CHAPTER 1

INTRODUCTION
1. CHAPTER 1: INTRODUCTION

1.1. Back Ground:-

The meaning of the word "Finance" is procurement of funds and funds are obtained through instruments, institutions and practices. In general financial management is broadly concerned with the collecting and distributing of the funds for various activities of the firm that are most favourable in the light of its objectives. Now a days finance has become an integral part of the overall management system rather than as a staff specialist concerned with the fund raising operations. Finance is concerned with everything that take place in the conduct of a business. With the help of Economic theory, models, ideas and Applications of quantitative methods analysis the approach of financial management has become more analytical and quantitative. Thus, decision making in the firm with respect to finance becomes reliable and scientific. There are several Goals of the firm: Maximisation of Income and Profit, Maximisation of earning per share, Maximisation of return on equity (equity earning/net worth), Minimisation of direct and indirect expenditure but all these suffer from some limitations so maximisation of the wealth of equity share holders are to maximise the present value of the stream of equity returns appears to be the most appropriate goal for financial decision making. The three broad activities of financial management are (i) Financial analysis, Planning and control (ii) Management of the firm’s asset structure and (iii) Management of the firms financial structure. Financial Management is in many ways an integral part of jobs of managers who are involved in planning, allocation of resources and control. The responsibilities for financial management are dispersed thought the organization. Accordingly, the finance manager has been assigned wider responsibilities. It is not sufficient for the finance manager to see that the company has sufficient funds to carry out its plans but at the
same time he has to ensure scientific allocation of funds in the productive process.

1.2. Different Tools of Financial Management:-

1.2.1. Meaning of A Tool:-

A financial tool is a logical method employed by skilled managers to measure the effectiveness of operations of a firm and to access validity of the decisions. An array of financial tools involves analysis of the relationships among the financial statement items of a single set of statements and the changes that have taken place in these items as reflected by successive financial statements.

To interpret the position of an enterprise, two types of analysis are undertaken:

1) Analysis of relationship as between different individual components and as between these components and their totals for a given period of time.

Such an analysis examines relationship as between different components for a given point of time and does not shed light on changing behaviour of the above relationships. It is also regarded as static or vertical analysis.

  e.g. Comparison of current assets to current liabilities or comparison of debt to equity for one point of time.

2) Analysis of changes in different components of the financial statements over different periods with the help of series of the statements.

This type of analysis is known as dynamic analysis or horizontal analysis. Such an analysis makes it possible to study periodic fluctuations in different components of the financial statements. Study of trends in debt as share capital of in their
relationship over the past ten year period of study of profitability trends for a period of five or ten years are examples of horizontal type of analysis.

Methods employed to examine the vertical as well as horizontal relationships of different financial variable with a view to studying profitability and financial position of a business firms are called tools of financial analysis.

1.2.2. Different Tools in Financial Management:-

Following are the number of tools in financial management which helps finance managers to undertake financial analysis:

(i) Comparative Financial Statements
(ii) Trend Analysis
(iii) Common-Size Financial Statements
(iv) Ratio Analysis
(v) Funds Flow Statement
(vi) Cash Flow Statement
(vii) Cash Budgeting
(viii) Performa Statement
(ix) Leverage Analysis

(i) Comparative Financial Statements:

Comparative Financial Statements are those statements, which have been designed in a way so as to provide time perspective to the consideration of various elements of financial position. In these statements, figures for two or more periods are placed side-by-side, absolute changes and changes in terms of percentages are calculated to facilitate comparison. Here both, comparative P & L A/c and Comparative Balance Sheet can be prepared.

The presentation of Comparative Financial Statements in annual and other reports enhances the usefulness of such reports and brings out more
clearly the nature and trend of current changes affecting the organization. Such presentation emphasizes the fact that statements for a series of periods are far more significant than those of a single period and that the accounts of one period are but an instalment of what is essentially a continuous history. The companies Act 1956 provides that companies should give figures for different times for the previous period, together with current period figures in their P & L A/c and Balance Sheet only for the sake of comparison.

(ii) Trend Analysis:

The method of analysis studies the percentage relationship that each item of the financial statement bears to the same item in the base year. Through this analysis, the analyst seeks to review changes that have take place in individual categories therein from year to year and over the years. Thus, trend analysis can take the form of year to year comparisons, Index number, Time Series and Trend ratio.

(a) Year to year comparisons:

In this method, certain financial items are studied by computing the year to year change in absolute terms or in terms of percentages. In this method, the base year changes every year. Positive or negative sign is used so as to know increase or decrease that has occurred in the item in relation to the previous year. When a negative value appears in the base year and a positive value in the following year or vice versa, no percentage change can be meaningfully computed. When an item has a value in a base year and none in the following year, the decrease would be 100 percent. When there is no value for the base year no percentage change can be computed.

(b) Trend Ratios:

Trend ratio is a device to study relationship between the two related variable over a period of time. Changes in the behavioural relationship of sales and inventories, Sales and receivables, Current
assets and current liabilities, net profit to total capital employed etc. over period of time can be gainfully studied with help of trend ratios. They also provide sufficient clues about favourable or unfavourable tendencies and thereby help the analyst to draw meaningful conclusions about the state of affaire of the enterprise.

The rising trend of sale coupled with more pronounced increasing tendency in inventories and receivables reflect an unfavourable condition. Such situation would indicate an over investment in inventories and receivables which may be attributable to inefficient inventory and credit management of the company. Furthermore comparability of the data is also distorted by the price level changes; therefore the analyst should first eliminate the effects of price level changes before undertaking comparative study.

(c) Index number Trend Series:

Year to year comparison will not be helpful where a comparison of financial statements is undertaken for a long period of time. For studying secular trend of an item of financial statement index number would timeout to be the best means.

In order to calculate a series of index numbers a base year should be chosen. This base year will, for all items, have an index amount of 100. In choosing the base year the analyst should see that a normal year in which abnormal event have not taken place, is chosen. Index numbers of an item for different years are computed by reference to the base year. If the value of the item in a year is less than that in the base year, the trend percentage will be below, if the amount is more than the base amount, the trend percentage will be above 100 percent.

Thus, long run trend analysis can be undertaken with the help of index number trend series. Computation of index numbers is simple
affair. In planning an index number trend comparison, it is not necessary to include in it all the items in the financial statements. Such a comparison will be very useful in analyzing changes in the composition of working capital. Furthermore, trend analysis provides the analyst a better understanding of management’s philosophic, policies and motivations which have brought about the changes noted over the years.

The greatest drawback of trend analysis is that it fails to reveal whether changes in particular item over a period of time are in the interest of the enterprise. Thus, to make study of trend analysis more meaningful trend ratios are compared.

(ii) Common-Size Financial Statements:

Common size statement is financial tools of studying key changes and trends in financial position of a company. In common size statement, each item is stated as a percentage of the total of which that item is apart. This statement also designated as “Component percentage” or “100 Percent Statement”.

Preparation of the common size statement involves two steps:

(i) State the total of the statement as 100 percent.
(ii) Compute the ratio of each statement item to the statement total.

It can be used both for vertical and horizontal analysis.

There are two types of common-size statements, common size balance sheet and common size profits and loss account.

(a) Common-Size Balance Sheet:

Common Size balance sheet is prepared by stating the total assets as 100 and reducing individual assets in to percentages of the total. Likewise, individual liability terms are expressed as percentages
of the total liabilities. Thus, the common size balance sheet percentages show the relation of each asset item to total assets and of each liability and owner’s equity item to total liabilities and owner’s equity.

The common-size balance sheet analysis, can of course, be carried further and extended to the study of what portion of a subgroup, rather than the total, an item is. Thus, in assessing the liquidity of current asset, it may be of interest to know not only what proportion of total assets in inventories but also what proportion of current assets is represented by this asset.

A Study of common-size statements of the company with those of competitive company or the industry would whether or not the company is managing assets efficiently. An analysis of the pattern of distribution of liability reveals debt equity position of the company. Too large a percentage of liabilities in relation to owner’s equity show debt pressure for company and relatively low margin of safety for creditors.

Comparison of common size statements of a single enterprise over the years is valuable in that it reveals the changing proportions of components within groups of assets and liabilities.

(b) Common-Size Income Statements:-

The Common-Size income statements for a number of years are very helpful in pointing out efficiencies and inefficiencies. It is designed to exhibit what proportion of the net sales has been absorbed by the various costs and expenses incurred by the enterprise, and the percentage that remains as net income. For preparing common-size income statement all items in the income statement are expressed in percentage form in terms of total sales. It must be remembered that the
percentage may be influenced by variation in sale price, higher or lower costs of goods acquired or both.

Common-Size percentage must be supplemented for making detailed analysis of financial and operating data. It will therefore be more useful to use trend ratios as well as individual ratios showing relationships between balance sheet and income statement items.

(iii) Ratio Analysis:

Of the various methods of financial statement analysis, ratio analysis is the most widely used tool. The term ratio refers to the numerical or quantitative relationship between two items or variables. A ratio is calculated by dividing one item of the relationship with other. As a tool of financial management, ratio can be expressed as (a) percentage (b) fraction and (c) a stated comparison between numbers. Ratio expressed the relationship in a more meaningful way so has to enable financial executives to draw conclusions from them. The rational of ratio analysis lies in the fact that it makes related information comparable. A single figure by itself has no meaning but when expressed in term of a related figure it yields significant inferences. Comparison with related facts is the basis of the ratio analysis ratio can be classified, for the purpose of exposition, into four broad types (a) liquidity ratios (b) capital structure ratios (c) profitability ratios and (d) activity ratios.

(iv) Funds Flow Statements

A Funds Flow Statement is a statement that shows change in working capital position from one period to another.

Funds Flow Statement is widely used by the financial analysts and credit granting institutions and financial managers in performance of their jobs. It has become a useful tool in their analytical kit.

Funds Flow Statement provides a ready answer to so many queries, such as:
- Why the liquid position of the business is becoming more and more imbalanced in spite of business making more and more profits, or vise versa?
- How was it possible to distribute dividends in excess of current earnings?
- Where have the profits gone?
- What is overall creditworthiness of the enterprise?
- How much funds are generated through normal business operations?

Definite answers to these queries will help in directing of funds to those channels, which will be most profitable for the business.

A projected Funds Flow Statement will help the analyst in finding out how the management is going to allocate the scarce resources for meeting the productive requirements of the business. It is a test of effective use of working capital by the management during a particular period. The adequacy or inadequacy of working capital will tell the financial analyst about the possible steps that the management should take for effective use of surplus working capital or make arrangements in case of shortfall of working capital.

(v) Cash Flow Statements

A Cash Flow Statement is statement depicting change in cash position from one period to another.

A Cash Flow Statement is useful for short term planning. It discloses the complete story of cash movement. The increase or decrease in cash and the reasons can be known. It discloses the reasons for low cash balance in spite of heavy operating profit or vise versa.

It also helps in evaluating financial policies and cash position. Cash is the basis for all operations and hence a projected cash flow statement will enable the management to plan and coordinate the financial operations properly. The management can know how much cash is needed, from which
source it will be derived, how much can be generated internally and how much can be obtained from outside.

Cash flow analysis provides information about funds, which will be available from operations. This will help the management in determining policies regarding internal financial management, e.g. possibility of repayment of long-term loan, dividend policies, replacement of plant etc.

The extent of success or failure of cash planning can be known by comparing the projected cash flow statement with actual cash flow statement and necessary remedial measures can be taken.

1.3. Need for Inventory Management:-

"Good inventory management is good financial management"

According to Guthmann and Dougal, "Business finance can be broadly defined as the activity concerned with planning, raising, controlling and administration of the funds used in the business". In business, Inventory is nothing but the physical stock in hand.

Inventory management System plays an important role to determining the optimization levels of inventories such a way so total inventory control cost remain minimum. The finance manager is responsible for supplying necessary finance to support the firm’s investment in inventories. In order to ensure that funds are allocated efficiently in inventories, the finance manager must familiarize himself with various scientific methods to determining the EOQ, So that he allocate optimal magnitude of investment in inventories.

Inventories categories in three broad types: raw materials, work in process, and finished goods. Raw materials are useful to making the final product; work in process refers to goods in the intermediate stages of production, and final products that are ready for sale is known as finished goods. All these three types of Inventories hold by the manufacturing companies where as distribution firms hold mostly finished goods. After
plant and equipment, Inventories becomes in the second largest asset category for manufacturing companies. In most of the case the proportion of inventories to total assets generally varies between 15 to 30 percent. Inventories generally represent a very significant proportion of total assets. Hence the importance of inventory automatically coincides with financial management, shortages of row material and product, Expected price change, risk factor, Government policy and restrictions, consumer behaviour, sales, production and marketing environment are key factors which effect the inventory in large and so finance of the firm. It is important for the firm to find out acceptable risk level which minimise the cost of the firm. By adopting Comprehensibility, Adaptability and Timeliness criteria firm should judging the appropriate inventory system.

Three Inter Co-related department of the firm production, purchasing and marketing are decision makers with respect to the inventories. Usually, row material policies are shaped by purchasing and production managers, work in process inventory is influenced by the decisions of production managers and finished goods inventory policy is evolved by production and marketing managers. Yet, as inventory management has important financial implications, the financial manager has the responsibility to ensure that inventories are properly monitored and controlled. He has to emphasis the financial point of view and initiate programmes with participation and involvement of others for effective management of inventories.

1.3.1. Area of Inventory Management:-

The area of inventory management covers the following individual phases: Determining the size of inventory to be carried, establishing timing schedules, procedures and lot size for new orders; ascertaining minimum safety level; co-ordinating sales, production and inventory policies; providing proper storage facilities; arranging the receipt, disbursement and
procurement of materials; developing the forms of recording these transactions; assigning responsibilities for carrying out the inventory control functions; and providing the reports necessary for supervising this over-all activity.

1.3.2. Inventory Control in Firm:-

Following are important aspect to control the inventory in business firm: to provide customer service in the face of sales and production fluctuations; to take action against expected increase in sales; to handle production variations; to manufacture goods in economic production runs; to promote flexibility in plant scheduling; to promote more flexible raw material scheduling; to take advantage of distribution costs; to provide buffer for over-runs or mis-runs; to keep storage equipment operational; to allow far errors in measuring and recording production and sales; to protect against strikes and work stoppages and acts of God; to speculate against price and cost changes; to minimize costs and maximise profits; to avoid running out of stock; to keep inventory within the available storage capacity; to control capital investment; to maximise sales or share of market.

1.3.3. Inventory Management in India:-

Prof. Janat Shah of IIM described the Inventory Management in India as below:-

Inventory Management Practices:

1. Inventory levels in India appear to be high. The reasons commonly cited for this are as follows:

   (a) Purchase executives are severely penalized for stock outs, but they are not questioned for high inventories.
(b) Lengthy and cumbersome important procedures in the past forced companies to carry huge amounts of inventories for important items.

(c) It pays to keep inventories high because prices rise due to inflation.

(d) Most of the vendors are not reliable in term of delivery schedules and quality of the materials supplied. Hence, Companies carry large safety stocks.

(e) Due to lack of standardisation there is a large variety of stores.

2. The most commonly used tools of inventory management in India are ABC analysis, FSN analysis and inventory turnover analysis:

Though ABC analysis is widely used, one often finds that the ABC classification is not reviewed and revised periodically.

For the purpose of control, companies classify items in to Fast moving, Slow moving and Non-moving categories. Unfortunately, companies do not dispose off non-moving item swiftly.

Inventory Turnover Analysis is done at an aggregative level.

Areas of Improvement:

Inventory management in India can be improved in various ways. Improvements could be effected through:

(a) Effective Computerisation: Computers should not be used merely for accounting purpose but also for improving decision making.

(b) Review of classifications: ABC and FSN classification must be periodically reviewed.

(c) Improved Coordination: Better coordination among purchase, production, marketing and finance departments will help in achieving greater efficiency in inventory management.
(d) Development of long-term relationship: Companies should develop long-term relationship with vendors. This would help in improving quality and delivery.

(e) Disposal of obsolete/surplus Inventories: Procedures for disposing obsolete and surplus inventories must simplify.

(f) Adoption of challenging norms: Companies should set benchmarks with global competitors and use ideas like JIT to improve inventory management

Thus there is considerable scope for improving inventory management in India.

1.3.4. Basic Models of Inventory Management:

(1) Economic Lot Size Problem when shortages are not permitted:

In Financial management, financial executives always concerned with allocation of funds in various types of inventories. It is very well familiar that good inventory management is good financial management. So financial executives always try to obtain an optimum production/order quantity for each production run/order and the optimum interval between successive runs/order under the following Assumption:

(i) Demand is known and uniform
(ii) Production or supply of commodity is instantaneous
(iii) Lead time is zero, set up cost is fixed.
(iv) Holding cost is $C_h$ per unit set up cost is $C_s$ per production/order

Diagram for this type of situation as bellow:-
Notations:

Annual inventory holding cost \( f(Q) = \frac{QC_1}{2} \)

Annual cost associated with runs of size \( Q \) \( g(Q) = nC_3 = \frac{DC_3}{Q} \)

\[ : \text{ Total annual cost is} \quad C(Q) = f(Q) + g(Q) \]

\[ = \frac{QC_1}{2} + \frac{DC_3}{Q} \]

Now \( \frac{\partial C(Q)}{\partial Q} = 0 \Rightarrow Q = \sqrt{\frac{2DC_3}{C_1}} \)

And \( \frac{\partial^2 C(Q)}{\partial Q^2} > 0 \) for \( C_1, D \) and \( Q \)

\[ : \text{ The optimum value of} \ Q \text{ has thus been obtained and is given by} \]

\[ Q_{opt} = \sqrt{\frac{2DC_3}{C_1}} \]

\[ : \text{ The optimum time interval for production run an order is obtained as,} \]

\[ t_{opt} = \frac{Q_{opt}}{D} = \sqrt{\frac{2C_3}{C_1D}} \]

and the total annual cost associated with holding inventory and setting up the machine when the optimum lot size is \( Q_{opt} \) is obtained by,

\[ C(Q_{opt}) = \frac{Q_{opt}C_1}{2} + \frac{DC_3}{Q_{opt}} \]

\[ = \sqrt{\frac{2DC_1}{C_3}} \]
The minimum total cost is demonstrated graphically as below:-

Conclusion:- Since \( C_j > 0 \), annual inventory costs are a linear function of \( Q \) with positive slope. The smaller the average inventory the lower are these costs. In contrast to these inventory holding costs, setup cost \( C_3 \) increases as \( Q \) increases. In this model if the setup cost is \( C_3 + bQ \) instead of \( C_3 \) where \( b \) is the set up cost per unit item produced/ordered than there is no change in the \( Q_{opt} \) due to change in setup cost.

(2) EOQ Model with uniform demand and several production runs of unequal length:-

Under the assumptions given in the above model, let us take demand is uniform and production runs differ units. Let \( t_1, t_2, t_3, ..., t_n \) denote the times of successive productions runs, such that

\[
t_1 + t_2 + t_3 + ... + t_n = T \text{ year}
\]

\[
\therefore f(Q) = \frac{QC_1T}{2}
\]

\[
g(Q) = \frac{DC_3}{Q}
\]

\[
C(Q) = \frac{QC_1T}{2} + \frac{DC_3}{2}
\]

Hence, we can obtain optimal order quantity \( q_{opt} \) & minimum cost \( C(q_{opt}) \) as below:-

\[
Q_{opt} = \sqrt{\frac{2C_3D}{C_1T}}
\]

\[
& C(Q_{opt}) = \sqrt{\frac{2C_1C_3D}{T}}
\]
Remarks:- If \( T = t_1 + t_2 + t_3 + \ldots + t_n = 1 \) year than this model give same result as stated in EOQ model without shortages.

(3) EOQ Model with Shortages:-

Assumption:-

(i) Demand is known and uniform

(ii) Shortages are permitted

(iii) \( Q \) denotes the lot size in each production run/order.

Here \( Q = Z + S \) where \( Z \) denotes the amount which goes into inventory and ---

\( S \) denotes the amount which is immediately taken to satisfy part orders or unfilled demand. \( C_2 \) be the shortage cost per unit of time per unit quantity

Diagram of the situation:-

Here the total time period is one year and is divided into equal parts, say \( t \), such that \( t = t_1 + t_2 \). During the interval \( t_1 \), the items are drawn from the inventory as needed and during \( t_2 \), orders for the item are being accumulated but not filled. Then the end of the interval \( t \) an amount \( Q \) is produced or delivered.

Results:-

Annual inventory holding cost = \( \frac{ZC_1 t_1}{2t} \)

Annual shortage cost = \( \frac{SC_2 t_2}{2t} \)

Annual Cost associated with runs of size \( Q \) = \( nC_3 \) = \( \frac{DC_3}{Q} \)
\[ \text{Total annual cost} = C(Z, S) = \frac{ZC_1}{2t} + \frac{SC_2t}{2t} + \frac{DC_3}{Q} \]

but \( t_1 = \frac{Zt}{Q} \) and \( t_2 = \frac{St}{Q} \)

\[ \therefore C(Z, S) = \frac{Z^2C_1}{2Qt} + \frac{S^2C_2t}{2Qt} + \frac{DC_3}{Q} = \frac{Z^2C_1}{2Q} + \frac{S^2C_2}{2Q} + \frac{DC_3}{Q} \]

Since \( S = Q - Z \)

\[ C(Z, Q) = \frac{Z^2C_1}{2Q} + \frac{(Q - Z)^2C_2}{2Q} + \frac{DC_3}{Q} \]

For determining the optimum value of \( Z \) and \( Q \) so as to optimize \( C(Z, Q) \), we have

\[ \frac{\partial C(Z, Q)}{\partial Z} = 0 \quad \Rightarrow \quad Z = \frac{C_2Q}{(C_1 + C_2)} \]

\[ \frac{\partial C(Z, Q)}{\partial Q} = 0 \quad \Rightarrow \quad Q = \sqrt{\frac{2C_1D + CZ^2}{C_2} + Z^2} \]

and \( \frac{\partial^2 C(Z, Q)}{\partial Z^2} > 0, \frac{\partial^2 C(Z, Q)}{\partial Q^2} > 0 \) for these values of \( Z \& Q \).

Thus, the optimum results are given by:

\[ Q_{opt} = \sqrt{\frac{2C_2D(C_1 + C_2)}{C_1C_2}}, \quad Z_{opt} = \sqrt{\frac{2C_2D}{C_1(C_1 + C_2)}}, \quad \& C(Z, Q) = \sqrt{\frac{2C_2D}{C_1 + C_2}} \]

(4) EOQ Model with price break:

In real life problem, unit cost of item, in most of the purchasing depend on quantity procured. Often, discounts are offered for the purchase of large quantities which take as the form of price breaks.

Assumption:-

(i) Demand is known and uniform.

(ii) Shortages are not permitted.

(iii) Production for supply of commodities is instantaneous.
Results:

Let $Q$ be the lot size in each production run, $D$ be the total number of units produced or supplied over the entire time period, $C_3$ be the setup cost per production run. Let the cost of manufacturing or purchasing be $P$ per unit, and monthly holding cost $I$ per unit.

Average number of months inventories for each run = $\frac{1}{2} Q t$

= $\frac{Q^3}{D}$

Number of lot month inventories per run = $\left(\frac{Q t}{2}\right) / Q$

Annual costs associated with runs of size $Q = f(Q) = nQP + nC_3$

= $DP + \frac{D}{Q} C_3$

Annual inventory holding costs associated with the setup costs are

$g(Q) = C_3 I / 2$

Annual inventory holding costs associated with the purchasing costs are

$h(Q) = QIP / 2$

Total expected annual cost $C(Q) = f(Q) + g(Q) + h(Q)$

= $DP + \frac{DC_3}{Q} + \frac{C_3 I}{2} + \frac{QIP}{2}$

Now, $\frac{dC(Q)}{dQ} = 0 \Rightarrow Q = \sqrt{\frac{2C_3 D}{IP}}$

And $\frac{d^2}{dQ^2} C(Q) > 0$

Thus the optimum value of $Q$ has been obtained and is given by

$Q_{opt} = \sqrt{\frac{2C_3 D}{ID}}$
(A) Purchase Inventory Problem with one price break:

When there is only one price break or one quantity discount, the situation may be illustrated as below:

<table>
<thead>
<tr>
<th>Range of Quantity</th>
<th>Purchase Cost per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ≤ Q₁ &lt; a</td>
<td>P₁</td>
</tr>
<tr>
<td>a ≤ Q₂</td>
<td>P₂</td>
</tr>
</tbody>
</table>

Where a is the quantity at end beyond which the quantity discount applies and p₂ < p₁.

Now using result (I) total expected cost \( C(Q₁) \) for any purchase quantity, \( Q₁ \), in range \( 0 ≤ Q₁ < b \) will be given by

\[
C(Q₁) = \frac{DC₃}{Q₁} + \frac{Q₁P₁}{2} + DP₁ + \frac{C₃I}{2}
\]

Similarly, for any purchase quantity, \( Q₂ \), in range \( Q₂ ≥ b \), the total expected cost \( C(Q₂) \) will be given by,

\[
C(Q₂) = \frac{DC₃}{Q₂} + \frac{Q₂P₂}{2} + DP₂ + \frac{C₃I}{2}
\]

In order to obtain the optimum purchase quantity,

We proceed as follows:

Step-1: Compute \( Q₂ \) and compare it with the quantity \( a \).

Step-2: If \( Q₂ \geq a \), the optimum lot size will be \( Q₂ \).

Step-3: If \( Q₂ < a \), the quantity discount will not be applicable to purchase quantity \( Q₂ \).
In order to obtain optimum purchase quantity, we need only to compare the total expected cost for \( Q = \bar{Q}_1 \) with \( Q = a \). These cost equations are given by

\[
C(\bar{Q}_1) = \frac{DC_3}{\bar{Q}_1} + \frac{Q_1 P_1 I}{2} + DP_1 + \frac{C_3 I}{2}
\]

and

\[
C(a) = \frac{DC_3}{a} + \frac{aP_2 I}{2} + DP_2 + \frac{C_3 I}{2}
\]

if \( C(a) < C(\bar{Q}_1) \) then \( \bar{Q}_1 = a \) otherwise \( \bar{Q}_\text{opt} = \bar{Q}_1 \).

(B) Purchase Inventory Problem with two price break:

When there are two price breaks or two quantity discounts, the situation may be illustrated as follows:

<table>
<thead>
<tr>
<th>Range of Quantity</th>
<th>Purchase Cost Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 0 &lt; Q_1 &lt; a_1 )</td>
<td>( P_1 )</td>
</tr>
<tr>
<td>( a_1 &lt; Q_2 &lt; a_2 )</td>
<td>( P_2 )</td>
</tr>
<tr>
<td>( a_2 &lt; Q_3 )</td>
<td>( P_3 )</td>
</tr>
</tbody>
</table>

Where \( a_1 \) and \( a_2 \) are those quantities which determine the price breaks, the computational procedure for obtaining the optimum purchase quantity is given below:-

Step-1: Compute \( \bar{Q}_1 \) and compare it with quantity \( a_2 \).

Step-2: IF \( \bar{Q}_1 \geq a_2 \), the optimum purchase quantity is reached.

Step-3: If \( \bar{Q}_1 < a_2 \), compute \( \bar{Q}_2 \). Now since \( \bar{Q}_1 < a_2 \), therefore \( \bar{Q}_2 < a_2 \), because \( \bar{Q}_1 < \bar{Q}_2 < \bar{Q}_3 \). Thus, either \( \bar{Q}_2 < \bar{Q}_1 \) or \( a_1 < \bar{Q}_2 < a_2 \).
Step-4: If \( Q_1 < a_2 \) and \( a_1 \leq Q_2 < b_2 \) the proceed as in the case of only one
price break; that is compare \( C(Q_2) \) and \( C(a_2) \) to determine the
optimum purchase quantity.

Step-5: If \( Q_1 < a_2 \) and \( Q_2 < a_1 \) then compute \( Q_i \) which will now satisfy the
inequality \( Q_i < a_1 \). compare \( C(Q_i) \) with \( C(a_1) \) and \( C(a_2) \) so as to
get the optimum purchase quantity.

(5) Multi-Deterministic EOQ Model:

Let us consider the problem of having \( n \) items in inventory with
instantaneous production and no lead time. Assume that demand is known
and is uniform at a rate \( D_i \) per unit time for the \( i^{th} \) item \((i=1, 2, 3, \ldots, n)\). Let
\( C_{1i} \) be the carrying cost on inventory holding cost per unit of the quantity of
the \( i^{th} \) item and \( C_{3i} \) be the set up cost per run for the \( i^{th} \) item. If shortages are
not allowed, then the total cost of \( i^{th} \) item per unit of time is given by,

\[
\frac{1}{2} C_{1i} Q_i + C_{3i} \frac{D_i}{Q_i}
\]

Where \( Q_i \) is the quantity of \( i^{th} \) item in inventory at the beginning of the
period.

Thus the total cost per unit of time is given by

\[
C(Q) = \sum_{i=1}^{n} \left[ \frac{C_{1i} Q_i}{2} + \frac{C_{3i} D_i}{Q_i} \right]
\]

In order to find the optimum values for \( Q_i, i=1, 2, 3, \ldots, n \) so as to
minimize \( C(Q) \), we have,

\[
\frac{\partial C(Q)}{\partial Q_i} = \frac{C_{1i} Q_i}{2} - \frac{C_{3i} D_i}{Q_i^2}
\]

but \( \frac{\partial C(Q)}{\partial Q_i} = 0 \)

\[
Q_i = \sqrt{\frac{2D_i C_{3i}}{C_{1i}}} \quad \text{and} \quad \frac{\partial C(Q)}{\partial Q_i^2} > 0 \quad \text{for all} \ Q_i
\]
Therefore \( Q_{opt} = \sqrt{\frac{2D_iC_{hi}}{C_i}} \)

Limitation on Inventories: If there is a limitation on inventories that requires that the average number of all units in inventory should not exceed \( K \) items of all types, then the problem is to minimize the cost \( C(Q_i) \) subject to the condition that,

\[
\frac{1}{2} \sum_{i=1}^{n} Q_i \leq K,
\]

Since the average number of units at any time for an item is \( \frac{Q_i}{2} \).

There are now two possibilities,

(i) If \( \frac{1}{2} \sum_{i=1}^{n} Q_i \leq K \), there is no problem and the optimum values obtained above are the required values.

(ii) If \( \frac{1}{2} \sum_{i=1}^{n} Q_i > K \), then we use Lagrange's multiplier technique. For this

Lagrangian function is define as

\[
L = \sum_{i=1}^{n} \left( \frac{1}{2} C_i Q_i + \frac{C_i D_i}{Q_i} \right) + \lambda \left( \sum_{i=1}^{n} Q_i - 2K \right) \text{ where } \sum_{i=1}^{n} Q_i - 2K \to 0
\]

Where \( \lambda = \) Langrangian Multiplier

Now,

\[
\frac{\partial L}{\partial Q_i} = \frac{1}{2} C_i - \frac{C_i D_i}{Q_i^2} + \lambda \text{, } i = 1,2,3,...,n
\]

And

\[
\frac{\partial L}{\partial \lambda} = \sum_{i=1}^{n} Q_i - 2K
\]

The optimum value of \( Q_i \) are obtained by setting

\[
\frac{\partial L}{\partial Q_i} = 0 \text{ and } \frac{\partial L}{\partial \lambda} = 0
\]

\[
\therefore Q_{opt} = \sqrt{\frac{2C_i D_i}{C_i + 2\lambda}} \text{ and } \sum_{i=1}^{n} Q_{opt} = 2K
\]
For finding the value of \( \lambda \) occurring in the value of \( \frac{Q}{\text{opt}} \), we make use of the fact that \( \sum_{i=1}^{n} \frac{Q_i}{\text{opt}} = 2K \), which is possible by trial and error method only.

(6) ITOR Models under JIT Situation:

Just-in-Time (JIT) is one of the most important techniques to achieve perfection through continuous improvement and removal of waste in inventory management. It enables organization to simultaneously achieve the goals of high quality, low cost and high degree of flexibility for quick response. It is helpful in total quality management, world class manufacturing and zero inventories. It is a highly integrated production, sales and distribution system, leading to a continuous flow through the whole supply chain therefore JIT plays very important role in financial management also.

The principles of JIT techniques concerns with the management of inventories. Aims of JIT are to create a zero or low inventory operating system. The primary objectives of JIT are the improvement of product quality and productivity through the elimination of materials and workers that are absolutely essential for production. That is, anything that does not add to the value of the product is a waste. Rework and scrap are obvious wastes, and should be removed. Less obvious is inventory, which also requires to be eliminated. Reduction in inventory is of considerable benefit in its own way, e.g. to reduce space requirements, amount of tied up capital and risk of loss and damage, JIT leads to a more efficient allocation of scarce resources and provides a base for long term productivity growth. JIT is characterized by small production runs, quick responses and low inventories which are motivation in the productivity process. Thus, in order to have a JIT system, both production and purchasing activities must be synchronized.

Various ITOR Models are developed with the help of JIT Purchasing and Manufacturing Models in this thesis.

\( \text{Properly defined before} \) ??
In most of inventory models, it was explicitly assumed that once the units enter into the inventory system they remain in the same condition forever. In many industrial organizations, planning over a short period will be unaffected by problems of perishable or deteriorating items and hence, in such cases, the assumption of infinite life-time is not improper. But in several areas of economic sector problems arise with the management of deteriorating inventories, i.e. items whose utility does not remain the same with the passage of time. The item may be deteriorating and hence its price might go down depending on its age which affects the ITOR: food item, photographic films, most drugs and pharmaceuticals, certain chemicals, radioactive substances, readymade garments and electronic components are some examples of units such that sufficient deterioration may occur during the normal storage period of the units in the inventory system. The loss due to deteriorating the financial encountered while analyzing items must be encountered while analyzing the financial management system for issuing an optimal policy.

In this chapter the basic inventory turnover ratio model is developed for items with any well behaved probability distribution of the time to deterioration of an item. By a well behaved probability distribution of the time to deterioration it means that distribution for which the age-specific failure rate function $\phi(t)$ exists and is an explicit function of $t$. Here, it is also assumed that $\phi(t)$ is integrable.

From the general model developed here, the models of Ghare and Schrader, coverts and Philip and Philip will be obtained as particular cases by taking a suitable probability distribution for the time to deterioration of an item.
In this thesis the basic inventory turnover ratio model and its cases are developed and discussed few items with any well behaved probability distribution of the time to deterioration of an item.

(8) ITOR Models under Inflationary Situation:

Inflation plays measure role on the market situation thus on firms. Therefore financial management of the company becomes over estimated and its effect all the departments of the firm. So, it must necessary to consider inflationary situation of the market. Inflation directly effect the price of the commodity and hence production, purchasing and demand of the commodity.

In this thesis basic ITOR models of Inflationary Situation are developed and try to study that what is the impact on ITOR.

Inventory Turn Over Ratio (ITOR) Models:

The inventory turnover ratio is a valuable measure of selling/purchasing efficiency and inventory quality. It is computed by dividing the cost of goods sold/purchased by the average inventory. The average inventory refers to the simple average of the opening and closing inventory. The ratio indicates how fast inventory is sold. A high ratio is good from the view point liquidity and vice versa. A low ratio would signify that inventory does not sell fast and stays on the shelf or in the warehouse for a long time.

Inventory turnover ratio is a broad measure. It does not bring into light several important facts. For example, high inventory turnover ratio might lead the people to believe that the management is handling greater sales with less investment in inventory. However, it fails to reveal the amount of sales lost by the company owing to maintenance of low inventories or even periodic stock outs, lost incurred as a result of frequent reordering or production runs, cost of storing large accumulations of inventory out of large production run. It would therefore be genuine to evolve such techniques.
as may evaluate the management of inventory in the light of objectives of inventory management. The most important objective of inventory management is to minimize risk of being out of stock and to reduce cost of obsolescence and spoilage and other carrying costs. The management must, therefore, establish some mechanisms and systems to check the firm's performance in above respects.

In this thesis, we have tried to fit ITOR aspect of financial management under Economic Order Quantity approach. There are two cases in which ITOR is optimized: (i) Simple demand (ii) Stock dependent demand. To find out optimal turnover under various environment like Multi Deterministic, JIT, Inflation, deteriorating..., we have consider the ITOR aspect for various models of Inventories.

1.4. Literature Survey:

According to Meigs W.B. and others, “Financial Statements themselves are organized summaries of detailed information and are, thus, a form of analysis. The type of statements accountants prepares, the way they arrange items on these statements, and their standards of disclosures are all influenced by a desire to provide information in convenient form”. The analysis of financial statements is, thus, an important aid to financial analysis. But not further discussed in this thesis...

The focus of financial analysis is on key figures contained in the financial statements and the significant relationship that exists between them. According to Mectcalf and Titard “Analysing financial statements is a process of evaluating relationship between component parts of financial statements to obtain a better understanding of a firm’s position and performance. The type of relationship to be investigated depends upon the objective and purpose of evaluation. The purpose of evaluation of financial
statements differs among various groups interested in the results and relationships reported in the financial statements.

The first task of the financial analyst is to select the information relevant to decision under consideration from the total information contained in the financial statements. The second step involved in financial analysis is to highlight significant relationships. The final step is interpretation and drawing of inferences and conclusions. Therefore, according to Meigs W.B. “financial analysis is the process of selection, relation and evaluation”.

A variety of advanced concepts and techniques have been suggested for managing different factors of the working capital. These have emanated in different disciplines like economics, operation research, production management, statistics and computer sciences. The most useful and advanced concepts and techniques are as bellow:-

(i) Working capital leverage:-

Working capital leverage reflects the sensitivity of return on investment to changes in the level of current assets. It is defined as ration of percentage changes in return on investment to the percentages in value of current assets or gross working capital. If a current asset increases than Earning Power(ROI) increases and it decrease than Earning Power decreases.

(ii) Analysis of working capital components:-

In order to understand the length of time for which resources are committed to various components of working capital (a) operating cycle analysis (b) Weighted operating cycle analysis may be done.

The operating cycle analysis focuses only the time dimension of investment. It shows the durations of various components of the operating cycle. This analysis can be extended to take into account differential magnitudes of investment at different stages of the operating cycle. Such extended analysis leads to the calculation of
what may be referred to as the weighted operating cycle which is more useful in working capital analysis.

(iii) Cash Budget Simulation:-

The cash budget prepared by a business firm is based on single value estimates of various factors like sales, distribution of sales between cash and credit sales, and so on. The financial manager responsible for the preparation of the cash budget is aware that some of these factors are subject to considerable variability. Hence, realism demands that the impact of variability characterizing these factors is properly examined. For this purpose, the technique of simulation may be employed. The procedure of simulation consists of three broad phases (i) Model development (ii) Specification of probability distributions of exogenous variables, and (iii) running of the model, following are the advantages of simulation:

(a) It helps the financial manager develop an informed judgment about the expected value and the variability of cash balance at the end of each period which information enables the financial manager to plan for raising/deploying of cash.

(b) It may be used to evaluate the consequences of alternative financial policies. Simulation helps in learning about the impact of different financial policies on the cash balances fairly efficiently and quickly.

(c) It is powerful tool to assess the outcome of changes in exogenous variables.

(d) It aids the financial manager in assessing the value of information.
(iv) Advantages in inventory management:-

Many interesting advances have occurred in the field of inventory management. The more important ones among them are:

(a) Materials requirements planning
(b) Just in time system
(c) Electronic data interchange and bar coding.

Materials requirements planning (MRP) is essentially a computerized planning and control system for the effective management of production and control in a manufacturing environment. The objective of the MRP system is to order just the right parts in right quantity at the right time.

The just in time (JIT) system seeks to achieve a Zero level of inventory. Unlike conventional system where inventory is treated as an asset, the JIT system views inventory as the "root of all evil". In traditional organization, a high level of inventory is held to cover up the problem areas related to quality, vendor delivery, machine break downs and others. The JIT system is the opposite. The inventory level is lowered to expose the organizational problems and attempts are made to solve the problems at their points of incipience. Under the JIT system workers need a broad range of skills, the layout of the plant has to be different, quality is absolutely essential, and vendor relations are radically different.

The Electronic data interchange (EDI) is the direct computer to computer exchange of information such communication results in timely and accurate information, greater administrative efficiency, and improved quality of decision making. Bar coding identifies products using Machine-readable codes. The bar code technology allows faster and more accurate data entry, better document tracking, and reduced inventory cost.
Discriminant analysis is a statistical tool helpful for classification purpose. It has application in several areas of financial analysis. For example, it can be used for (a) classifying customers into two categories “good or bad” on the basis of certain financial ratios (b) classifying firms into two categories “sick or non sick” on the basis of certain financial characteristics.

To convey a basic understanding of discriminant analysis, we shall employ the following assumptions:

- There are two discrete groups.
- Two variable combined in a linear manner would be used for discrimination between the two discrete groups.
- These two variables arise from multivariate normal population. While the means of the two variables in each group are different, their variance/covariance matrix is identical for each group.
- The steps involved in discriminant analysis with respect to above assumptions are as below:
  - Estimation of the discriminant function
  - Choice of the cut-off point for the discriminant function
  - Examination of the predictive ability of the discriminant function.

Cash Management Models:

The cash budget of the firm indicates periods when the firm is expected to have shortage of funds and surplus of funds. If a shortage is expected, ways and means of overcoming the shortage must be explored. On the other hand, if a surplus is projected, it has to be determined how it should be split between marketable securities and cash holdings. Two cash management models have addressed this issue of split between marketable securities and cash holdings:
(a) The Baumol Model

(b) The Miller and Orr Model

(a) The Baumol Model:

William J. Baumol proposed a model which applies the economic order quantity concept, commonly used in inventory management to determine the cash conversion size (which in turn influences the average cash holding of the firm). The purpose of such an analysis is to balance the income forgone when the firm holds cash balances (rather than invests in marketable securities) against the transaction costs incurred when marketable securities are converted into cash.

Baumol general model is as below:

Total cost = invest income faregone + conversion cost

\[ TC = \frac{IC}{2} + \frac{bT}{C} \]

Where,

- \( C \) = amount of marketable securities converted into cash per order
- \( I \) = Interest rate earned per planning period on investment in marketable securities.
- \( T \) = Projected cash requirements during the planning period
- \( TC \) = Sum of conversion and holding costs.

The values of \( c \) which minimizes \( TC \) can be found from the following equation

\[ C_{opt} = \sqrt{\frac{2bT}{I}} \]

![Cash balances according to Baumol model](image-url)
(b) Miller and Orr Model:

Expanding on the Baumol Model, Miller and Orr consider a stochastic generating process for periodic changes in cash balance. As against the completely deterministic assumptions of the Baumol model, Miller and Orr assume that the changes in cash balance over a given period are random, in size as well as direction, as shown in figure given below. As the number of periods increases, the cash balance changes from a normal distribution.

Given this behaviour of cash balance changes, Miller and Orr Model seek to answer the following questions:

- When should transfers be affected between marketable securities and cash?
- What should be the magnitude of these transfers?

According to the Miller and Orr model, upward changes in cash balance are allowed till the cash balance reaches up "upper control limit" (UCL) as shown in figure given below. As this level is attained the cash balance is reduced to a "return point" (RP) by investing UCL-RP in marketable securities. On the other hand, downward changes are permitted only till the cash balance touches a "Lower Control Limit" (LCL), as shown in figure given below. Once this level is reached, enough marketable securities are disposed to restore the cash balance to its "return point" (RP)
Changes in cash balance with managerial intervention

While the value of the “Lower Control Limit” is set by the management based on what it consider to be the minimum below which the cash balance should not fall, the values of RP and UCL have been derived by Miller and ORR with a view to minimizing the total ordering and holding costs. The following are the results of the analysis:–.

\[
RP = \sqrt{\frac{3b\sigma^2}{4I}} + LCL
\]

\[
UCL = 3RP - 2LCL
\]

Where,

RP = Return Point
B = fixed cost per order for converting marketable securities into cash
I = daily interest rate earned on marketable securities.
\(\sigma^2\) = Variance of daily changes in the expected cash balance
LCL = The lower control Limit
UCL = The Upper Control Limit

1.5. Area Considered For The Present Study:

Financial Analysis is the process of identifying the strength and weakness of a company by properly establishing relationships between the items of the balance sheet and the profit and the profit and loss account. Such that financial analysis helpful financial manager to take most appropriate financial decision to strengthen the financial condition of the company. One of the important tools of financial analysis is Ratio Analysis.
Ratios are among the best known and most widely used tools of financial decisions.

1.5.1. **Ratio Analysis**:

Ratio Analysis is one of the powerful tools of the financial analysis. A ratio can be defined as the indicated quotient of two mathematical expressions and as the relationship between two or more things. Thus ratio is the numerical or an arithmetical relationship between two figures a ratio can be used as a yard stick for evaluating the financial position and performance of a company. Ratio Analysis helps the analysts to make quantitative judgment.

Ratio may be expressed in either of the three forms (i) As a pure ratio, e.g. 5:2 (ii) As a rate, e.g. inventory turnover during the year (iii) As a percentage e.g. return on share holder’s equity is 10 percent.

**Standards for comparison in financial analysis**:

(a) For making a proper use of ratios, it is essential to have fixed standards for comparison. A ratio itself has very little meaning unless it is compared to some appropriate standard. Selection of proper standards of comparison is a most important element in ratio analysis. The four most common standards used in ratio analysis in financial management are (a) Absolute (b) Historical (c) Horizontal and (d) Budgeted

Absolute Standards are those which become generally recognized as being desirable regardless of the type of company, the time, stage of business cycle, or the objectives of the analyst.

Historical or internal standards involve comparing a company’s own past performance as a standard for the present or future.

In Horizontal or external standards one company is compared with another or with the average of other companies of the same nature.
The budgeted standard is arrived at after preparing the budget for a period. Ratios developed from actual performance are compared to the planned ratios in the budget in order to examine the degree of accomplishment of the anticipated targets of the firm. Budgeted standards can be very useful in financial analysis particularly when they are evolved after taking into account the prevailing conditions and the specific company situation.

(b) Ratios are significant both in vertical and horizontal analysis. In vertical analysis, ratios help the analysts to form a judgment whether performance of the company at a point of time is good, questionable or poor. Likewise, use of ratios in horizontal analysis indicates whether the financial condition of the company is improving or deteriorating and whether the cost, profitability or efficiency is showing an upward or downward trend.

**Limitations of ratio analysis:**

Limitations of ratio analysis arise due to difficulties in making comparisons. The most common drawbacks of ratio analysis are as below:

(i) Ratios can sometimes be misleading if an analyst does not know the reliability and soundness of the figures from which they are computed and the financial position of the business at other items of the year.

(ii) The mechanic of ratio construction is not as important as the proper interpretation of the ratio. As a matter of fact, ratios are only a preliminary step in interpretation.

(iii) Ratios can never be the substitute of raw figures.

(iv) Price level changes make ratio analysis difficult.

(v) Ratios do not provide a definite answer to financial problems. There is always the question of judgment as to what significance should be given to the figures.
Differences in definition of various terms of financial analysis make ratio analysis difficult.

**Classification of ratios:**

Ratio Analysis is one of the most important tools for financial analysis. Therefore it is important to obtain some meaningful information such as liquidity, profitability efficiency and financial position of a company by using ratio as a tool. Financial ratios can be classified under the following five categories: (i) Structural (ii) Liquidity (iii) Profitability (iv) Turnover (v) Miscellaneous group.

(i) **Structural Ratios:**

a. Funded debt to total capitalization: The term 'total' capitalisation comprise long-term debt, capital stock and reserves and surplus. The ratio of funded debt to total capitalisation is computed by dividing funded debt by total capitalization. It can also be expressed as a percentage of the funded debt to total capitalisation. Earning power of a company may justify a higher percentage. It is, however, necessary to note that too heavy debt burdens reduce the margin of safety for lenders, increases fixed charges upon earnings, decreases earnings available for distribution to shareholders and in the case of continued inadequate or no profits may invite in solvency and force reorganization.

b. Debt to equity: Due care must be given to the computation and interpretation of this ratio. The definition of debt takes two forms: one includes the current liabilities while the other excludes them. The difference in the meaning of debt is confusing in general. The amount of debt that a firm can reasonably carry depends on varied factors. A public utility with stable earnings and favourable prospects can safely finance a
much larger percentage of its assets with debt as against a manufacturer with an erratic record of profitability. Whether a particular ratio depicts a good or bad condition has to be concluded after due care.

c. Equity to net fixed assets: this ratio gives an indication of the extent to which equity capital is invested in net fixed assets. In case of net fixed assets being in excess of net worth, difficulties may arise to provide depreciation resulting in a reduction in profits. In addition, the more the shareholder’s contribution is tied up in fixed assets, the less is the amount available for investment in current assets, which, in other words, means that creditors have contributed. Towards large proportion of the net fixed assets. The higher this ratio the less the protection for creditors. Where net fixed assets exceed net worth, it may be a single for many industrial concerns which should plan for an additional equity capital.

d. Net fixed assets to funded debt: This ratio acts as a supplementary measure to determine security for the lenders. A ratio of 2:1 would mean that for every rupee of long-term in debtedness, there is a book value of two rupees of net fixed assets. But book value and actual liquidating value may be greatly at variance and in interpreting this ratio, this fact must be born in mind.

e. Funded debt to networking capital: This ratio is calculated by dividing the long-term debt by the amount of the net working capital. It helps in examining creditor’s contribution on the liquid assets of the firm. Funded debt should not exceed net working capital for most industrial concerns; in fact, it should be less. If net working capital is less than funded debt, difficulty
in meeting financial obligations is likely to arise over the long run.

(ii) Liquidity Ratios:

a. Current ratio: The current ratio is computed by dividing current assets by current liabilities. Current assets normally include cash, marketable securities, sundry debtors and inventory and current liabilities consist of sundry creditors, short term loans and advances, current liabilities and provisions for taxes and other accrued expenses. This ratio is generally an acceptable measure of short term solvency as it indicates the extent to which the claims of short-term creditors are covered by assets that are likely to be converted into cash in a period corresponding to the maturity of the claims. In interpreting this ratio, consideration should be given to the proportion of the various components of current assets. A current ratio of 2:1 has long been considered generally satisfactory but indiscriminate use of this standard is unsound. This ratio varies from industry to industry and within the same industry from company to company and within the same company from season to season. One should be careful to determine acceptable standards within the industry in which the company operates.

b. Acid-test ratio: This is also termed as quick ratio. It is determined by dividing “Quick assets”, i.e. cash, marketable investments and sundry debtors, by current liabilities. This ratio is a better test of financial strength than the current ratio as it gives no consideration to inventory which may be very slow moving. Like current ratio, a reasonable standard for the acid-test ratio varies from season to season in company and from company to company in an industry.
(iii) Profitability Ratios:

a. Operating ratio: It is calculated by dividing the total operating expenses by net sales and is expressed as a percentage. Total operating expenses include all cost except financing costs and income-tax. This is the most general measure of operating efficiency and is important to management in judging its operations.

b. Operating profit to sales: The difference between the operating ratio and 100 in the ratio of operating profit (earning before interest and taxes) to net sales. The lower the operating ratio, the higher the margin of profit. While this ratio serves as an index of overall efficiency, its usefulness is limited by its vulnerability to changes resulting from accounting decisions. For instance a high ratio may signify nothing more than a management policy of not providing necessary maintenance and depreciation. This ratio is very useful for purpose of internal analysis in detecting the areas of difficulty.

c. Net profit to sales: This ratio and net profit margin. It is determined by relating the net income after taxes to the net sales for the period and measures the profit per rupee of sales. This percentage, in conjunction with the operating ratio, throws light on the importance of a company's non-operating activities.

d. Coverage of interest payment: This ratio is determined by dividing interest charges on long-term barrowing and dividend on preference shares into the company's earning before interest and taxes (EBIT) for the period. This is stated as:

\[ \frac{EBIT}{Interest} \]

The numerator indicates the extent of earnings available for the payment of interest. The ratio is used mainly as a measure of the
firm's ability to meet its interest obligations. Sinking fund payments or instalments due for repayment of capital can be added to the interest charges in order to determine the capacity of the company to serve its debt obligations. This can be stated as:

$$\frac{\text{EBIT}}{\text{Interest} + \text{Sinking fund payments}} \times \frac{1}{(1-t)}$$

Where t stands for the tax rate payment by the company on its income.

e. Return on investment: This relationship can be examined under two heads (i) EBIT/Capital employed and (ii) Net profit to net worth.

The ratio examines the relationship between the size of operating profits and the capital employed. It is one of the most basic ratios. It can be computed in a number of ways in relation to total assets, capitalization (equity capital plus long-term debt) or owner's equity. From the management point of view, the meaningful relationship is between the earnings before interest and taxes and the capital employed. This relationship is expressed as EBIT/Capital Employed and provides a good indication of the profitability of the capital employed in the firm. There is a variation of this ratio by dividing the EBIT by capitalization and not capital employed. This refinement emphasizes the earnings on the permanent capital as distinguished from the capital supplied by short-term creditors. Some analyst adjusts this measure by using an average capital employed during the year while other prefers ending balances.

For determining return on the investment of the equity holders in a company, the afore-mentioned ratio has to be modified. For the shareholders, the relationship between the net profit and the
net worth is more meaningful. For calculating this ratio, the cost of borrowed capital and income tax are deducted from earnings. It is fair measure for appraising the earning power of the equity investment, i.e. net worth. However, the accounting and operating policies of a firm influence the reliability of this measure. In addition, shareholders frequently relate the earnings available to them to the market value rather than to book value of their shares.

(iv) Turnover Ratios:

a. Assets turnover: This ratio is also termed as capital turnover. It is calculated by dividing net sales by the net tangible assets i.e. net fixed assets plus current assets. Some analysts prefer to use gross fixed assets due to the varying depreciation policies which make comparisons difficult. A high ratio suggests management’s ability to make a good use of its tangible assets but low ratio may be caused by large outlays for fixed assets. Results of this ratio should be interpreted in the light of other factors in operation.

b. Net working capital turnover: It is computed by dividing average net current assets in to net sales. It helps in measuring the efficiency of the employment of working capital. Generally speaking, the higher the turnover, the greater the efficiency and the larger the rate of profits. However, a very high ratio may signify a potentially dangerous situation of the shortage of working capital.

c. Receivables turnover (collection period): This ratio measures the relationship between credit sales during a particular accounting period and the average receivables outstanding during the period. This ratio is also called the collection ratio or
book debts to sales ratio. It is expressed in two forms (i) net sales/average amount of accounts receivables and (ii) average collection period after calculating average daily sales and dividing accounts receivables by sales per day.

There are two ways of presenting the relationship of inventory to sales or cost of goods sold:

i. Sales / Ending inventory

ii. Cost of Goods sold / Average Inventory

(i) Sales/Ending Inventory: This ratio has got two limitations (a) ending inventory figure may not be representative of the level of inventory throughout the year and (b) investment in inventory should be related to the cost of goods sold as against sales which contain the element of profits over and above the recorded cost of goods. Thus, the relationship is not entirely that of comparable figures and any comparative studies of this ratio between companies may be misleading through difference in the gross margin taken on sales.

(ii) Cost of goods sold / Average inventory: This relationship expresses the frequency with which average level of inventory investment is turned over through operations. The higher the inventory turnover, the larger the amount of profit, the smallest the amount of capital lied up in inventory and the more current the merchandise stock. Moreover, a firm with a high turnover has a great competitive advantage as it can afford to sell its merchandise at a lower price because increased sales volume may yield a larger total profit even though the margin of profit per unit is slightly less.
The inventory turnover is a valuable measure of selling efficiency and inventory quality. A low inventory turnover may be due to a variety of reasons like poor merchandise, over-valuation of closing inventory, a large stock of unsaleable goods, over-buying, an anticipated future increase in sales etc. In the last case, the low inventory turnover may be desirable in terms of its effect on sales and profits. On the other hand a substantially higher rate of inventory turnover may disclose conservative pricing of closing inventory, inventory valuation at a point where it is unusually low, a real shortage of inventory for required sales, a contemplated reduction on sales etc. It is thus worth noting that a high inventory turnover may not be itself desirable.

(v) Other Important Ratios:

a. Earning-Price Ratio: This ratio is also termed as earning yield. It is computed by dividing earnings per share by market price per share. Earnings by the number of shares outstanding. There are, however, difficulties in finding out the market price, should it be on a certain day or an average of period? This ratio is very useful for the prospective investors in a company.

b. Price-earning ratio: This is the reciprocal of earnings-price ratio. This ratio indicates the times the earnings per share are covered by its market price. This ratio is useful in financial forecasting. This ratio may show great diversity between one company and another as share price fluctuates widely. It is a rate of thumb that equity shares in industrial companies should sell at 10 times of earnings, i.e. earning-price ratio should be 10 percent; the percentage may be lower or the multiplier higher in the case of
companies commanding investment prestige and showing a progressive increase in earning power. By comparing the earning-price percentage or multiplier at which shares are selling in relation to earnings, it is determined whether shares are under-priced or over priced.

c. Dividend Yield: This ratio measures relationship between the dividend per share and the market price for an investor, not only the amount of this ratio is important but also the extent of coverage of this ratio by the earning yield.

d. Pay-Out ratio: This ratio is calculated by dividing the dividend per share by the earning per share. The attractiveness of investments depends on its earning power and profitability over a period of time. The rate of earning per share is the best single measure of profitability. It reflects productivity of investment. As earnings fluctuate from year to year, they have to be studied over a number of years covering periods of depression and prosperity in order to find out a tuned after making due allowance for abnormal factors. The rate of earnings per share also indicates the dividend protection available to equity shares which is particularly significant in a growth situation.

The ratio expresses the amount of equity dividend as a percentage of earnings available for equity shares after meeting all charges. A ratio lower than 100 percent indicates retention of earnings in the firm where as a ratio hither than 100 percent indicate distribution of part of reserves by way of dividends. The pay-out ratio may be relatively lower when earnings are utilized for financing growth or expansion. The pay-out ratio is a test of managerial ability and reputation.
1.6. **Outline of Thesis**:

**Chapter One:**
In this chapter, General background of financial management, its tools meaning and importance, Inventory management with respect to financial management, Inventory Control in firm, Inventory management in India, Basic Models, Literature Survey, Ratio Analysis e.t.c. are discussed in brief. It also describes briefly the coverage of the entire study in the form of introduction of the relevant subject concerned.

**Chapter Two:**
In this chapter, the concept of inventory turnover ratio has been studied for various issues pertinent to the traditional inventory control techniques under stock dependent consumption rate. Also various cases have been discussed under these models. Results are obtained and justified with the help of hypothetical problem.

**Chapter Three:**
In this chapter, the turnover ratio has been considered under a multi deterministic situation for an ITOR based system and there is a limit on the amount that can be incurred on inventories. When the inventories turnover consist of several items under some limitation, it is not possible to consider each item separately, since there exists a relationship between them. Then the technique of lagrangian multipliers is used to tackle such cases. The results are obtained and try to justified with the help of a hypothetical problem.

**Chapter Four:**
In the real world, it is not always true that the unit cost of an item is independent of the quantity procured. Often,
discounts are offered for the purchase of large quantities. These discounts take the form of price breaks. This concept has been discussed in this chapter for uniform and constant demand and stock dependent with price break for simple and multi deterministic situation respectively with respect to ITOR.

Chapter Five:

In this chapter, ITOR model is considered by taking shortage costs. If shortages occur, demand of the customer is meet in the beginning of new production run/order otherwise the customer moves to some other firm to fulfil his requirements. This chapter deals with those cases of shortages where left over inventory turnover are supplied in such a way that risk of not fulfilling customer requirements is minimized irrespective of maximum total cost. Here, the total cost on inventory turnover is maximum with increases in the size of inventory turnover due to instantaneous production/orders.

Chapter Six:

The concept of inventory turnovers is an important aspect of the financial analysis. The management of the firm whether good or bad, is dependent on turnovers. A good management always try to balance between high and low inventory turnovers. In this chapter, basic models of JIT approach has been discussed to obtain optimum level of ITOR. In JIT approach, problem of shortages does not exit, frequent deliveries are made in small shipments therefore there is a long term commitment between the supplier and the buyer. In this chapter it is shown that a high turnover is extremely profitable to the firm in JIT based situations. This theory is proved with the help of a hypothetical problem.
Chapter Seven:
This chapter deals with the determination of the optimum lot size for two brands of given product to maximise the inventory turnover ratio of a brand under consideration when rival brand is also trying to maximize its turnover ratio by optimising the lot size level in fixed market. For this purpose the model suggested by Ramasesh and multiple operation module suggested by Grout and Seastrand is used to develop the lot sizes for product in the JIT environment in competitive situations.

Chapter Eight:
In this chapter, the basic inventory turnover ratio model is developed for Deteriorating/Perishable items with any well behaved probability distribution of the time to deterioration of an item. By a well behaved probability distribution of the time to deterioration it means that distribution for which the age specific failure rate function $\varphi (t)$ exist and is an explicit function of $t$. Here, it is also assume that $\varphi(t)$ is integrable. Also, Analysis of ordering policies of deteriorating/perishable products in different cases has been studied in this chapter with respect to Inventory turnover ratio.

Chapter Nine:
In this chapter, an attempt is made to determine the optimum lot size for replenishment, such that the suppliers Inventory turnover ratio becomes the maximum. The different inventory cost consider in this chapter are subject to inflationary
situation. Main objective of this chapter is to find out the
behaviour of ITOR under inflationary situations.

Chapter Ten:

In this chapter, the turnover ratio has been consider under
a finite production rate in which demand rate is always less than
production rate. It is studied for uniform and constant demand
and stock dependent demand and setup cost. The results are
obtained and try to justify with the help of a hypothetical
problem.

Chapter Eleven:

This thesis ends with concluding remarks and guidelines
for future research. In this chapter, the future scope of the
research with respect to Inventory Turnover Ratio approach in
different fields is discussed in brief.

Necessary graphs and related computer programs for the models
discussed here are presented in Appendix – I and Appendix – II. The efforts
also have been made to present this thesis as e-Thesis.

Note: The programs have been written in C++ language.