit	2,20,000
Sales	40,50,000

Desired Sales = 14,42,000 + 2,20,000

$$\begin{aligned}
 & 270 - 174.4 \\
 & = \underline{16,62,000} \\
 & 95.4 \\
 & = 17,422 \text{ units}
 \end{aligned}$$

### **Determination of Sale, Selling price per Unit and Margin of Safety**

**Q.43** A company produces single product which sells for Rs. 20 per unit. Variable cost is Rs. per unit and Fixed overhead for the year is Rs. 6, 30,000 Required:

- (a) Calculate sales value needed to earn a profit of 10% on sales.
- (b) Calculate sales price per unit to bring BEP down to 1, 20,000 units.
- (c) Calculate margin of safety sales if profit is Rs.60, 000.

Solution: (a) Let the units to be sold to earn a profit of 10% on sales.

$$\text{Sales value} = 20x$$

$$\text{V.C.} = 15x$$

$$\text{Profit} = 10\% \times 20x = 2x$$

$$\text{Fixed overheads} = 6,30,000$$

$$\text{Sales} = \text{V.C.} + \text{Profit} + \text{Fixed Overheads}$$

$$20x = 15x + 2x + 6,30,000$$

$$3x = 6,30,000$$

$$X = 6,30,000 = \underline{2,10,000} \text{ units}$$

$$3$$

$$\text{Sales Value} = 2, 10,000 \text{ units} \times \text{Rs.}20$$

$$= 42, 00,000$$

$$\begin{aligned}
 \text{(a) BEP} &= \frac{\text{Fixed Overheads}}{\text{Contribution per unit}}
 \end{aligned}$$

$$1,20,000 \text{ units} = \underline{\text{Rs. } 6,30,000}$$

Contribution per unit

Contribution per units = Rs. 6, 30,000

1, 20,000 units

= Rs.5.25

Selling price per unit to bring BEP to 1,20,000 units = V.C. per unit + Contribution per unit

= Rs.15 + Rs.5.25

= Rs.20.25

(c) P/V ratio = Contribution × 100 = Rs.5 × 100 = 25%

Sales

Rs.20

Margin of Safety = Profit = Rs.60, 000 = Rs.2, 40,000

P/V ratio

25%

### Step Cost and Computation of BEP

Q.44 Kalyan University conducts a special course on “Computer Application” for a month during summer. For this purpose, it invites applications from graduates. An entrance test is given to the candidates and based on the same; a final selection of a hundred candidates is made. The Entrance Test consists of four objective type examinations and is spread over four days, one examination per day. Each candidate is charged a fee of Rs.50 for taking up the entrance test. The following data was gathered for the past two years:

### Kalyan University

#### Statement of Net Revenue from the Entrance Test for the Course of “Computer Applications”

Particulars	1993 Rs.	1994 Rs.
Gross Revenue (Fees collected)	1,00,000	1,50,000
Costs:		
Evaluation	40,000	60,000
Question	20,000	30,000
Hall Rent at Rs.2,000 per day	8,000	8,000
Honorarium of Chief Administrator	6,000	6,000

Supervision Charges (one Supervisor for every 100 Candidates at the rate of Rs.50 per day)	4,000	6,000
General Administration Expenses	6,000	6,000
Total Cost	84,000	1,16,000
Net Revenue	16,000	34,000

You are required to compute:

- The budgeted net revenue if 4,000 candidates take up the entrance test in 1995.
- The break even number of candidates.
- The number of candidates to be enrolled if the net income desired is Rs.20,000.

**Solution: (a) Statement showing Budgeted Net Revenue from the Entrance Test in 1995**

Number of candidates	4,000
(a) Gross revenue (fees collected) $4,000 \times 50$	Rs.2,00,000
Costs:	
Variable – Evaluation $(4,000 \times \text{Rs.20})$	80,000
- Question booklets $(4,000 \times \text{Rs.10})$	40,000
- *Supervision charges $\times (40 \text{ supervisors} \times \text{Rs.200})$	<u>8,000</u>
	1,28,000
Fixed – Hall rent $(\text{Rs.2,000} \times 4 \text{ days})$	8,000
- Honorarium to chief administrator	6,000
- General administrative expenses	<u>6,000</u>
	20,000
(b) Total Cost (Variable + Fixed)	1,48,000
Net Revenue (A - B)	52,000

Note: Gross revenue is given. Number of candidates can be found out by dividing gross revenue with fees charges per candidate.

\* Supervision costs vary with every 100 candidates. If the candidates are less than 100, it becomes fixed.

(b) Let 100 candidates be one unit.

Contribution per units =  $\text{Rs.5,000} - \text{Rs.2,000} - \text{Rs.1,000} - \text{Rs.200} = \text{Rs.1,800}$

Break Even Point (No. of units) =  $\text{Rs.20,000} / \text{Rs.1,800} = 11.1111$

B.E. number of candidates = 1,111.11 candidates.

Supervision cost is semi fixed if the candidates are less than 100 in number. This cost is variable if the candidates are in multiple of 100. For 11.11 candidates another supervisor has to be engaged for four days. The supervision charges will be  $\text{Rs.}50 \times 4 \text{ days} = \text{Rs.}200$  (fixed cost). The variable cost @ Rs.2 per candidate has already been recovered. The unrecovered fixed cost will be  $\text{Rs.}200 - (11.11 \times \text{Rs.}2)$  or Rs.177.78. Additional 8.89 units ( $\text{Rs.}177.78 \div \text{Rs.}20^*$ ) will have to be added to the existing BEP. Hence the revised BEP =  $1111.11 + 8.89 = 1,120$  candidates.

(c) Sales for desired profit =  $(\text{Rs.}20,000 + \text{Rs.}20,000) / \text{Rs.}1800 = 22.2222$  units or

= 2222.22 candidates.

For 22.22 candidates additional fixed cost will be =  $\text{Rs.}200 - (22.22 \times 2)$  or Rs.155.56.

To recover this amount 7.78 candidates will have to be added to 2,222.22

Thus, the desired number of candidates =  $2,222.22 + 7.78$  or 2,230 candidates.

*Gross revenue	Rs.2,00,000
Less: Variable cost without supervision charges	1,20,000
	80,000
No. of candidates in 1987	4,000
Revised contribution per candidate	Rs.20

### Key Factor Ranking

Q.45 A company has a Machine X which can produce either product A or B. The cost data relating to A and B are as follows:

	Product A	Product B
Selling price	Rs.20.00	Rs.30.00
Variable Expenses	14.00	18.00
Contribution	6.00	12.00

Following additional information is also given:

(a) Capacity of Machine X is 1,000 hours.

(b) In one hour Machine X can produce 3 units of A and 1 unit of B.

Should Machine X produce A or B?

Solution: Statement showing contribution per hour of Machine X

	Product A	Product B
Sales	Rs.20.00	Rs.30.00
Variable Expenses	14.00	18.00
Contribution per unit	6.00	12.00
Contribution per hour	18.00	12.00
Rank	I	II

Machine X should be used to produce A.

Q.46 The following particulars are obtained from costing records of a factory:

Particulars	Product A (per unit)	Product B (per unit)
	Rs.	Rs.
Selling Price	400	1000
Material (Rs.40 per litre)	80	320
Labour (Rs.20 per hour)	100	200
Variable Overhead	40	80

Total fixed overheads - Rs.30,000

Comment on the profitability of each product when:

(a) raw material is in short supply;

(b) production capacity is limited;

(c) sales quantity is limited;

(d) sales value is limited;

(e) only 1,000 litres of raw material is available for both the products in total and maximum sales quantity of each product is 300 units.

Solution:	Product A	Product B
Particulars	(per unit)	(per unit)

	Rs.	Rs.	Rs.	Rs.
Selling Price		400		1000
Less: Variable Costs:				
Materials	80		320	
Labour	100		200	
Variable Overhead	40	220	80	600
Contribution per unit		180		400
P/V Ratio = $\frac{\text{Contribution}}{\text{Sales}} \times 100$	$\frac{180}{400} \times 100$		$\frac{400}{1000} \times 100$	
	45%		40%	
Contribution per litre of material	$\frac{\text{Rs.180}}{2 \text{ litres}} = \text{Rs.90}$		$\frac{\text{Rs.400}}{8 \text{ litres}} = \text{Rs.50}$	
Contribution per Labour hour	$\frac{\text{Rs.180}}{5 \text{ hrs.}} = \text{Rs.36}$		$\frac{\text{Rs.400}}{10 \text{ hrs.}} = \text{Rs.40}$	

- When raw material is in short supply, contribution per litre of product A is higher and hence product A is more profitable.
- When production capacity is limited, contribution per hour of product B is higher and hence product B is more profitable.
- When sales quantity is limited, contribution per unit of product B is higher and hence product B is more profitable.
- When sales value is limited, the P/V Ratio of product A is higher and hence product A is more profitable.
- When raw material as well as sales quantity both are limited, the raw material should first be used for maximum number of units of product A i.e. for 300 units. 600 litres of material shall be consumed and the balance 400 litres shall be utilized for producing 50 units (i.e. 400/8) of product B. The profit in such a case would be as follows:

	Rs.
--	-----

Contribution from 300 units of product A ( $300 \times 180$ )	54,000
Contribution from 50 units of product B ( $50 \times 400$ )	20,000
Total Contribution	74,000
Less: Fixed overheads	(30,000)
Maximum Profit	44,000

Q.47 Khalsa Automation produces and sells two small components P and Q used in automobiles. The details regarding unit income and costs of these components are as under:

	Products	
	P (Rs.)	Q (Rs.)
Selling Price	12	20
Direct Material	2	4
Direct Labour	2	1
Variable Factory Overhead	2	4
Fixed Factory Overhead	2	4
Total Cost of Goods Sold	8	13
Gross Profit per unit	4	7

Factory overheads, both fixed and variable, have been accounted for on machine hour basis. Sales outlook is such that the plant could operate at full capacity on either of both products. Both P and Q are processed through the same cost centers. Selling costs are all fixed. Which product should be preferred? Give a brief explanation in support of your answer.

Solution:	P	Q
Contribution	6	11
Mach. Hrs. ratio p.u.	<u>1</u>	<u>2</u>
Contribution per Mach. Hr. ratio	<u>Rs.6</u>	<u>Rs.5.50</u>
Rank	I	II

**Key Factor Ranking, Determination of Optimal Product Mixed and Maximum Profit**



Q.48 Vinak Ltd. Which produces three products furnishes you the following data for 2006 – 07:

	Products		
	A	B	C
Selling price per unit (Rs.)	100	75	50
Profit volume ratio (%)	10	20	40
Maximum sales potential (Units)	40,000	25,000	10,000
Raw material content as percentage of variable costs (%)	50	50	50

The fixed expenses are estimated at Rs.6,80,000. The Company uses a single raw material in all the three products. Raw material is in short supply and the company has a quota for the supply of raw materials of the value of Rs.18,00,000 for the year 2006 – 07 for the manufacture of its products to meet its sales demand. You are required to:

- (i) Set a product mix which will give a maximum overall profit keeping the short supply of raw materials in view (ii) Compute that maximum profit.

Solution: (i) The Product mix is as under:-

Products	Selling price unit Rs.	PV Ratio %	Variable as % of sales price %	Cost Per Unit Rs.	Material Content @ 50% of v.cRs./ Unit	Contribution		Rank
A	100	10	90	90	45	10	22.2*	3
B	75	20	80	60	30	15	50.0	2
C	50	40	60	30	15	20	133.3	1

Product	Material Cost/Unit Rs.	Units	Total Material Cost Rs.	Amount Available for Materials Rs.
C	15	10,000	1,50,000	18,00,000
B	30	25,000	7,50,000	16,50,000
A	45	20,000	9,00,000	9,00,000

(ii) Computation of maximum profit:

Product	Units	Selling Price/Unit Rs.	Contribution per unit Rs.	Total Contribution Rs.
A	20,000	100	10	2,00,000
B	25,000	15	25	3,75,000
C	10,000	50	20	2,00,000
Less: Fixed expenses				7,75,000
				6,80,000
Profit				95,000

Contribution as percentage of material content

A:  $10 \times 100 = 22.2\%$ ; B:  $15 \times 100 = 50\%$ ; C:  $20 \times 100 = 133.33\%$

45                      30                      15

Q.49. From the following data, recommend the most profitable product mix, presuming that direct labour hours available are only 700:

	Products	
	A	B
	Rs. 30	Rs. 20
Contribution p.u.		
Direct labour hrs. per unit	10 hrs.	5 hrs.

The maximum production possible for each of the products A and B is 100 units. The fixed Overheads are Rs. 2,000

Solution:	A	B
Contribution	30	20
Labour Hrs.	<u>10 hrs.</u>	<u>5hrs.</u>
Contribution per labour hr.	<u>Rs. 3</u>	<u>Rs. 4</u>
Rank	II	I
Maximum production possible	100	100

Total labour hrs. available	700 hrs.
(-) hrs. for B ( $100 \times 5$ )	<u>500 hrs.</u>
Hrs. available for A	200 hrs.
Hrs. required for A p.u.	<u>10 hrs.</u>
<u>= 20 units</u>	
Contribution (A = $30 \times 20$ )	600
(B = $20 \times 100$ )	2000
(-) Fixed Cost (fixed Overheads)	<u>(2000)</u>
Net profit	<u>600</u>

Q.50. A firm can produce three different products from the same raw material using the same production facilities. The requisite labour is available in plenty at Rs. 8 per hour for all products. The supply of raw material which is imported at Rs. 8 per kg. is limited to 10,400 kgs. For the budget period. The variable overheads are Rs. 5.60 per hour. The fixed overheads are Rs. 50,000. The selling commission is 10% on sales.

(a) From the following information, you are required to suggest the most suitable sales mix, which will maximize the firm's profits. Also determine the profit that will be earned at that level:

Product	Market demand (units)	Selling price per unit Rs.	Labour hours required per (unit)	Raw material required per unit Kgs.
X	8,000	30	1	0.7
Y	6,000	40	2	0.4
Z	5,000	50	1.5	1.5

(b) Assume, in above situation, if additional 4,500 kgs. Of raw material is made available for production, should the firm go on for further production, if it will result in additional fix overheads of Rs. 20,000 and 25 percent increase in the rates per hour for labour and variable overheads on additional units.

Solution: (a) Statement of contribution and Ranking

Products per units	X	Y	Z
--------------------	---	---	---

	Rs.	Rs.	Rs.
Direct material	5.60 (0.7 kg. × Rs. 8)	3.20 (0.4 kg. × Rs. 8)	12.00 (1.5 kg. × Rs. 8)
Direct labour	8.00	16.00	12.00
Variable overhead	5.60 (1 hr. × Rs. 5.60)	11.20 (2 hr. × Rs. 5.60)	8.40 (1.5 hr. × Rs. 5.60)
Selling Commission	3.00	4.00	5.00
Total Variable Cost: (A)	22.20	34.40	37.40
Selling price (B)	30.00	40.00	50.00
Contribution: [ (B) – (A) ]	7.80	5.60	12.60
Contribution per kg. raw material	11.14 (Rs. 7.80 / 0.7 kg.)	14.40 (Rs. 5.60 / 0.4 kg.)	8.4 (Rs. 12.60 / 1.5 kg.)
Ranking	II	I	III

Statement of profit as per Suggested Sales Mix

Balance available for other products	Production propriety	Raw material required per unit	Units produced	Raw material consumed (Total 10,400 Kgs.)	Contribution
Kgs.		Kgs.		Kgs.	Kgs.
8,000	X	0.4	6,000	2,400	33,600
2,400	Y	0.7	8,000	5,600	62,400
Nil	Z	1.5	1,600	2,400	20,160

(b) When additional 4,500 Kgs. Of raw material is made available of production, the same would be utilized to produce 3,000 additional units of product Z. The additional profit which will accrue form this of this material is as follows:

Rs.

Rs.

Contribution for 3,000 units @ Rs. 12.60 per unit	37,800
Less: Increase in labour cost for 3,000 units	9,000
@ Rs. 3 per unit	
Increase in variable overheads for 3,000 units	<u>6,300 15,300</u>
@ Rs. 2.10 per unit	
Additional Contribution	22,500
Less: Additional Fixed Overheads	<u>(20,000)</u>
Additional Profit	<u>2,500</u>

Since the use of additional 4,500 kgs. Of material can increase the profit by Rs. 2,500, it is desirable to go in for the production of 3,000 additional units of Z.

Q.51. The Chief Cost Accountant of a company running an orchard with an adequate supply of labour, presents the following data and requests you to advise about the area to be allotted for the cultivation of various types of fruits, which would result in maximization of profits. The company contemplates growing Apples, Oranges and peaches:

Particulars	Apples	Lemons	Oranges	Peaches
Selling price per box (Rs.)	15	15	30	45
Season yield in boxed per acre	500	150	100	200
Costs:	Rs.	Rs.	Rs.	Rs.
Material per acre	270	105	90	150
Labour: Growing per acre	300	225	150	195
Picking and packing per box	1.50	1.50	3	4.50
Transport per box	3	3	1.50	4.50

The total fixed costs in each season would be Rs. 2,10,000. The following limitations are also placed before you.

- The area available is 450 acres butt out of this; 300 acres are suitable for growing only oranges and lemons. The balance of 150 acres is suitable for growing any of the four fruits.
- The marketing strategy of the company requires the compulsory production of all the four types of fruits in a season and the minimum quantity of any one type to be 18,000 boxed.

Calculate the total profit that would accrue if your advice is followed.

Solution: Statement Showing Contribution per Acre

Particulars	Apples	Lemons	Oranges	Peaches
Selling price per box Rs.	15	15	30	45
Season yield in boxes per acre	500	150	100	200
Sales Value per acre (A) Rs.	7,50	2,250	3,000	9,000
Material Cost per acre Rs.	270	105	90	150
Labour: Growing per acre Rs.	300	225	150	195
Picking, and Transport per acre				
500 × 4.50 Rs.	2,250			
150 × 4.50		675		
100 × 4.50			450	
200 × 9				1,800
Variable Cost per acre Rs. (B)				
Contribution per acre (A) - (B) Rs.	2,820	1,00,5	690	2,145
Preference according to Contribution per acre	4,680	1,245	2,310	6,855
	II	IV	III	I

Since the minimum quantity of production of each type is 18,000 boxes and all the four types of fruits have to be produced, the minimum acreage to be allocated to each fruit would be as follows:

Apples	=	18,000/500	=	36 acres
Lemons	=	18,000/150	=	120 acres
Oranges	=	18,000/100	=	180 acres
Peaches	=	18,000/200	=	<u>90 acres</u>
Total				<u>426 acres</u>

Lemons and oranges require 300 acres in total to produce. Moreover, 300 acres of land is suitable only for these two products, hence 300 acres would be used to produce only these products. The balance of

24 acres (i.e., 450 - 426) is available for production of any of the fruits. Since the peaches give the highest contribution per acre and hence they should be preferred for allocation of 24 acres. The total acreage for peaches would therefore be 90 + 24 = 114 acres.

Statement of Profit

Particulars	Apples	Lemons	Oranges	Peaches	Total
Area (acres)	36	120	180	114	450
Contribution per acre Rs.	4,680	1,245	2,310	6,855	
Total Contribution Rs.	1,68,480	1,49,400	4,15,800	7,81,470	15,15,150
Less: Fixed Costs					2,10,000
Net Profit					13,05,150

Q.52 Taurus Ltd. produces three products – A, B and C, from the same manufacturing facilities. The cost and other details of the three products are as follows:

	A	B	C	Total
Selling price/unit (Rs.)	200	160	100	
Variable cost/ unit (Rs.)	120	120	40	
Fixed expenses/month (Rs.)				2,76,000
Maximum production per month (units)	5,000	8,000	6,000	
Total hours available for the month				200 hours
Maximum demand per month (units)	2,000	4,000	2,400	

The processing hours cannot be increased beyond 200 hours per month.

You are required to:

- Compute the most profitable product-mix;
- Compute the overall break-even sales of the company for the month based on the mix calculated in (a) above.

**Solution: (a)**

**M/s Taurus Limited**

### Most Profitable Product Mix

Product	*No. of units to be produced	Contribution per unit Rs.	Total Contribution Rs.
A	2,000	80	1,60,000
B	1,600	40	64,000
C	2,400	60	1,44,000
Total			3,68,000
Less: Fixed Expenses:			2,76,000
Profit			92,000

\*Refer to Working Note 1

(b) Overall Break Even Sales

[Based on the mix calculated in (a) part]

Break Even Sales = Fixed Costs × Sales

Contribution

= Rs.2, 76,000 × \*Rs.8,96,000 = Rs.6,72,000

Rs.3,68,000

\*Refer to Working Note 2.

#### Working Notes: 1.

Products	A	B	C
Selling price/Units Rs. (I)	200	160	100
Variable cost/unit (Rs.) (II)	120	120	40
Contribution/unit (Rs.) (I-II)	80	80	60

Maximum production per hour (units)	<u>5,000</u> = 25	<u>8,000</u> = 40	<u>6,000</u> = 30
	200	200	200



Contribution per hour (Rs.)	2,000	1,600	1,800
(Maximum production per hour × contribution per unit)	(Rs.80 × 25)	(Rs.40 × 40)	(Rs.60 × 30)
Ranking	1	3	2
Units to be produced	2,000	1,600	2,400
Time required for the units to be produced (Hrs)	80	40	80

## 2. Statement of Contribution

Products	Units	Selling price Per Unit	Sales Revenue
			(i)
		Rs.	Rs.
A	2,000	200	4,00,000
B	1,600	160	2,56,000
C	2,400	100	2,40,000
			8,96,000

Q.53 From the following particulars, find the most profitable product mix and prepare a statement of profitability of that product mix: —

	Product A	Product B	Product C
Units budgeted to be produced and sold	1,800	3,000	1,200
Selling price per unit Rs.	60	55	50
Requirement per unit:			
Direct Materials	5 kg	3 kg	4 kg
Direct Labour	4 hrs	3 hrs	2 hrs
Variable Overheads	Rs.7	Rs.13	Rs.8
Fixed Overheads	Rs.10	Rs.10	Rs.10
Cost of Direct Materials per kg.	Rs.4	Rs.4	Rs.4

Direct Labour Hour Rate	Rs.2	Rs.2	Rs.2
Maximum Possible Units of Sales	4,000	5,000	1,500

All the three products are produced from the same direct material using the same type of machines and labour. Direct labour, which is the key factor, is limited to 18,600 hours.

Solution: Statement of Most Profitable Product Mix

Products:	A	B	C
	Rs.	Rs.	Rs.
Selling price per unit (i)	60	55	50
Variable Cost:			
Direct Material	20	12	16
Direct Labour	8	6	4
Variable Overhead	7	13	8
Total Variable Cost (ii)	35	31	28
Contribution per unit [ (i) – (ii) ]	25	24	22
Contribution per hour (Refer to Note 1)	6.25	8	11
Ranking of most profitable product mix	III	II	I

**Statement of Profitability of the most profitable product mix**

	Products			
	A	B	C	Total
Ranking	III	II	I	
Units produced and sold	150	5,000	1,500	
(Refer to Note 2)				
Contribution per unit (Rs.)	25	24	22	
Total contribution on units	Rs.3,750	Rs.1,20,000	33,000	1,56,750
Sold (Rs.)	(150 × Rs.25)	(5,000×Rs.24)	(1,500×Rs.22)	
Less: Fixed Cost (Rs.)				60,000

(Refer to Note 3)

---

Profit (Rs.)

96,750

Notes:

(1) Products	A	B	C
Contribution per unit (Rs.)	25	24	22
Direct labour hours per unit	4	3	2
Contribution per hour (Rs.)	$\frac{25}{4} = 6.25$	$\frac{24}{3} = 8$	$\frac{22}{2} = 11$
	4	3	2

(2) Here direct labour hour is the key factor and only 18,600 hours are available to produce the three products. The available 18,600 hours are utilized in the order of the ranking assigned i.e. first of all product C then product B and lastly product A will be produced.

The number of units of each product to be produced will depend upon the maximum possible sale of each product. The details of the products to be produced keeping in view of available hours and their ranking are as below:

Total hours utilized		
Product C	1,500 units × 2 hrs.	3000
Product B	5,000 units × 3 hrs.	15,000
Product A	150 units × 4 hrs.	<u>600</u>
Total hours		<u>18,600</u>

	Products			
	A	B	C	Total
Budgeted units to be produced and sold:	1,800		3,000	1,200
Fixed overhead (Rs.) per unit	10	10	10	
Total fixed overhead (Rs.)	18,000	3,0000	1,2000	60,000

Q.54. A company manufactures three products. The cost data are as under:

	A	B	C
--	---	---	---

Direct Materials	Rs.	64	152	117
Direct Labour dept.	Rate per hour	Hrs.	Hrs.	Hrs.
	Rs.			
1	5	18	10	20
2	6	5	4	7
3	4	10	5	20
Variable Overhead		Rs.16	9	21
Fixed Overheads	Rs. 4,00,000 per annum			

The budget was prepared at a time, when the market was sluggish. The budgeted quantities and selling

Product	Budgeted Qty.	Selling price (Rs.) / unit
A	9,750	270
B	7,800	280
C	7,800	400

Later the market improved and the sales quantities could be increased by 20% for product A and 25% each for products B and C. the sales manager confirmed that the increased quantities could be achieved at the prices originally budgeted. The production manager stated that the output cannot be increased beyond the budgeted level due to limitation of direct labour hours in Department 2.

Required: (1) present a statement of budgeted. Profitability.

(2) Set optimal product mix and calculate the optimal profit.

Solution: (1) Statement of Budgeted profitability

Products	A	B	C	Total
Budgeted Quantity (Units) (1)	9,750,	7,800	7,800	
	Rs.	Rs.	Rs.	
Selling price per unit	270	280	280	
Variable Cost per unit:				
Direct Materials	64	152	117	

Direct Labour	160	94	222	
Variable Overheads	16	9	21	
Total Variable Cost per unit (3)	240	255	360	
Contribution per unit (4) [(2) – (3)]	30	25	40	
Total Contribution (1) × (4)	2,92,500	1,95,000	3,12,000	7,99,500
Less: Fixed Cost				<u>4,00,000</u>
Profit				3,99,5000

(2) Statement of Optimal product Mix and Profit

Products		B	C	Total
Contribution per unit (1)	30	25	40	
Direct Labour hours in Department 2(2)	5	4	7	
Contribution per direct labour hour (1) / (2) (Rs.)	6	6.25	5.71	
Ranking	II	I	III	
Optimal product Mix Units (3)	11,700	9,750	5,292	
	(58,500 hrs.)	(39,000 Hrs.)	(37,044 Hrs.)	
Total Contribution (Rs.) (1) × (3)	3,51,000	2,43,750	2,11,680	
Less: Fixed Costs (Rs.)				
Optimal profit				4,06,430

Working Notes: Total Hours Available In Department 2

Products	Units	Hrs.	Total Hrs.
(b)	(b)	(c)	(d) = (b) × (c)

A	9,750	5	48,750
B	7,800	4	31,200
C	7,800	7	54,600
Total			1,34,550

## 2. Maximum Sales Quantities of Products (Under Improved Market Conditions)

Products	Units	Increase in percentage	Total number of units
A	9,750	20	11,700
B	7,800	25	9,750
C	7,800	25	9,750

## Break-even Charts

Q.55. From the following particulars draw a break-even chart and find out the break-even point:

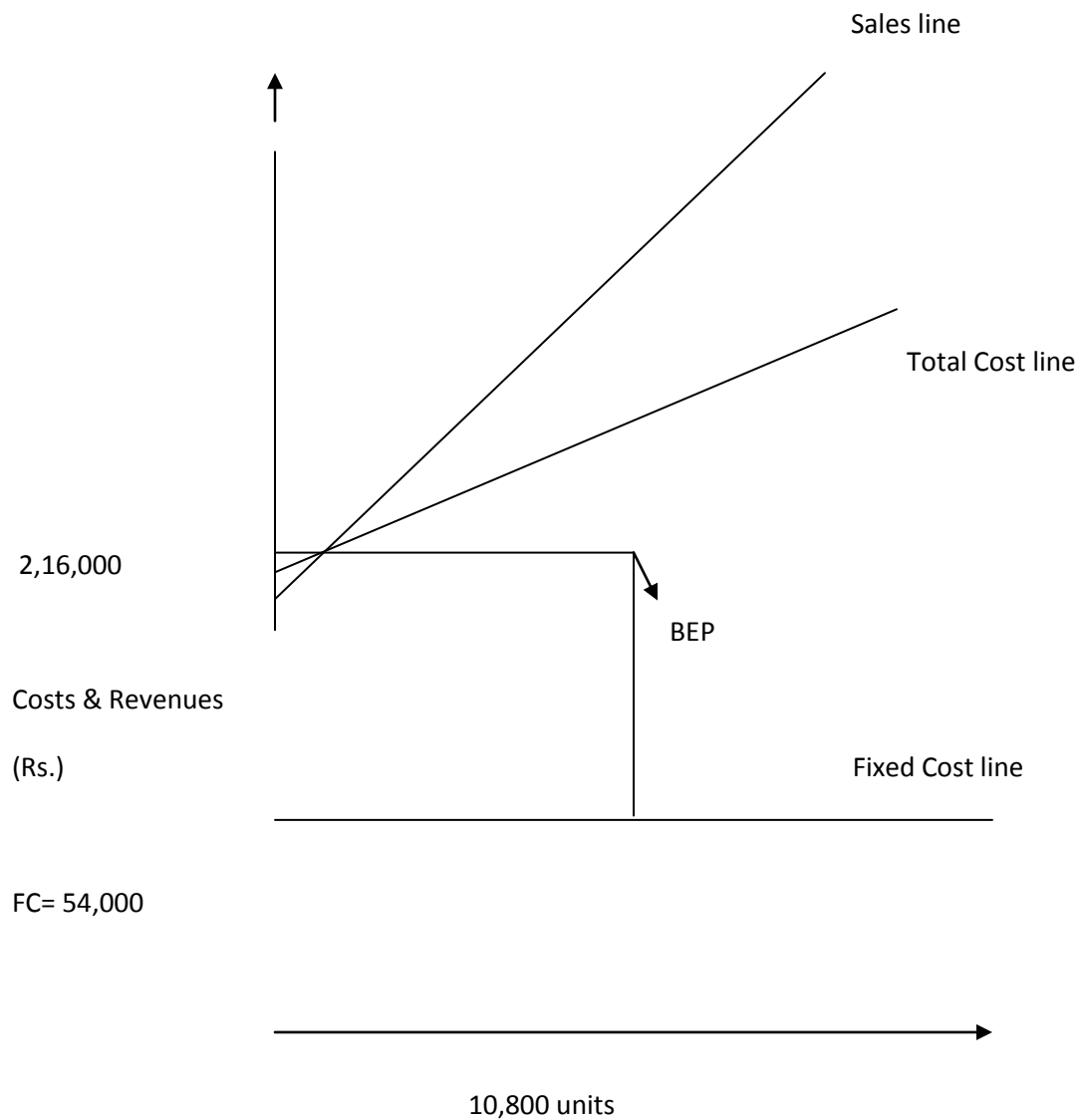
	Rs.
Variable cost per unit	15
Fixed expenses	54,000
Selling price per unit	20

What should be the selling price per unit, if the break-even point is to be brought down to 6,000 units?

Solution:  $BEP (units) = \frac{Rs. 54,000}{Rs. 20 - Rs. 15} = 10,800 \text{ units}$

Rs. 20 - Rs.15

$BEP (Rs.) = 10,800 \text{ units} \times Rs.20 = Rs.2,16,000$



$$\text{BEP} = \frac{\text{Fixed Cost}}{\text{Contribution p.u.}} = \frac{54,000}{9} = 6,000$$

Contribution p.u.

Contribution per unit

Contribution p.u. = Rs.9

SP = 9 + 15 = Rs.24

Q.56 (a) Plot the following data on a graph and determine the break-even point:

Direct Labour 100 per unit

Direct Material 40 per unit

Variable Overheads	100% of direct labour
Fixed Overheads	60,000
Selling Price	Rs.400 per unit

(b) In order to increase efficiency in production, the concern installs improved machinery which results in an increase in fixed overhead of Rs.20,000 but the variable overhead is reduced by 40%.

You are required to plot the data on the above graph and to determine the new break-even point assuming that there is no change in sale price.

Solution: (a) Total Variable Cost per unit =  $100 + 40 + 100 = 240$

Selling price = 400

Contribution =  $400 - 240$

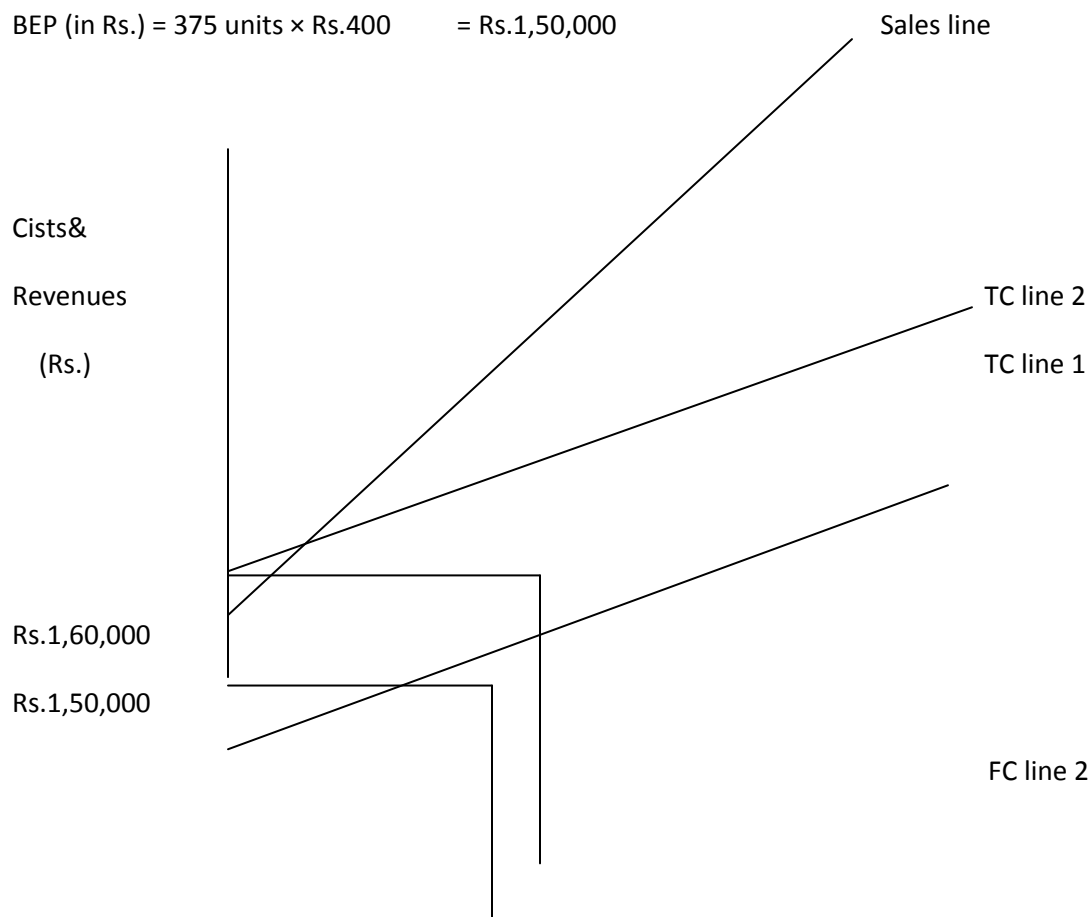
= 160

Fixed Cost = 60,000

BEP (in Rs.) =  $\frac{60,000}{160} = 375$  units

160

BEP (in Rs.) =  $375 \text{ units} \times \text{Rs.}400 = \text{Rs.}1,50,000$





Rs.80,000

Rs.60,000

FC line 1

**375 400**

(b) Total Variable Cost per unit =  $100 + 40 + 60 = 200$

Fixed Cost = 80,000

BEP (in units) =  $\frac{80,000}{400 - 200}$

= 400 units

BEP (in Rs.) =  $400 \text{ units} \times \text{Rs.}400 = \text{Rs.}1,60,000$

#### **Cost Statement as per Marginal/Absorption Costing**

Q.57 Your company has a production capacity of 2,00,000 units per year. Normal capacity utilization is reckoned as 90%. Standard variable production costs are Rs.11 per unit. The fixed costs are Rs.3,60,000 per year. Variable selling costs are Rs.3 per unit and fixed selling costs are Rs.2,70,000 per year. The unit selling price is Rs.20. In the year just ended on 30<sup>th</sup> June 1998, the production was 1,60,000 units and sales were 1,50,000 units. The closing inventory on 30.6.98 was 20,000 units. The actual variable production costs for the year were Rs.35,000 higher than the standard.

(i) Calculate the profit for the year 1998:

(a) by the absorption costing method, and (b) by the marginal costing method.

(ii) Explain the difference in the profits.

Solution: (i) (a) Cost Sheet (Absorption costing)

Fixed Cost	3,60,000
(+) Variable Cost ( $11 \times 1,60,000 + 35,000$ )	17,95,000
Total cost of production	21,55,000
(+) Opening Stock of Finished Goods	1,30,000

[(10,000) × (11 +2)]	
( - ) Closing Stock of Finished Goods	(2,69,375)
( <u>21,55,000</u> × 20,000)	
1,60,000	
<b>Cost of Goods sold</b>	20,15,625
Selling Overhead	
Fixed	2,70,000
Variable (1,50,000 × Rs.3)	4,50,000
<b>Cost of Sales</b>	27,35,625
(+) Profit	2,64,375
Sales	30,00,000

(b) Marginal costing Approach

Variable Cost of production	17,95,000
Opening Stock of Finished Goods	1,10,000
(10,000 × 11)	
(-) Closing Stock of Finished Goods	(2,24,375)
( <u>17,95,000</u> × 20,000)	
1,60,000	
<b>Variable Cost of Goods sold</b>	16,80,625
(+) Variable Selling Overhead	4,50,000
Variable Cost of Sales	21,30,625
<b>Sales</b>	30,00,000
(-) Variable Cost of Sales	(21,30,625)
Contribution	869,375
(-) Fixed Cost (3,60,000 + 2,70,000)	(6,30,000)

<b>Profit</b>	<b>2,39,375</b>
---------------	-----------------

(ii) The reason for difference in profits as per absorption costing and marginal costing is that absorption costing includes fixed cost in inventory valuation and marginal costing ignores the same. Marginal costing considers fixed cost as period cost and charges the entire fixed cost of the period against the contribution earned during the period.

Q.58 Mega Company has just completed its first year of operations. The unit costs on a normal costing basis are as under:

		Rs.
Direct material 4 kg @ Rs.4	=	16.00
Direct labour 3 hrs @ Rs.18	=	54.00
Variable overhead 3 hrs @ Rs.4	=	12.00
Fixed overhead 3 hrs @ Rs.6	=	<u>18.00</u>
		100.00

Selling and administrative costs:

Variable	Rs.20 per unit
Fixed	Rs.7,60,000

During the year the company has the following activity:

Units produced	=	24,000
Units sold	=	21,500
Unit selling price	=	Rs.168
Direct labour hours worked	=	72,000

Actual fixed overhead was Rs.48,000 less than the budgeted fixed overhead. Budgeted variable overhead was Rs.20,000 less than the actual variable overhead. The company used on expected actual activity level of 72,000 direct labour hours to compute the predetermine overhead rates.

Required:

(i) Compute the unit cost and total income under:

(a) Absorption costing

(b) Marginal costing

(ii) Under or over absorption of overhead.

(iii) Reconcile the difference between the total income under absorption and marginal costing.

**Solution:**

**Computation of Unit Cost & Total Income**

Unit Cost	Absorption Costing (Rs.)	Marginal Costing (Rs.)
Direct Material	16.00	16.00
Direct Labour	54.00	54.00
Variable Overhead	12.00	12.00
Fixed Overhead	18.00	--
Unit Cost	100.00	82.00

**Income Statements**

**Absorption Costing**

Sales (21500 × 168)		36,12,000
Less: Cost of goods sold (21500 × 100)	(21,50,000)	
Less: Over Absorption	(28,000)	(21,22,000)
Gross Profit		14,90,000
Less: Selling & Distribution Expenses		(11,90,000)
Net Operating Profit		3,00,000

**Marginal Costing**

Sales		36,12,000
Less: Variable Cost of goods sold (21500 × 82)	(17,63,000)	
Add: Under Absorption of variable overheads	(20,000)	(17,83,000)
		18,29,000
Less: Variable Selling & Distribution Expenses		(4,30,000)
Contribution		13,99,000





	<u>Rs.24,00,000</u> × 3,20,000 units	
	4,00,000 units	-----
Total cost of production		1, 47, 20,000
(+) Opening stock of finished goods (40,000 units × Rs.46)		18, 40,000
(-) Closing stock of finished goods (50,000 units × Rs.46)		<u>(23, 00,000)</u> <u>Cost of Goods</u>
<u>Sold</u>	<u>1,42,60,000</u>	(+) Selling & distribution expenses
→ Variable (3,10,000 units × Rs.12)		37,20,000
→ Fixed		<u>16, 00,000</u>
Cost of Sales		1, 95, 80,000
(+) Profit		52, 20,000
Sales		<u>2, 48, 00,000</u>
Profit before charging under absorbed overheads		52, 20,000
(-) Under absorbed overheads		<u>(4, 80,000)</u>
Profit before charging under absorbed overheads		<u>47, 40,000</u>







**Q.1. Write short notes on the following :**

**(i) Standard Cost; (ii) Standard Costing; (iii) Variance Analysis.**

**Ans.: (i) Standard Cost :**

It means the pre-determined cost of future, *i.e.* what should be the cost in future period under a given set of operating conditions. Standard cost is important because it is the ideal cost to be incurred and it is also the base for comparison with actual cost. The comparison of standard cost with actual cost is essential because it helps us to ascertain the difference between the expected cost and actual cost so that appropriate corrective actions can be taken in future to prevent such difference.

**(ii) Standard Costing :**

In the meaning of standard costing, following elements are included :

- a) Determine of standard cost for each elements of costs (Materials, Labour and Overheads).
- b) Comparison of actual cost with the standard cost, the difference between the two is termed as variance.
- c) Analysis of variances to ascertain the reason of variances.
- d) Presentation of information to the appropriate level of management so that remedial steps may be taken.

**(iii) Variance Analysis :**

It is a process of analyzing, variances by sub-dividing total variances in such a way that the management can assign responsibility for below standard performance.

Variance analysis is very important because with the help of it, we can ascertain those variance which are controllable and steps can be taken to reduce such variations. A detailed analysis of controllable variances are helpful to ascertain :

1. the amount of variance
2. the causes of variance
3. the person responsible for variance; and
4. the corrective action to be taken.

**Q.2. Distinguish between standard cost and estimated cost.**

**Ans.:** (1) Estimated cost is in the nature of cost '*will be*' whereas standard cost is in the nature of cost '*should be*,'

(2) Estimated costs are calculated by adjusting past figures to possible future changes. Standard costs are however calculated on scientific basis.

(3) Standard cost are meant for control purposes which is not the case with estimated costs.

- (4) Standard costing is used by a firm which has adopted standard costing system, whereas estimated cost is used by a firm which has adopted historical system of ascertaining costs.

**Q.3. Distinguish between Standard Costing and Budgetary Control.**

- Ans. (1) Budget is a projection of financial accounts whereas standard cost is a projection of *Cost Account*.
- (2) Budget covers the operations of the business as a whole and, therefore, it is extensive in nature.
- (3) Budgets are prepared for different functions of business, *e.g.* Sales, Production, Purchase, *etc.* whereas standard costs are ascertained for each elements of cost. *E.g.* Material, Labour and Overheads.
- (4) Budgets are meant to be used for forecasting requirement of financing, material, labour *etc.* Standards on the other hands, tells what the costs '*should be*'.
- (5) Budgetary control is possible in parts whereas standard costing technique has to be applied in full.

Besides above mentioned joints of differences, there are some principles which are common to both standard costing and budgetary control. They are :

1. Setting up the target performance
2. Measurement of actual performance
3. Comparison of actual performance with the target performance
4. Analysis of variances between actual and standard performance
5. Taking corrective actions, wherever necessary.

**Q.4. Briefly explain various types of standards.**

- Ans.: 1. **Basic Standard** : These are long term standards and remains unchanged for a long period of time.
2. **Ideal Standards** : These are the standards to be attained under the most favourable conditions possible.
3. **Normal Standards** : Such standards are based on average performance in the past. They are attainable under the normal conditions.
4. **Attainable Standards** : These are the standards which can be achieved with reasonable efforts. They are based on practical considerations and they are also called the expected or practical standards.
5. **Loose or Lax Standards** : When the standards are deliberately set below efficiency level to show favourable variances, they are called the loose or lax standards.

6. **Revised Standards** : When the standards are changed to correspond with the current conditions, they are called the revised standards.
7. **Current Standards** : Standards set for the current period are known as current standard.

**Q.5. What are the major factors to be kept in view in deciding whether or not to investigate variances in budgetary control and standard cost systems ?**

- Ans.: 1. **Cost Benefit Analysis** : Investigation involves some costs of its own and a decision to investigate can be taken only when it is found that the financial benefits is more than the cost of investigation.
2. **Amount of Variance** : A limit can be set which will decide whether variance should be investigated or not. *For example*, a variance of 5% of Rs.5,000 may be considered worthy of investigation.
3. **Controllability** : Uncontrollable variances need not be investigated. *For example*, a material price variance due to imposition of additional taxes by Govt. need not be investigated. On the other hand, the controllable variances should be fully investigated if the amount of variance is above the limits prescribed.

**Q.6. “Calculation of variances in standard costing is not an end in itself, but a means to an end”. Discuss.**

Ans.: It is generally understood that the purpose of standard costing is to compute the variances. In fact, the computation of variances can be termed as first step and the main purpose of management starts after computation of these variances. The management should act as early as possible to investigate the causes of variances. It is necessary because of following reasons :

1. It helps the management to place responsibilities for variances
2. Waste, scrap and losses, if not corrected immediately, continue to increase.
3. It prevents of re-occurrence of variances
4. To scientifically plan and take various important decisions for future course of business operation.

Hence, the end is the control aspect and the computation of variances is only a means to achieve this end.

## CONCEPT 1: MATERIAL COST, PRICE &amp; USAGE VARIANCE



Q.1.

RS Ltd. has adopted standard costing furnishes the following information

Standard :

Material for 7 kg. of Finished Products	10 kgs.
Price of materials	Rs. 10 per kg.

Actual :

Output	21,000 kgs.
Material used	28,000 kgs.
Cost of materials	Rs. 2,52,000

Calculate :

- (a) Material Usage Variance :
- (b) Material Price Variance :
- (c) Material Cost Variance :

Ans. i. Rs. 48,000 (F), ii, Rs. 20,000 (F) iii, Rs. 28,000 (F)

Q. 2

SK Ltd. presents the following information for November 2008 :

Budget production of product P = 200 units.

Standard consumption of Raw materials = 2 kg per unit of P.

Standard price of material A = Rs. 6 per kg.

Actually, 250 units of P were produced and material A was purchased at Rs. 8 per kg and consumed at 1.8 kg per unit of P. Calculate the material cost variances.

Ans. i. 600 (A), ii, 900 (A) iii, 300 (F)

## CONCEPT NUMBER 2:- MATERIAL MIX & YIELD VARIANCE

Q.3

PS Ltd. has established the following standard mix for producing 9 tonnes of product Z.:

	Rs.
5 tonnes of material A at Rs. 7 per tones	35.
3 tonnes of material B at Rs. 5 per tones	15
2 tonnes of material C at Rs. 2 per tones	<u>4</u>
	Rs. 54

A standard loss of 10% of input is expected to occur. Actual input was as under :

53,000 tonnes of material A at Rs. 7 per tonnes.

28,000 tonnes of material B at Rs. 5.30 per tones.

19,000 tonnes of material C at Rs. 2,20 per tonnes.

Actual output for a period was 92,700 tonnes of product Z.

Compute :

- (i) Material Mix Variance :
- (ii) Material Yield Variance.

Ans. i. 9,000 (A), ii. 16,200 (F) iii, 16,200 (F)

Q.4

YK Ltd. manufactures BXE by mixing three raw materials. For every batch of 100 kgs. of BXE, 125 kgs. of raw materials are used. In April 2007, 60 batches were prepared to produce an output of 5,600 kgs. of BXE. The standard and actual particulars for April 2006 are as under :

Raw material	Standard		Actual		Quantity Purchased
	Mix	Price Per Kg.	Mix	Price per Kg.	
	%	Rs,	%	Rs.	Kg.
A	50	20	60	21	5,000
B	30	10	20	8	2,000
C	20	5	20	6	1,200

Calculate all Material variances.

Ans. i. Rs. 17,500 (A), ii. Rs. 3,000 (A) iii, Rs. 14,500 (A) iv, Rs. 7,500 (A)

v. Rs. 7,000 (A)

Q.5

80 kgs. of material a at a standard price of Rs. 2 per kg. and 40 kgs of material B at a standard price of Rs. 5 per kg. were to be used to manufacture 100 kgs. of a chemical.

During a month, 70 kgs. of material A priced at Rs. 2.10 per kg. and 50 kgs. of material B priced at Rs. 4.50 per kg. were actually used and the output of the chemical was 102 kgs.

Find out the material variances.

Ans. i. 4,80 (A), ii. 18 (F) iii, 22,80 (A) iv, 30 (A) v. 7,20 (F)

Q. 6

Nescafe Ltd. produces an article by blending two basic raw materials. The following standards have been set up for raw materials :

Material	Standard Mix	Standard Price per kg.
A	40%	Rs. 4.00
B	60%	Rs. 3.00

The standard loss in processing is 15%. During September, 1990, the company produced 1,700 kg. of finished output.

The position of stock and purchases for the month of September, 1990 is as under :

Material	Stock on 1.9.90	Stock on 30.9.90	Purchased during September, 90	
	Kg.	Kg.	Kg.	Cost Rs.
A	35	5	800	3,400
B	40	50	1,200	3,000

Calculate the following variances :

- Material price variance
- Material usage variance.
- Material yield variance
- Material mix variance
- Total material cost variance.

Assume first in first out method for the issue of material. The opening stock is to be valued at standard price.

Ans. i. Rs. 198.75 (Adverse) ii. Rs. 90 (A) iii, xxx iv, Rs. 22 (A)  
v. Rs. 286.25 (Favourable) 286.25 (F) 90 (A)

Q. 7

Tide Chemical Industries provide the following information from their records :-

For making 10 kgs. of GEMCO, the standard material requirements is

Material	Quantity	Rate per kg.
----------	----------	--------------



	Kgs.	Rs.
A	8	Rs. 6.00
B	4	Rs. 4.00

During April 1988, 1000 kgs. of GEMCO were produced. The actual consumption of materials is as under :-

Material	Quantity Kgs.	Rate per kg. Rs.
A	750	Rs. 7.00
B	500	Rs. 5.00

Calculate :

- Material Cost Variance
- Material Price Variance.
- Material Usage Variance
- Material Mix Variance
- Material Yield Variance.

Ans. i. Rs. 1,350 (A) ii. Rs. 1,250 (A) iii, Rs. 100 (A) iv, Rs. 166.67 (F)  
v. Rs. 266.67 (A)

Q. 8

Calculate from the following data :-

- The Material Price Variance
- The Material Mix Variance.
- The Material Yield Variance
- The Material Usage Variance
- The Material Cost Variance.

Material	Standard Price per lb.	Standard Weight per unit of output (lbs.)	Actual Usage for output of 36 units (lbs.)	Actual Price per lb.
	Rs.			Rs.
A	10	2	72	12
B	1	4	108	1
C	5	3	126	4

Ans. i. Rs. 18 (Average) ii. Rs. 132 (A) iii, xxx iv, Rs. 54 (A) v. 72 (A)

Q. 9

One kilogram of product 'K' requires two chemicals A and B. The following were the details of product 'K' for the month of June 2007 :

- (a) Standard mix Chemical 'A' 50% and chemical 'B' 50%.
- (b) Standard price per kilogram of Chemical 'A' Rs. 12 and chemical 'B' Rs. 15.
- (c) Actual input of chemical 'B' 70 kilograms.
- (d) Actual price per kilogram of Chemical 'A' Rs. 15.
- (e) Standard normal loss 10% of total input.
- (f) Materials cost variance total Rs. 650 adverse.
- (g) Materials yield variance total Rs. 135 adverse.
- (h) Actual output is 90 kg.

You are required to calculate :

- (I) Material mix variance
- (II) Materials usage variance
- (III) Materials price variance
- (IV) Actual loss of actual input
- (V) Actual input of Chemical 'A'
- (VI) Actual price per kilogram of Chemical 'B'.

Ans. i. 45 (A) ii. Rs. 180 (A) iii, Rs. 470 (A) iv, 20 kg.

Q. 10

Compute the missing data indicated by the Question Marks from the following :

Particulars	A	B
Standard Price/Unit	Rs. 12	Rs. 15
Actual Price/Unit	Rs. 15	Rs. 20
Standard Input (kgs)	50	?
Actual Input (kgs.)	?	70

Material Price Variance	?	?
Mutual Usage Variance	?	Rs. 300 Adverse
Material Cost Variance	?	?

Material mix variance for both products together was Rs. 45 Adverse.

Ans. i. Rs. 120 (A) ii. Nil iii, Rs. 650 (A)

### CONCEPT NUMBER 3:- QUESTIONS BASED ON LABOUR VARIANCE

Q. 11

Standard Cost specification for a Product

Time 15 hours per unit

Cost Rs. 3 per unit

Actual Performance in a Cost Period

Production 500 units

Hours taken

Production 7,800 hours

Idle Time 200 hours

Total Time 8,000 hours

Payment made Rs. 24,800 (average per hour Rs. 3.10) Calculate labour variances.

Ans. i. Rs. 800 (A) ii. Rs. 900 (A) iii, Rs. 600 (A) iv. Rs. 2,300 (A), Rs. 2,300 (A)

Q. 12.

The Standard cost on 'Material' and 'Labour' for the making of one unit of Product Z is estimated as under :

Material 80 kg at Rs. 1.50 per kg.

Labour 18 hours at Rs. 1.25 per hr.

On completion of production of one unit of Product Z, it was found that 75 kg. of material costing Rs. 1.75 per kg. has been consumed and that the time taken was 16 hours, the wage rate being Rs. 1.50 per hour. You are required to analyse material and labour variances.

Ans. i. 11.25 (A) 1.5 (A) ii. 18.75 (A), 4 (A) iii, 7.50 (F), 2.5 (F)

Q. 13.

The standard output of product 'EXE' is 25 units per hour in manufacturing department of a company employing 100 workers. The standard wage rate per labour hour is Rs. 6.

In a 42 hour week, the department produced 1,040 units of 'EXE' despite 5% of the time paid was lost due to an abnormal reason. The hourly wage rate actually paid were Rs. 6.20, Rs. 6 and Rs. 5.70 respectively to 10, 30 and 60 of the workers. Compute labour cost, rate, efficiency & idle time variances.

Ans. i. Rs. 432 (F) ii. Rs. 672 (F), iii, Rs. 1,020 (F) iv. Rs. 1,260 (F)

Q. 14.

Vim Ltd. turns out only one article, the prime cost standards for which have been established as follows :

Per Completed Piece		
Material 5 lbs.	@ Rs. 4.20	Rs. 21
Labour 3 Hour	@ Rs. 3.00	Rs. 9

The production schedule for the month of July 1998 required completion of 5,000 pieces. However 5,120 pieces were actually completed.

Purchases for the month of July 1998 amounted to 30,000 lbs. of material at the total invoice price of Rs. 1,35,000. Production records for the month of July, 1998 showed the following actuals results :

Material requisitioned and used	25,700 lbs
Direct labour 3 hours 15,150 hours	Rs. 48,480

Calculate appropriate material and labour variances.

Ans. i. 8,130 (A) 2,400 (A) ii. 7,710 (A), 3,030 (A) iii, 420 (A) 630 (F)

Q. 15.

100 skilled workmen, 40 semi-skilled workmen and 69 unskilled workmen were to work for 30 weeks to get a contract job completed. The standard weekly wages were Rs. 60, Rs. 36 and Rs. 24 respectively. The job was actually completed in 32 weeks by 80 skilled, 50 semi-skilled and 70 unskilled workmen who were paid Rs. 65, Rs. 40 and Rs. 20 respectively as weekly wages. Find out the labour cost variance, labour rate variance, labour mix variance and labour effectively variance.

Ans. i. Rs. 8,800 (A) ii. Rs. 10,240 (A), iii, 1,440 (F) iv 19,200 (F) v.  
17,760 (A)  
vi. Rs. 8,800 (A) vii. Rs. 1,440 (F)

Q. 16.

Calculate the labour variances from the following information :

Standard wages :

Grade X : 90 Labourers at Rs. 2 per hour

Grade Y : 60 Labourers at Rs. 3 per hour

Actual Wages :

Grade X : 80 Labourers at Rs. 2.50 per hour

Grade Y : 70 Labourers at Rs. 2.00 per hour

Budgeted Hours 1,000 : Actual Hours 900

Budgeted Gross Production 5,000 units.

Standard Loss 20%; Actual loss 900 units.

Ans. i. Rs. 64,000 (F) ii. Rs. 27,000 (F), iii, Rs. 36,000 (F) iv Rs. 9,000  
(A)  
v. Rs. 45,000 (F) vi. Rs. 45,000 (F) vii. Rs. 63,000 (F) viii. Rs. 36,000 (F)

Q. 17.

A gang of workers usually consists of 10 men, 5 women and 5 boys in a factory. They are paid at standard hourly rates of Rs. 1.25, Re. 0.80 and Re. 0.70 respectively. In a normal working week of 40 hours the gang is expected to produce 1,000 units of output.

In a certain week, the gang consisted of 13 men, 4 women and 3 boys. Actual wages were paid at the rates of Rs. 1.20, Re. 0.85 and Re. 0.65 respectively. Two hours were lost due to abnormal idle time and 960 units of output were produced. Calculate various labour variances.

Ans. i. Rs. 70 (A) ii. Rs. 24 (F) iii, Rs. 50.90 (A) iv Rs. 43.10 (A) v. Rs.  
5.90 (A)  
vi. Rs. 8 (F) vii. Rs. 70 (A) viii. Rs. 50.90 (A)

Q. 18.

Direct Materials	Rs.
2 units of A at Rs. 4 per unit	8.00
3 units of B at Rs. 3 per unit	9.00
15 units of C at Re. 1 per unit	<u>15.00</u>
	32.00
Direct Labour 3 hrs. @ Rs. 8 per hour	<u>24.00</u>
Total Standard Prime Cost	56.00

The company manufactured and sold 6,000 units of the product during the year. Direct Material Costs were as follows :-

12,500 units of A at Rs. 4.40 per unit.

18,000 units of B at Rs. 2.80 per unit.

88,500 units of C at Rs. 1.20 per unit

The company worked 17,500 direct labour hours during the year. For 2,500 of these hours the company paid at Rs. 12 per hour while for the remaining the wages were paid at the standard rate. Calculate the Materials Cost, Price and usage variances and Labour Cost, Rate and Efficiency Variances.

Ans. i. 19,600 (A) ii. 19,100 (A), iii. Rs. 500 (A) iv. xxx v Rs. 10,000 (A) vi. Rs. 4,000 (Favourable)

Q. 19.

From the particulars given below, compute : Material Price variance, Material Usage Variance, Labour Rate Variance, Idle Time Variance and Labour Efficiency Variance with full working details :

1 tonne of material input yield a standard output of 1,00,000 units. The standard price of material is Rs. 20 per kg. Number of employees engaged is 200. The standard wage rate per employee per day is Rs. 6. The standard daily output per employee is 100 units. The actual quantity of material used is 10 tonnes and the actual price paid is Rs. 21 per kg. Actual output obtained is 9,00,000 units. Actual number of days worked is 50 and actual rate of wages paid is Rs. 6.50 per day. Idle time paid for and included in above time is  $\frac{1}{2}$  day.

Ans. i. Rs. 10,000 (A) ii. Rs. 20,000 (A), iii. Rs. 5,000 (A) iv. Rs. 600 (A)

v Rs. 5,400 (A)

Q. 20.

During a period 850 assemblies were made with a nil rate variance and a Rs. 4,400 adverse efficiency variance. If the standard labour hours per assembly are 24 with a Rs. 8 per hour standard labour cost, how many actual labour hours were worked?

Ans. i. 20,950 hrs.

Q. 21.

During a period 25,600 labour hours were worked at a standard rate of Rs. 7.50 per hour. The direct labour efficiency variance was Rs. 8,250 (A). How many standard hours were produced?

(a) 24,500 (b) 25,000 (c) 24,000 (d) 25,500

### Variable Overheads Variances

Q. 22.

Actual variable overhead	Rs. 10,000
Budgeted variable overhead	Rs. 12,000
Budgeted production	500 units
Actual production	450 units
Actual hours	200
Standard time for 1 unit	30 minutes

Ans. i. Rs. 800 (F) ii. Rs. 400 (A), iii, Rs. 1,200 (F)

Q. 23.

From the following data, calculate Fixed Overheads Expenditure and Volume Variances :

Fixed overhead budget for November	Rs. 1,00,000
Budgeted production for the month (1 hour per unit)	50,000 units

Actual production for the month	54,000 units
Actual fixed overhead incurred	Rs. 1,20,000

Ans. i. 20,000 (A) ii. 8,000 (F)

Q. 24.

The following information was obtained from the records of a manufacturing unit using Standard Costing System.

	Standard	Actual
Production	4,000 units	3,800 units
Working Days	20	21
Fixed Overheads	40,000	39,000

You are required to calculate the following Fixed Overheads Variances :

- (i) Cost Variance, (ii) Expenditure Variance, (iii) Volume Variance,  
(iv) Efficiency Variance, (v) Capacity Variance

Ans. i. 1,000 (A) ii. 1,000 (F), iii, 2,000 (A) iv. 4,000 (A) v. Rs. 2,000 (F)

Q. 25.

In Department A the following data is submitted for the week ended 31st October :-

Standard output for 40 hours per week	1,400 Units
Standard Fixed Overhead	Rs. 1,400
Actual output	1,200 Units
Actual hours worked	32 hours
Actual fixed overhead	Rs. 1,500

Ans. i. 300 (A) ii. 100 (A), iii, 200 (A) iv. 80 (F) v. 280 (A) vi. 280 (A)  
v Rs. 5,400 (A)



Q. 26.

R. Ltd. has furnished you the following data :

	Budget	Actual
		July 2007
No. of working days	25	27
Production in units	20,000	22,000
Fixed overheads	Rs. 30,000	31,000

Budgeted fixed overhead rate is Rs. 1 per hour. In July, 2007 the actual hours worked were 31,500. Calculate the following variances :

1. Fixed O/H Cost Variance      2. Fixed O/H Exp. Variance      3. Fixed O/H Vol. Variance
4. Fixed O/H Eff. Variance      5. Fixed O/H Cap. Variance      6. Fixed O/H Cal. Variance
7. Fixed O/H Rev. Variance

Ans. i. Rs. 2,000 (F)   ii. 1,000 (A),   iii. 3,000 (F)   iv. 1,500 (F)   v. 1,500 (F)  
vi. 2,400 (F)   vii. 900 (A)

Q. 27.

A company has a normal capacity of 120 machines, working 8 hours per day of 25 days in a month. The fixed overheads are budgeted at Rs. 1,44,000 per month. The standard time required to manufacture one unit of product is 4 hours.

In April, 1998, the company worked 24 days of 840 machine hours per day and produced 5,305 units of output. The actual fixed overheads were Rs. 1,42,000.

Compute : (1) Efficiency variance   (2) Capacity variance      (3) Calendar variance  
(4) Expense variance      (5) Volume variance      (6) Total fixed overheads cost variance

Ans. i. Rs. 1,4680 (A)   ii. 2,000 (F),   iii. Rs. 16,680 (A)   iv. 6,360 (F)  
v. 23,040 (A)   vi. 5,760 (A)   vii. 17,280 (A)

Q. 28.

A Cost Accountant of a Company was given the following information regarding the overheads for February 2007 :

- (a) Overheads cost variance Rs. 1,400 Adverse.
- (b) Overheads volume variance Rs. 1,000 Adverse.
- (c) Budgeted hours for February 2007 1,200 hours.
- (d) Budgeted overheads for February 2007 Rs. 6,000.
- (e) Actual rate of recovery of overheads Rs. 8 per hour.

You are required to assist him in computing the following for February 2007 :

- (1) Overheads expenditure variance                      (2) Actual overheads incurred.
- (3) Actual hours for actual production                      (4) Overheads capacity variance
- (5) Overheads efficiency variance.                      (6) Standard hours for actual production.

Ans. i. Rs. 400 Adverse.    ii. Rs. 6,400 (A),    iii, xxx    iv. Rs. 2,000 Adverse.  
       v Rs. 1,000 (F)    or    Rs. 1,000 (F)    vi. xxx

Q. 29.

The budgeted and the actual sales for a period in respect of three products are given below :

Budgeted figures

Product	Quantity	Price Rs.	Value Rs.
A	1,000	5	5,000
B	750	10	7,500
C	<u>500</u>	15	<u>7,500</u>
	2,250		20,000

Actual

Product	Quantity	Price Rs.	Value Rs.
A	1,200	6	7,200
B	700	9	6,300
C	<u>600</u>	14	<u>8,400</u>

	2,500		21,900
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Calculate sales variances.

Ans. i. Rs. 1,900 (F)    ii. Rs. 100 (A),    iii, Rs. 2,000 (F)    iv. Rs. 222 (A)  
v. Rs. 2,22 (F)

Q. 30.

PR Ltd. furnishes the following information relating to budgeted sales and actual sales for April 2007 :

	Product	Sales quantity units	Selling price per unit Rs.
Budgeted sales			
	A	1200	15
	B	800	20
	C	2000	40
Actual sales			
	A	880	18
	B	880	20
	C	2640	38

Calculate the following variances :

(i) Sales Value Variance (ii) Sales Volume Variance    (iii) Sales Price Variance  
(iv) Sales Mix Variance (v) Sales Qty. Variance.-

Ans. i. Rs. 19,760 (F)    ii. Rs. 22,400 (F),    iii, Rs. 2,640 (A)    iv. Rs. 11,000 (F)  
v. Rs. 11,400 (F)

Q. 31. SQC Ltd. provides the following data for the month of October, 1999 :

Budget			
Product	Budgeted Sales Quantity	Budgeted Selling Price per Unit (Rs.)	Standard Cost Per Unit (Rs.)

A	2,160	12	9
B	1,440	5	3

Actuals			
Product	Actual Sales Quantity	Actual Selling Price per Unit (Rs.)	Actual Cost Per Unit (Rs.)
A	2,240	11	8
B	960	6	5

You are required to compute :

- (i) Sales margin quantity variance                      (ii) Sales margin mix variance  
 (iii) Sales margin volume variance                      (iv) Sales margin price variance  
 (v) Sales margin total variance.

Ans. i. 2,000 (A)      ii. 720 (A),      iii, 1,280 (A)      iv. 320 (F)      v. 1,040 (A)

All Variances

Q. 32.

The details regarding a food products manufactured by XYZ Co. for the last one week are as follows :

Standard Cost (For one unit)	Rs.
Direct Materials                      10 units @ Rs. 1.50	15
Direct Wages                              5 hours @ Rs. 8	40
Production Overheads                      5 hours @ Rs. 10	<u>50</u>
	<u>105</u>

Actuals (For whole activity)

Direct Materials	Rs. 6,435
Direct Wages	Rs. 16,324

Analysis of Variances :

Direct Materials

Price	Rs. 585 (A)
Usage	Rs. 375 (F)

Direct Wages (Labour)

Rate	Rs. 636 (F)
Efficiency	Rs. 360 (A)
Production Overheads	
Expenditure	Rs. 400 (F)
Volume	Rs. 750 (F)

You are required to calculate (i) Actual output units; (ii) Actual price of material per unit; (iii) Actual wage rate per labour hour; (iv) The amount of production overhead incurred and (v) The production overhead efficiency variance.

Ans. i. 415 units    ii. Rs. 19,600 ,    iii. Rs. 450 (A)

Q. 33.

The following information is available from the cost records of a Company for February 2007 :

	Rs.	
Materials purchased : 20,000 pieces		88,000
Materials consumed 19,000 pieces		
Actual wages paid for 4,950 hours	24,750	
Factory Overheads Incurred	44,000	
Factory Overheads Budgeted	40,000	
Units produced 1,800		

Standard Rates and prices are :

Direct Material Rates Rs. 4 per piece.

Standard Input 10 pieces per unit.

Direct Labour Rate Rs. 4 per hour.

Standard requirement 2.5 hours per unit.

Overhead Rs. 8 per labour hour.

Required

(a) Show the Standard Cost Card.

(b) Compute all material, labour and overhead variances for February, 2007.

Ans. i. Rs. 11,600 (A)    ii. Rs. 7,600 (A),    iii. Rs. 4,000 (A)    iv. Rs. 6,750 (A)  
 v. Rs. 4,950 (A),    vi. Rs. 1,800 (A),    (vii) Rs. 8,000 (A)  
 viii. Rs. 4,000 (A) (ix) Rs. 3,600 (A) (x) Rs. 400 (A)

Q. 34. X Pvt. Ltd., operates a system of standard costs. Following information is available :

Actuals	Rs.
Materials Consumed (3,600 units at Rs. 52.50 per unit)	1,89,000
Direct Wages	22,100
Fixed Expenses	1,88,000
Variable Expenses	62,000

Output during the period was 3,500 units of finished product.

For the above period, the standard production capacity was 4,800 units and the break-up of standard cost per unit was as under :

	Rs.
Materials (1 unit @ Rs. 50 per unit)	50
Direct Wages	6
Fixed Expenses	40
Variable Expenses	<u>20</u>
Total standard expenses cost per unit	<u>116</u>

The standard wages per unit is based on 9,600 hours for the above period at a rate of Rs. 3.00 per hour. 6,400 hours were actually worked during the above period, and in addition, wages for 400 hours were paid to compensate for idle time due to breakdown of a machine, and overall wage rate was Rs. 3.25 per hour.

You are required to compute the following variances with appropriate workings :

- (a) Direct Material Cost Variance      (b) Material Price Variance
- (c) Material Usage Variance              (d) Direct Labour Cost Variance
- (e) Wage Rate Variance                  (f) Labour Efficiency Variance
- (g) Idle Time Variance                    (h) Variable Expenses Variance
- (i) Fixed Expenses Expenditure Variance    (j) Fixed Expenses Volume Variance
- (k) Fixed Expenses Capacity Variance      (l) Fixed Expenses Efficiency Variance
- (m) Total cost variance.

Ans. i. Rs. 14,000 (Adverse)      ii. Rs. 9,000 (Adverse),      iii. Rs. 5,000 (Adverse)  
 iv. Rs. 1,100 (Adverse)      v. Rs. 1,700 (Adverse)      (vi) Rs. 1,800 (Favourable)

- (vii) Rs. 1,200 (Adverse) (viii) Rs. 8,000 (Favourable) (ix) Rs. 4,000 (Favourable)  
 (x) 52,000 (A) (xi) Rs. 56,000 (Adverse) (xii) Rs. 4,000 (Favourable)  
 (xiii) Rs. 55,100 (A).

Q. 35.

ISPAT Pvt. Ltd. operates a system of standard costing in respect of one of its products which is manufactured within a single cost centre. The Standard Cost Card of a product is as under :

Standard	Unit Cost (Rs.)
Direct material	5 kgs @ Rs. 4.20 21.00
Direct labour	3 hours @ Rs. 3.00 9.00
Factory overhead	Rs. 1.20 per labour hour <u>3.60</u>
Total manufacturing cost	33.60

The production schedule for the month of June, 2007 required completion of 40,000 units. However 40,960 units were completed during the month without opening and closing work-in-process inventories.

Purchases during the month of June, 2007, 2,25,000 kgs of material at the rate of Rs. 4.50 per kg. Production and Sales records for the month showed the following actual results :

Material used 2,05,600 kgs.

Direct labour 1,21,200 hours cost incurred Rs. 3,87,840

Total factory overhead cost incurred Rs. 1,00,000

Sales 40,000 units

Selling price to be so fixed as to allow a mark-up of 20 per cent on selling price.

Required :

- Calculate material variances based on consumption of material.
- Calculate labour variances and the total variance for factor overhead.
- Prepare Income statement for June, 2007 showing actual gross margin.
- An incentive scheme is in operation in the company whereby employees are paid a bonus of 50% of direct labour hour saved at standard direct labour hour rate. Calculate the Bonus amount.

Ans. i. Rs. 65,040 (A) ii. 3,060 (A), iii. 61,680 (A) iv. 19,200 (A)  
 v. 5,040 (F) vi. 24,240 (A) (vii) Rs. 47,456 (F)

Q. 36.

BETA Woven Ltd. has furnished the following information for the month ending 30th June, 2007 :

	Master Budgeted	Actual	Variance
Units produced and sold	<u>80,000</u>	<u>72,000</u>	
Sales (Rs.)	<u>3,20,000</u>	<u>2,80,000</u>	40,000 (A)
Direct material (Rs.)	80,000	73,600	6,400 (F)
Direct wages (Rs.)	1,20,000	1,94,800	15,200 (F)
Variable overheads (Rs.)	40,000	37,600	2,400 (F)
Fixed overhead (Rs.)	<u>40,000</u>	<u>39,200</u>	800 (F)
Total Cost	<u>2,80,000</u>	<u>2,55,200</u>	

The Standard costs of the products are as follows :

	Per unit (Rs.)
Direct materials (1 kg. at the rate of Re. 1 per kg.)	1.00
Direct wages (1 hour at the rate of Rs. 1.50)	1.50
Variable overheads (1 hour at the rate of Re. 50)	0.50

Actual results for the month showed that 78,400 kg. of material were used and 70,400 labour hours were recorded . Required :

- (i) Prepare Flexible budget for the month and compare with actual results.
- (ii) Calculate material, labour, sales price, variable overhead and fixed overhead expenditure variances and sales volume (profit) variance.

Ans. i. 8,000 (A)    ii. 1,600 (A),    iii. 6,400 (A)    iv. 3,200 (F)    v. 800 (F)

vi. 2,400 (F)    vii. 1,600 (A)    viii. 800 (F)    ix. 4,000 (A)