Module - 2
Finance & IT Applications in a Distribution Utility

HRD Department
CESC Limited
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Finance & IT Applications in a Distribution Utility

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**FOREWORD**

Power Distribution business is undergoing significant changes with emergence of market forces and growing customer expectations, introduction of legislative & regulatory regimes and to keep pace with current economic development of our country. Primary objective is to raise the bar to enhance performance level by way of bringing competition. The key indicators are availability of power, reliability of T & D network, high system efficiency and focused customer service.

In order to institutionalize the above journey and to trigger changing scenario of high performance level and sustaining growth in power business, role of Human resources has assumed paramount importance. CEA in their recently issued Regulations on “Measures relating to Safety & Electric supply 2010” has also elaborated the need of specific training for the personnel engaged in operation and maintenance of Transmission Distribution system, electrical plants etc.

In its zeal to develop multi skilling and multi-functional competency & to improve efficiency, BESCOM has reposed faith in the training methodology of CESC and has entrusted AIPM, the external training arm of CESC Limited, to conduct programmes on different modules covering the entire gamut of power distribution technology including change management. AIPM conducted a series of visits to various BESCOM sites, interacted with a sample cross section of people to identify the gaps for development of the training material. This Course Book, meant for technical officers, has been cast as a study material to provide an insight into Financial System of an Utility, IT applications in Distribution Management, Distribution Tariff principle and basic concept of Smart Grid, considered essential in running a power distribution company. However, we appreciate that this being a process of continuous development, there would be scope for further improvement of the contents of the handbook.

I am confident that this booklet shall be a useful guide for the BESCOM engineers for refreshing their knowledge and understanding. I am thankful to BESCOM for giving CESC an opportunity to share its experience and thus enriching itself and all those who have directly contributed to ensure timely compilation of this booklet.

Sd/-

Gautam Ray
Executive Director (HR & Admn)

Dated 18th, March, 2013
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Learning Objectives

After studying this unit, you should be able to understand:
- Fundamentals of Finance
- Financial Statement – Preparation, Analysis, Interpretation
- Cost of Capital, Leverage, Trading on Equity
- Working Capital Management
- Cost, Revenue & Capital Expenditure Budget & Budgetary Control
- Financial Control & Risk, Fraud & Window Dressing
- Tariff Determination for Power Distribution Companies
- Corporate Governance and Financial Reporting
- Stock Market, Foreign Investment, Dividend Policy
The word “Finance” was originally a French word and interpreted as “management of money” in older days. Today “Finance” has emerged as a subject of high degree of importance and significance and regarded not only as an art but also a science of managing various resources like assets, investments, securities, liquid cash, creditors and other liabilities, borrowed fund etc. as well as managing procurement of funds at the most economic rate and the best utilisation of such fund for productive activities and carrying business operations. Thus, “Finance” has become a branch of economics in modern era concerning resource allocation and management, acquisition, investment and markets – both commodity and securities. In lighter sense, when we talk about “Finance”, we automatically think about money. The manner in which we handle our money can make the difference between being financially stable or unstable. This is true both for personal finance, corporate finance and Government finance.

Simply, “Finance” deals with money matters.

“Finance” is now the life lime of economic activities all over the world and managing finance is now regarded as a very skilled function and a subject matter of academic discipline with high significance, research and value added service to the society.
1.1.1 Classification Of Finance

Framework

Private Finance

Business Finance

Govt. Finance

Economic Activities of Public Enterprises

CORPORATE FINANCE

Functions & Relationship

1. Concerned with the acquisition, management and utilization of fund by business entities - both in Private and Public sector

2. Boosts up county’s economic condition

3. Has relationship with marketing management

4. Influenced by macro-economic environment

5. Has significant role in corporate sustainability

What is macro-economic environment?

- Economic system of a country or world.
- Change in total output, employment, price index, effects of investments, tax policies, government revenue and expenditure.
- County’s fiscal policies, capital and credit market structure, Govt. Regulations.
- Economic behaviour of individual and other business activities.
1.1.2 Features of Corporate Finance

- Assets Creation
- Investment Acquisition
- Earning decision & opportunities
- Business Growth decision making / Project Financing
- Optimum utilisation of fund
- Profit Maximisation
- Financial solvency in long term operation
- Working Capital Management
- Loan Management
- Corporate / Individual Taxation
- Financial Internal Control Management
- Presentation of Financial Information
- Accounting Policies decision
- Regulatory / Statutory compliances of financials
- Corporate Social Responsibility
- Human Capital Creation
- Building of stakeholders’ confidence
1.1.3 Traditional Management of Corporate Finance

Corporate Finance is managed by the Finance Dept. led by Director (Finance).

- Finance Dept. deals with all financial matters of a business / company and has a significant role in business success and growth.
- Maximising return on investment is the prime function of the Corporate Finance Dept.
- Decision on financial strategy with the objectives of achieving healthy bottom line is the focus area of Corporate Finance Dept.
- Raising money that the corporate needs to operate is the basic functions of Corporate Finance Dept.
- Corporate Finance Dept. is also responsible for controlling the fund raised by it and growing of funds through investments.
- Interaction of Corporate Finance Dept. with other departments of the Company is of utmost importance for timely allocation of adequate funds to achieve business goals.
- Presenting financial accounts and information through financial statements is a major function of the Finance Dept.

1.1.4 Changing Role of Finance

- Management of corporate finance is now moving away from traditional functions and becoming a key element as strategic business partners, directly linked with decision making and planning process.
- Business partnering model looks finance as a value added functions with dual role - seeing company as a holistic organisation and advising non-financial colleagues about sustainability, growth, opportunities, threat and risk.
- Finance Dept. now-a-day plays a pivotal proactive role in driving a business into the next decade and formulating future road map for growth and diversification.

“Finance is the art of passing currency from hand to hand until it finally disappears”
1.2 FINANCIAL STATEMENT - PREPARATION, ANALYSIS, INTERPRETATION

1.2.1 Anatomy of Financial Statements
1.2.1.1 Definition & Meaning

"Financial Statements are prepared for the purpose of presenting periodical view or report on progress by management and deal with the status of the investment in the business and results achieved during the period under view"
- American Institute of Certified Public Accountants

Financial Statement (FS) is a written report of the financial condition and health of a business concern. It is a collection of reports consisting of Profit & Loss Account, Balance Sheet & Cash Flow Statement. Simply, it provides a snapshot of the current financial standing of the business. It also furnishes useful information to various interested parties like shareholders, creditors, stock exchange, bankers, lenders etc. Hence it needs to be reliable and relevant. In order to be reliable and relevant, while preparing FS, Generally Accepted Accounting Principles (GAAP) are followed to make them acceptable to layman.

1.2.1.2 Contents
Financial Statement contents:
- Balance Sheet showing the entity's assets, liabilities and shareholders' equity as on the reported date.
- Income Statement showing the results of the entity's operations and financial activities for the period under review.
- Statement of cash flow showing the changes in the entity's cash flow during the period under review.
- Accounting notes mentioning various accounting policies, details of various broad expenses etc.
- Auditors' Report.

Preparation of financial statement is the last step of accounting cycle.

1.2.1.3 Usefulness
FS is useful for the following reasons:
- Determines the ability of an enterprise to generate cash and sources and uses of the cash.
- Tracks trends of financial results.
- Assesses whether a business has the capability to mitigate its debts.
- Derives financial ratios indicating true business condition.
- Investigates certain business transactions.

1.2.1.4 Features
General Features
- Reflects of business entity's progress - Net operating results and effect of various transactions are reflected.
- Records financial facts - Prepared from all sets of accounting records maintained throughout the year
- Adheres to GAAP & AS - Accounting treatment requirements under GAAP and Indian Accounting Standards (AS) followed during preparation of FS.
Qualitative Features

- Understandability - Information provided must be readily understandable to the users of the FS.
- Relevance - Information furnished are to be relevant to the users for facilitating economic decision.
- Reliability - Accounting treatment requirements under GAAP and Indian Accounting Standards followed during preparation of FS.
- Comparability - Information must be comparable over the accounting period for trend analysis.
- Prudence - Information must be based on prudent accounting treatment.

1.2.1.4 Classification
FS can be of the following class:
- Comparative FS - A set of FS showing the results of the current and previous period.
- Consolidated FS - Financial Statement of a group of entities i.e. Parent Company with subsidiaries.
- Proforma FS - Financial Statement incorporating assumptions and estimations that may occur in future period of business operation, showing projected results of an entity.

1.2.1.5 Limitation
- Only monetary factors are considered.
- Effects of inflation not reflected.
- Window dressing possible.

1.2.1.6 Importance to various users
- Management - For framing policy, review decision, futuristic growth opportunity.
- Investors - For assessing of earning capacity, solvency position and growth opportunities of the entity as they are interested about risk and return on investment.
- Creditors - For judging credit worthiness of the firm.
- Lenders / Bankers - For determining debt-service coverage position, debt-equity relationship, profitability etc.
- Govt. / Regulators - For assessing tax liability, tariff control and determination
- Employees - For getting clear ideas about the health of the Company.
- Trade Unions - For addressing disputes over pay settlement / revision of wages.
- Research Associations - For conducting industry-wise performance research.

1.2.1.7 Financial Statement & Companies Act:
As per Company's Act, 1956, FS of a company must be prepared in compliance with Schedule VI and Accounting Standards.
General features of Schedule VI:
- Mandatory in nature.
- Stipulated minimum disclosure. Company may disclose more information.

1.2.1.8 Relationship between Profit & Loss Account & Balance Sheet
Balance Sheet discloses stock of various assets and liabilities at a point of time and P/L A/c shows the movement throughout the year. P/L A/c shows the net flow during a period. Effect of such flow is reflected in the Balance Sheet.
Both are complimentary to each other. They alone cannot provide the information in meaningful manner.
1.2.2 Financial Statement Analysis & Interpretation

What and why

Financial Statement records financial data. In order to make these financial information meaningful to users, these data should be evaluated through financial statement analysis. Therefore FS analysis can be defined as an evaluative method of determining the past, current and future projected performance of a business entity. FS analysis helps business and professionals improve their financial information and thus guides them to make more prudent and informed decision making.

"Financial Statement Analysis is largely a study of relationships among the various financial factors in a business, as disclosed by a simple set of statements, and a study of trends of these factors, as shown in a series of statements" - Myer

Objectives & Needs

- To measure operational efficiency and any financial weakness of the firm.
- To obtain better understanding of the performance and position of the firm.
- To know business solvency position.
- To check movements of cash of the firm.
- To make inter-firm, intra-firm comparison and growth potential.

Limitations

- Ignore non-monetary factors.
- Ignore qualitative aspects of business.
- Analysis of historical data does not provide meaningful information.
- Does not provide information on cost accounting, human resources accounting and inflation.

Steps

Processing of financial data - furnished by P/L A/c and Balance Sheet are rearranged, restructured for analysis purpose.

Application of Analysis Tools

- Comparative financial Statement.
- Trend Analysis
- Ratio Analysis
- Fund & Cash Flow Analysis

Approach

Traditional Approach - Involving collection of data from P/L A/c and Balance Sheet and to evaluate the raw data to provide information to various users.

Modern Approach - Applying several tools and techniques to analyse FS more meaningfully, thus reflecting more reliable, dependable data and financial position of the firm.
1.2.3 Techniques or Tools of Financial Statement Analysis
After generating data tools are applied for FS analysis, most commonly used tools are :-

- **Comparative Financial Statement** - Meaningful comparison of financial position of one accounting period to other.
  - Inter-firm comparisons.
  - Financial data are converted into percentage to some common base e.g. % of net profit to sales.
- **Common Size Statement**
  - Past is analysed to forecast future.
  - Data of past years are analysed for comparison.
  - Reflects the direction of change of financial position.
  - Future forecast is possible.
- **Trend Analysis** - Determinant of relationship of two data.
  - Provides comparative study between the data.
  - Presents the strength and weakness of business.
  - Expressed in mathematical terms.
  - Powerful tool of analyzing the performance of a concern.
- **Ratio Analysis** - Fund refers to working capital and flow refers to movement.
  - Primarily a statement showing the movement of Working Capital (WC).
  - Shows separately sources and application of WC.
  - Analyses the reasons for various changes that have taken place in the value of assets and liabilities during the year.

1.2.4 Gaap, Accounting Conventions, Doctrines, Assumptions and Concepts
1.2.4.1 Gaap
Refers to the rules, regulations, conventions and principles accepted by the majority of the business entity. That is GAAP is a common set of accounting principles, standards and procedures that business entities use to compile their financial statements. GAAP are mandatory and thus investors will have a level of consistency for financial statement analysis.

1.2.4.2 Accounting Conventions & Doctrines
Refers to the set of rules followed for achieving objects of accounting - transparency, understand ability, meaningful interpretation of financial data, comparative analysis, supportive to managerial decisions.

- **Doctrine of Disclosure** - Disclosure of accounting policies, contingent liability, EPS.
- **Doctrine of Materiality** - Not all, only very important and material information to be disclosed.
- **Doctrine of Conservatism** - Anticipate no profit, but recognize all possible loss.
- **Doctrine of Historical Cost** - Assets are recorded at its actual cost, not on fair value.
- **Doctrine of Reliability** - Provides correct information for investors' accurate decision making.
- **Doctrine of objectivity** - Portraying true and fair view of financial status.
1.2.4.5 Accounting Assumptions & Concepts

Refers to those basic rules which are universally followed by all entities in business in preparing financial statements.

Fundamental accounting assumptions are:

- **Going concern**: The enterprise is usually viewed as a going concern having continuous operations in foreseeable future.
- **Consistency**: Accounting policies are consistent from one period to another.
- **Accrual**: Revenues and expenses are accrued and recognized as earned or incurred and not money received or paid basis.

1.2.5 Elements Of Balance Sheet & Profit / Loss Account

1.2.5.1 Balance Sheet (BS)

Every balance sheet must give a true and fair view of the state of affairs of the company and must be in a prescribed form as set out by the Companies Act, 1956 (Sch. VI).

The three key components of BS are:

- Assets
- Liabilities
- Owners' Equity (Shareholders' Fund)

The BS equation is: **Owners’ Equity = Assets - Liabilities**

<table>
<thead>
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<th>Example</th>
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<tbody>
<tr>
<td>Current Assets</td>
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</tr>
<tr>
<td>Non-current Assets</td>
<td>8.0</td>
</tr>
<tr>
<td>Total Assets</td>
<td><strong>13.0</strong></td>
</tr>
<tr>
<td>Current Liabilities</td>
<td>1.5</td>
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<td>Non-current liabilities</td>
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<tr>
<td>Total liabilities</td>
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</tr>
<tr>
<td>Net Assets</td>
<td>9.4</td>
</tr>
<tr>
<td>Owners’ Equity</td>
<td>9.4</td>
</tr>
<tr>
<td>(Shareholders’ Fund)</td>
<td></td>
</tr>
</tbody>
</table>

- **Assets** - ✓ Represent expected future economic benefits. ✓ Measurable in terms of money. ✓ Has the capacity to exchange with other. ✓ Owned by the enterprise and has the legal right to use it. ✓ Has a cost that can be ascertained with reliability. ✓ On the basis of physical existence, it can be tangible and intangible. ✓ Usually divided into two categories - Fixed (Non-current) and current.
- **Assets** - Represent expected future economic benefits.
  - Measurable in terms of money.
  - Has the capacity to exchange with other.
  - Owned by the enterprise and has the legal right to use it.
  - Has a cost that can be ascertained with reliability.
  - On the basis of physical existence, it can be tangible and intangible.
  - Usually divided into two categories - Fixed (Non-current) and current.

**Nature of Assets**

**Fixed Assets** - Employed directly in the production / distribution process and held for long period. Fixed assets are not held for resale. Deplete with the usage or passage of time. Example: Land / Building, Plant / Machinery, Vehicles, Office Equipment etc.

**Current Assets** - Temporary in nature and change their form during the accounting period. Current Assets are maintained for smooth operation of business. Example - Stock, Short-term investments, Cash / Bank balances, Debtors, Loans & advances to employees etc.

**Liabilities** - Refer to a financial obligation to be discharged. Must arise due to past transactions. Once recognized, continues to remain as liability till discharged. Measurable in terms of money. Results in future outflow of resources.

**Nature of liabilities**

**Long-term liability** - Not payable within a short period of time usually 12 months e.g. long term borrowing, consumers' security Deposits.

**Current liability** - Payable within 12 months since recognized. e.g. short tem borrowings, trade payable, Proposed dividend.

**Contingent liability** - May arise in future depending upon the happening /non-happening of an uncertain event. Example: Disputed Income Tax Claim / Excise duty claim etc.

- **Owners' Equity** - Net worth of the business. 
  - Equals the difference between assets and liabilities.
  - Represents the amount belongs to the shareholders after meeting all financial obligations.

**Owners' Equity (Shareholders' Fund)** : Share Capital + Reserves & Surplus

- **Reserve & Surplus**

**Reserves**

Funds set aside for future use. Reserves are that funds which were withdrawn from general or specific profit of business and kept it in safe custody of Company.

Reserves are classified as 'Capital Reserve' and 'Revenue Reserve'. Capital Reserve cannot be utilized for distribution of dividend. However, dividend can be declared from revenue reserves.

When dividend proposed is more than 20% of the paid-up capital, at least 10% of the current profit is to be transferred to Reserve Account.

For any reserve, additions and withdrawals to / from the balance at the beginning of the year must be shown.
Example: General Reserve, Capital Redemption Reserve, Debenture Redemption Reserve, Securities Premium Account, Revaluation Reserve etc.

Surplus
It is the credit balance lying in the Profit & Loss Account of the Company.

- **Loan**

![Loan Diagram]

Debenture, Loan from Financial Institutions (FIs) / Bank, Foreign Currency Loans, Bonds

- Secured Loan
- Unsecured Loan

Public Deposit, Short term Loan from banks

- **Interest accrued and due on secured / unsecured loans should be included under the head ‘Secured Loan / Unsecured Loan’.
- **Interest accrued but not due is shown under Current Liabilities.
- **For Secured Loans, nature of Securities is to be disclosed in Annual Report.

1.2.5.2 Profit & Loss Account
Every Company's P & L Account must give a true and fair view of the profit or loss of the Company for a year.

- **Revenue (Meaning)** - Means sale proceeds or other cash inflows of the firm arising due to normal activities of the business. It is basically gross inflows of cash by:
  - Sale of goods
  - Rendering of services
  - Using other resources of the business e.g. rent from property, interest from investment, royalty from trade mark etc.

Sale of assets are not revenue. It is termed as "Gain" because such benefits arise out of transactions not linked with normal business activities.

- **Revenue (Recognition)** - Refers to the appropriate time for considering and accounting of revenue for determination of Profit or Loss.
  - Recognition of revenue depends on agreement between the parties involved in the transaction.

- **Expenses (Meaning)** - Refer to the cash outflow for transacting an service etc. in normal course of business e.g. rent, salaries, interest, repairs etc.

Any expense which does not generate revenue in turn is termed as loss e.g. loss on fire, bad debt etc.

- **Expenditure (Recognition)** - Expenditure directly related to revenue generation of the firm - Direct Expenditure.
  - Expenditure indirectly related to revenue generation of the firm - Indirect Expenditure.
Expenditure
(Classification)
- Capital Expenditure - The cost, benefit of which does not exhaust in current accounting year. It is recorded as "Asset" in Balance Sheet. It has the ability to generate revenue in future.
- Revenue Expenditure - The cost, benefit of which expires in the current accounting period. Such expenditure ceases to generate future benefits.
- Income - Refers to the excess of revenue over expenditure.

"Income is generally conceived to be a residuum income which emerges out of matching expired cost against revenue" - Harry Norris.

Expired cost : Basically revenue expenditure, benefit of which expires in the current accounting period.

**Accounting Concept of Income**

\[ I = (R + G) - (E + L), \]  
where \( I = \) Income,  
\( R = \) Revenue,  
\( G = \) Gain,  
\( E = \) Revenue Expenditure  
\( L = \) Loss

**Depreciation**
- For accounting purpose, depreciation indicates how much of an asset's value has been used up to date.
- A business firm depreciates fixed assets for both tax and accounting purpose.
- It is charged to P/L Account for the period in which the assets are used.
- Two major methods of computing depreciation expenses - Straight Line Method (SLM) and Reducing Balance Method (RBM).
  \[ \text{SLM} = \text{Rate of depreciation} \times \text{Actual cost of assets} \]
  \[ \text{RBM} = \text{Rate of depreciation} \times \text{Book value at the beginning of the year} \]
- Rates of depreciation on % of WDV have been prescribed in Income Tax Act, 1961.
- Rates of depreciation as % of WDV and SLM have been prescribed in Companies Act, 1956.
- Rates of depreciation for power generating companies as % of actual cost have been prescribed in Income Tax, 1961.
- Mandatory for every company to disclose the amount provided for depreciation & amortisation Acts as a tax shield and increases firm's cash flow.

**Bad Debt**
- Defined as that part of the accounts receivable that will likely remain uncollected.
- Appears as an expense on the company's income statement, thus reducing net income.
- Occurs when products / services are sold on credit.
- Amount of bad debt is based on "guesstimate".
- The ratio of bad debt losses and credit sales is an indicator of quality and efficiency of credit monitoring process of a business firm.

**Mandatory Disclosure of major Expenses**
- Value of raw materials consumed
- Rent, rates, taxes and insurance
- Repairs to building / Plant & Machinery
- Depreciation
- Provisions of expenses
- Payment to Auditors
- Profit / loss on sale of assets / investments
- Dividend proposed
Classification of Profit

Profit

Profit prior to Incorporation
Capital Profit
No dividend can be paid out of this profit

Profit after Incorporation
Revenue Profit
Dividend can be paid out of this profit

1.2.5.3 Cash Flow Statement (CFS)

Definition & Meaning
CFS deals with cash collection and cash disbursement. That is CFS records the amount of cash and cash equivalent entering and leaving a company.
CFS helps investors to get an idea about how a company's operations are running, where from its money is coming and how it is being spent.
Cash flow is determined by taking into account three components by which cash enters and leaves a company:
- Operating activities
- Investing activities
- Financing activities
Opening and closing cash & bank balances are also shown in this statement.
Cash flow statement is prepared in compliance with the Accounting Standard on Cash Flow Statement (AS-3) as per The Companies (Accounting Standards) Rules, 2006.

Usefulness
Cash from operating activities is compared to the company's net income. If the former is greater than the net income on consistent basis, the company's net income or earning are said to be of higher category.
In reverse situation, a red flag is raised as to why the reported net income is not converting to cash.
If a company consistently generates more cash than it is using in a year, the company will be able to reduce debt burden, acquire another company etc. All these add to shareholder's value.
Useful for short term planning.
Helps management in formulating policies regarding internal financial management - repayment of long term debt, dividend policies, capital expenditure planning etc.
Discloses success or failure of cash planning.

Basically, more cash available for business operation, the better. However, this is not a hard and fast rule. Sometimes a negative cash flow results from a company’s growth strategy in the form of expanding operations.
1.2.5.4 Capital

What it is

Initial and subsequent investment made by the owners (shareholders / promoters etc.) in the business for income generation and business activities are known as “Capital”. Capital is the life blood of any business. From Company Law’s point of view, paid-up share capital of the company is “capital”.

Capital can be defined as money value of net assets employed in a business.

Classification

1. Supplied by the owner of the business.
   - Permanent nature of capital.

2. Amount procured from outside source and employed in business Ex. Debenture, Bank Loan, Loan from FIS.
   - May be of long and short term.

3. That part of capital invested in the assets and yields benefit for long period. Ex. Investment in Plant / Machinery, Land Building etc.
   - Equity share Capital and Preference Share Capital are two forms of Capital.

4. That part of Capital required for day to day operation of the business.
   - Changes its forms (stock converts to debtors, debtors to cash etc.).
   - Invested in business as current assets like debtors, stock, cash etc.

5. Retained profit – another form of owned capital.
**Sources of Capital**
Capital for corporate bodies is raised from various sources.

**Sweat Equity Shares**
- Issued to employees/directors of the company in lieu of their services at a discount or for consideration other than cash.
- It is a new form of compensation to employees.
- SEBI has issued guidelines for Sweat Equity Shares.
- Amount of share capital increases due to issue of Sweat Equity Shares.

**Employee Stock Option Plan (ESOP)**
- It is a plan by which a company offers stock options to its employees for achieved performance.
• It is an option given to employees to buy shares of their own company on a predetermined date and at a predetermined price.
• Employee gains due to price difference on investment - return criteria.
• SEBI has issued guidelines for ESOP.
• Amount of share capital increases for ESOP scheme exercise.

**Provisions**
- A provision is an amount set aside for the probable but uncertain economic obligation of a business organisation and charged against P & L A/C.
- A provision is always made for a specific purpose.
- It is not for the distribution to the shareholders.
- The purpose of provision is to make current year’s profit / loss more accurate and to cover a future liability.
- Under GAAP, a provision means expense.

Examples:
- Provisions for doubtful debt
- Provision for taxation
- Provision for proposed dividend

Provision reduces the Company’s equity.

**1.2.6 Ratio Analysis**

**1.2.6.1 Meaning**
- A ratio is a mathematical derivative that provides a measure of relationship between two financial figures.
- It is the most widely used technique for interpreting and comparing financial reports.
- Accounting ratios based on past performance is helpful in predicting the future performances.
- Both internal and external groups use the ratios.

**1.2.6.2 Classification**
Classification is based on the statement from which ratios are calculated. Thus there are:

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<th>Balance Sheet Ratios</th>
<th>P / L Ratios</th>
<th>Combined Ratios</th>
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<tr>
<td>2. Liquid Ratio</td>
<td>2. Operating Ratio</td>
<td>2. Fixed Asset Turnover Ratio</td>
</tr>
</tbody>
</table>

- **Ratios can further be classified as:**
  - Liquidity Ratio
  - Solvency Ratio
  - Activity Ratio
  - Profitability Ratio
Measurement

Liquidity Ratio - Current Ratio Liquid Ratio
- Measures the ability of a firm to meet its short term obligations.

Current Ratio = Current Assets \(\text{Liquid Ratio} = \frac{\text{Quick Assets}}{\text{Current Liabilities}}\)
Current Liabilities
(Quick assets = Cash + Bank + Debtors + Receivables)

Solvency Ratio - Debt-equity Ratio, Proprietary Ratio, Interest Coverage Ratio

Indicates the Company’s ability to pay its liabilities as they become due

Debt - Equity Ratio \(= \frac{\text{Long term Debt}}{\text{Shareholders’ Fund}}\)

Proprietary Ratio \(= \frac{\text{Shareholders’ Fund}}{\text{Total Assets}}\)

Interest Coverage Ratio \(= \frac{\text{Earning before Interest & Tax (EBIT)}}{\text{Interest}}\)

Debt - Service Coverage Ratio \(= \frac{\text{PAT} + \text{Interest} + \text{Depreciation}}{\text{Debt repayment + Interest}}\)

Activity Ratio
- Stock Turnover
- Debtors Turnover
- Total Assets Turnover

Ratio
Ratio
Ratio

Stock Turnover Ratio \(= \frac{\text{Cost of Goods Sold}}{\text{Average stock}}\) [Indicates how quickly the inventory is sold]

Debtors Turnover Ratio \(= \frac{\text{Credit Sales}}{\text{Average Debtors}}\) [Indicates the no. of times per year the average balance of debtors are collected]

Total Assets Turnover Ratio \(= \frac{\text{Net Sales}}{\text{Total Assets}}\) [A low ratio indicates that assets are not being efficiently employed]

Profitability Ratio - Gross Profit Ratio Net Profit Ratio Operating Ratio

- Measures the returns achieved by the company through normal business activities and management’s overall efficiency.

Gross Profit Ratio \(= \frac{\text{Gross Profit} \times 100}{\text{Net Sales}}\) [The more GP earned, better]
Operating Ratio = \frac{\text{Cost of goods sold + operating expenses}}{\text{Net Sales}} \times 100 \quad \text{[Lower the ratio, greater the ability to carry a large burden of fixed overhead]}

Return on Capital Employed = \frac{\text{EBIT}}{\text{Capital Employed}} \quad \text{[Measures how well the firm is using all of its assets]}

**Illustration – Ratio Analysis**

The Balance Sheet of ABC Ltd. as on 31.12.2012 was as below:

<table>
<thead>
<tr>
<th>Liabilities</th>
<th>Amount (₹)</th>
<th>Assets</th>
<th>Amount (₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity Share Capital</td>
<td>20,000</td>
<td>Goodwill</td>
<td>12,000</td>
</tr>
<tr>
<td>Capital Reserve</td>
<td>4,000</td>
<td>Plant &amp; Machinery</td>
<td>28,000</td>
</tr>
<tr>
<td>Loan (Term) – 8%</td>
<td>16,000</td>
<td>Stock</td>
<td>6,000</td>
</tr>
<tr>
<td>Trade Payables</td>
<td>8,000</td>
<td>Debtors</td>
<td>6,000</td>
</tr>
<tr>
<td>Bank Overdraft</td>
<td>2,000</td>
<td>Investment</td>
<td>2,000</td>
</tr>
<tr>
<td>Taxation</td>
<td>4,000</td>
<td>Cash &amp; Bank</td>
<td>6,000</td>
</tr>
<tr>
<td>P &amp; L A/C : 12,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less : Transfer to Reserve</td>
<td>4,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less : Dividend</td>
<td>2,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6,000</td>
<td></td>
<td>60,000</td>
</tr>
</tbody>
</table>

Calculate ratio for testing liquidity, solvency and profitability.

**Sol.**

**Liquidity Ratios**

Current Ratio = \frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{\text{Stock + Debtors + Investment + Cash & Bank}}{\text{Trade Payable + Taxation}}

= \frac{20,000}{12,000} = 5:3 \text{ (good)}

Quick Ratio = \frac{\text{Quick Assets}}{\text{Current Liabilities}} = \frac{\text{Debtors + Investment + Cash & Bank}}{\text{Current Liabilities}}

= \frac{14,000}{12,000} = 7:6 \text{ (sound)}

**Solvency Ratios**

Solvency Ratio = \frac{\text{Total Assets}}{\text{Total outside liabilities}} = \frac{60,000}{28,000} = 15:7 = 2.1:1 \text{ (Solvency certain)}

**Profitability Ratios**

Return on Total Assets = \frac{\text{EBIT}}{\text{Total Assets}} \times 100 = \frac{11,280}{60,000} \times 100 = 18.8\%

Return on Capital Employed = \frac{\text{EBIT}}{\text{Shareholders’ Fund + Fixed Liabilities}} = \frac{11,280}{48,000} = 23.5\%
1.3 COST OF CAPITAL

1.3.1 Meaning
- The corporate obtains funds through various sources. These sources constitute components of funds.
- Each of these components of funds involves cost to the company.
- The cost of each component of funds is termed as specific cost of capital.
- “Cost of Capital” (COC) represents the rates of return, which the company must pay to the supplier of capital.
- COC is determined by the market and represents the degree of perceived risk by investors.
- Therefore, for a corporate “COC” means cost of obtaining funds.

1.3.2 Computation
Involves two steps –
- First, compute the specific cost of various sources;
- Next, compute the weighted average cost of capital by considering all specific costs, i.e. total/weighted cost of capital.

1.3.3 Specific costs

**Debt Capital**: 
\[ K_d = \frac{I}{ND} (1-t) \]
- \( I \) = Annual interest payment
- \( ND \) = Net cash proceeds from issue of debt
- \( t \) = Corporate tax rate
- \( K_d = \text{Cost of debt} \)

**Preference Share Capital**: 
\[ K_p = \frac{D}{NP} \]
- \( D \) = Rate of Preference dividend
- \( NP \) = Net cash proceeds from issue
- \( K_p = \text{Cost of Preference Share Capital} \)

Preference dividend is paid after the payment of tax by the company. Therefore, no adjustment is required for taxes while calculating cost of preference share capital.

**Equity Capital**: 
- For new equity shares:
  \[ K_e = \frac{DPS}{NP} \]
- For existing equity shares:
  \[ K_e = \frac{DPS}{MP} \]
- \( DPS \) = Expected dividend per share
- \( NP \) = Net proceeds per share
- \( MP \) = Market price per share
- \( K_e = \text{Cost of equity capital (Dividend Yield method)} \)

\[ K_e = \frac{EPS}{NP} \]
- \( EPS \) = Earning per share
- \( NP \) = Net proceeds per share
- \( MP \) = Market price per share
- \( K_e = \text{Cost of equity Capital (Earning Yield method)} \)

**Total / overall cost of capital**
The overall cost of capital takes into account the relative weights (proportions) of different sources in the capital structure of the company.
Illustration
X Ltd. issues ₹20,00,000/- 11% debentures of ₹100/- each. The Company pays 35% tax. What is the cost of debentures?

\[ K_d = \frac{I(1 - t)}{ND} \]
\[ = \frac{2,20,000 (1 - 0.35)}{20,00,000} = 7.15\% \]

X Ltd. issues ₹1,000/- 8% Pref. share capital of ₹100/- each at a discount of 5%. Determine the cost of preference shares.

\[ K_P = \frac{D}{NP} \]
\[ = \frac{8,000}{95,000} = 8.42\% \]

X Ltd. issues 9,000 equity shares of ₹100/- each at a premium of 10%. The equity shareholders expectation of dividend is 20%. Calculate the cost of new equity share.

\[ K_e = \frac{DPS}{NP} \]
\[ = \frac{20}{110} = 18.18\% \]

Find out the overall / total cost of capital of X Ltd.

<table>
<thead>
<tr>
<th>Sources of Funds</th>
<th>Amt (₹)</th>
<th>Weights</th>
<th>After Tax cost</th>
<th>Wt. cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debentures</td>
<td>20,00,000/-</td>
<td>0.67</td>
<td>7.15</td>
<td>4.79</td>
</tr>
<tr>
<td>Pref. Shares</td>
<td>1,00,000/-</td>
<td>0.03</td>
<td>8.42</td>
<td>0.25</td>
</tr>
<tr>
<td>Equity Capital</td>
<td>9,00,000/-</td>
<td>0.30</td>
<td>18.18</td>
<td>5.71</td>
</tr>
<tr>
<td><strong>---------------</strong></td>
<td><strong>30,00,000/-</strong></td>
<td><strong>1.00</strong></td>
<td><strong>---------</strong></td>
<td><strong>---------</strong></td>
</tr>
</tbody>
</table>

Wt. cost of capital → 10.75%

1.3.4 Leverage

Meaning
- Leverage is the technique which projects the risk - return relationship of different variables of capital structure,
- Primary aim of coverage testing is maximize the earning of shareholders and reduce the risk of company.
- Leverage is a sensitive tool in the hands of finance managers.

Types
Two types of leverage - 1) Operating Leverage & 2) Financial Leverage

1.3.5 Operating Leverage
- Refers to the use of fixed costs in operations.
- A firm with high operating leverage will have relatively high fixed operating cost in comparison with a firm with low operating leverage.
Degree of operating leverage (DOL) = \( \frac{\% \text{ change in EBIT}}{\% \text{ change in sales}} \)

DOL is the measure of the firm’s business risk which refers to the uncertainty of the firm’s EBIT.

1.3.6 Financial Leverage

✓ Refers to the extent to which the firm has fixed financial cost, arising from the use of debt capital.
✓ A firm with high financial leverage will have relatively high fixed financing cost.
✓ FL studies the sensitivity of EPS to EBIT.

Degree of Financial Leverage (DFL) = \( \frac{\% \text{ change in EPS or EBIT}}{\% \text{ change in EBIT or EBT}} \)

FL measures the financial risk of a company.

• Illustration

1. Determine the operating leverage for the two companies from the data given below and also comment on their operating risk.

<table>
<thead>
<tr>
<th></th>
<th>X Co. Ltd. (₹ lac)</th>
<th>Y Co. Ltd. (₹ lac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Fixed Cost</td>
<td>9</td>
<td>20</td>
</tr>
</tbody>
</table>

The variable costs are 40% of sales for X Co. Ltd and 20% for Y Co. Ltd.

Sol.

<table>
<thead>
<tr>
<th></th>
<th>X Co. Ltd. (₹ lac)</th>
<th>Y Co. Ltd. (₹ lac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Less Variable cost</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Contribution</td>
<td>18</td>
<td>32</td>
</tr>
<tr>
<td>Less Fixed cost</td>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td>Operating Profit (EBIT)</td>
<td>9</td>
<td>12</td>
</tr>
</tbody>
</table>

Degree of operating leverage (DOL) = \( \frac{\text{Contribution}}{\text{EBIT}} \)

X Co. Ltd: \( \frac{18}{9} = 2.0 \)

Y Co. Ltd: \( \frac{32}{12} = 2.7 \)

The operating or business risk of Y Co. Ltd. is greater as its DOL is higher than DOL of X Co. Ltd.

1.3.7 TRADING ON EQUITY

Trading on equity indicates the utilisation of non-equity source of funds in the capital structure of an enterprise. Trading on equity explains the impact on return on equity. The main objective of trading on equity is to provide a high rate of return to the equity shareholders. In other words, it means borrowing funds to increase capital investment with the hope that the business will generate returns in excess of interest charges of the borrowed fund.
"The financial highlights offered at the beginning of the report tend to focus on what they want you to see---but that's just an appetizer, .... The second course---the big plate of meat and potatoes---is the financial statement"

--- Richard Loth

1.4 WORKING CAPITAL MANAGEMENT

"He understands me," we say with elation when someone perceptively listens to us: "Oh, forget it," we say in frustration when others don't listen or understand. How are you as a listener? What are your beliefs about listening? Indicate whether you agree or disagree with the following:

- Meaning & Definition

  ✓ The primary objective of working capital management (WCM) is to manage the firm’s current assets and current liabilities in such a way that a satisfactory level of WC is maintained. WCM is the functional area of finance.

  “Working Capital is the amount of funds necessary to cover the cost of operating the enterprise” – Shubin

  ✓ WC is defined as the excess of Current Assets over Current Liabilities & Provisions.

    \[ WC = CA - CL. \]

- Components

  Two components of WC are: Current Assets & Current Liabilities
### Current Assets
- Raw materials stock
- Work-in-Progress
- Other inventories
- Finished goods stock
- Debtors (Trade Receivables)
- Cash / Bank balances
- Short term loans & advances
- Prepaid Expenses
- Deposits
- Claims receivables etc.

### Current Liabilities
- Creditors (Trade Payables)
- Short-term loans & advances
- Outstanding Expenses
- Provision for Taxation
- Unclaimed Dividend / Public Deposit
- Other Current obligations
- Retention money from contractors etc.

#### Classification
- **Gross Working Capital (GWC)** - Refers to the Capital invested in total current assets of a firm.
  \[ \text{GWC} = \text{Total Current Assets} \]
- A firm should maintain optimum level of GWC in order to avoid interruption of production activity.
- **Net Working Capital (NWC)** – Refers the excess of total current assets over total current liabilities.
  \[ \text{NWC} = \text{Total current Assets} - \text{Total Current Liabilities} \]

#### Significance
- Both GWC and NWC are important from firm’s operation point of view. There is no specific rule to determine the exact amount of gross or net working capital.
- Both inadequate or excess WC is dangerous from entity’s health point of view.

- Maintaining adequate WC is important for -
  - Regular supply of raw materials
  - Regular payment of wages / overhead expenses
  - Uninterrupted flow of Production
  - Solvency of the firm
  - Maintaining good Credit Standing
  - Facing sudden market crisis
  - Increasing profitability

### 1.4.1 Working Capital Cycle

Working Capital Cycle (WCC) is very significant in order to determine the WC requirement of a business concern. WCC is defined as the period that a business firm takes in converting cash back to cash. Simply, it refers the time duration that starts from procurement of raw materials through cash payments / credit term and ending with the realization of cash through sales.

![Working Capital Cycle Diagram](image-url)
1.4.2 Working Capital Requirements

- Influenced by a number of factors – both internal and external, such as:-
  - Nature and size of business
  - Sales volume
  - Production cycle
  - Operating efficiency
  - Credit Policy
  - Credit accessibility
  - Price level changes
  - Degree of competition

- **Sources**
  - May be internal or external
  - Internal sources –
    - Retained earnings
    - Provision for depreciation
    - Outstanding expenses
  - External sources –
    - Issue of share/debenture
    - Loans from FIs/Banks
    - Public Deposits
    - Advance from customer
    - Commercial papers
    - Trade creditor

1.4.3 Management of WC

- The main object of WC management is to manage the current assets and liabilities in such a way that optimum level of WC is maintained.

  - Significances of WC management are to ensure -
    - Higher profitability
    - Proper liquidity
    - Sound health of the organization
  - Management of current assets involve -
    - Management of Inventory (i.e. optimum level of inventory of raw materials/finished goods)
    - Management of Receivables (i.e. allowance of credit to customer and collection of debt)
    - Management of cash (i.e. avoiding holding of excessive liquid cash or excessive investment in short term fund)
  - Management of current liabilities involve -
    - Management of Creditors (i.e. bargaining with credit period without unfavorable terms)
### Illustration

**XYZ Ltd**

**Balance sheet as at 31.03.2012**

<table>
<thead>
<tr>
<th>Liabilities</th>
<th>₹</th>
<th>Assets</th>
<th>₹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity Share Capital</td>
<td>4,00,000</td>
<td>Fixed Assets</td>
<td>6,60,000</td>
</tr>
<tr>
<td>10% Debentures</td>
<td>2,20,000</td>
<td>Stocks/Inventory</td>
<td>1,60,000</td>
</tr>
<tr>
<td>Reserves &amp; Surplus</td>
<td>1,00,000</td>
<td>S/Debtors (Trade Receivables)</td>
<td>1,00,000</td>
</tr>
<tr>
<td>S/Creditors (Trade Payables)</td>
<td>3,00,000</td>
<td>Bills Receivable</td>
<td>80,000</td>
</tr>
<tr>
<td>Outstanding Expenses</td>
<td>40,000</td>
<td>Cash/Bank balances</td>
<td>1,60,000</td>
</tr>
<tr>
<td>Proposed Dividend</td>
<td>60,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provision for Taxation</td>
<td>40,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>11,60,000</strong></td>
<td></td>
<td><strong>11,60,000</strong></td>
</tr>
</tbody>
</table>

Calculate Gross and Net working capital:

**Sol.**

- **Total Current Assets**
  - Stocks/Inventory: 1,60,000
  - S/Debtors (Trade Receivables): 1,00,000
  - Bills Receivable: 80,000
  - Cash/Bank balances: 1,60,000
  - **Total Current Assets:** 5,00,000

- **Total Current Liabilities**
  - S/Creditors (Trade Payables): 3,00,000
  - Outstanding Expenses: 40,000
  - Proposed Dividend: 60,000
  - Provision for Taxation: 40,000
  - **Total Current Liabilities:** 4,40,000

- **Gross Working Capital (GWC):** 5,00,000 - 4,40,000 = 60,000 (Positive)

### 1.5 COST, COST STATEMENT, CONTRIBUTION, COST-VOLUME-PROFIT RELATIONSHIP

#### 1.5.1 Cost

- In business and accounting, ‘cost’ is the monetary value that a company has spent in order to produce something. It does not include mark-up for profit. In accounting, the term ‘cost’ refers to the monetary value of expenditure for raw materials, equipments, labour, services, rent, taxes, electricity etc.
- The companies usually follow cost plus model to determine the sale price of a product. Price = Cost + X % (X is the percentage to cover overhead or profit margin).

#### 1.5.1.1 Elements of cost

- Direct Material
• Direct labour
• Direct expenses
• Overhead expenses

1.5.1.2 Classification of Cost

• Classification by division:
  ✓ Prime cost = Direct Material + Direct Labour + Direct Expenses
  ✓ Works Cost = Prime cost + Factory overhead
  ✓ Cost of production = Works cost + Administrative overhead
  ✓ Cost of sales = Cost of production + Distribution & Selling overhead
  ✓ Sale price = Cost of sales + Profit Margin

• Classification by relationship:
  ✓ Fixed cost (Does not directly vary with production volume)
  ✓ Variable cost (vary directly in proportion with production volume)
  ✓ Semi variable cost (fixed upto a certain level of production, then increases with the increase in volume of production).

1.5.1.3 Cost Accounting (CA)

• A technique and process for ascertaining cost.
• Aims to capture company’s cost of production by assessing the input cost as well as fixed cost.
• Serves three crucial functions of management
  ✓ As an aid to financial accounts
  ✓ As an aid to planning
  ✓ As a means of co-ordination and control
    ✓ Does not replace financial accounting; merely an extension into accounting fields.

1.5.1.4 Difference with Financial Accounting (FA)

• CA is used within the company as an aid in decision making, FA is analysed by outside investors, lenders, bankers etc.
• CA is beneficial as a tool for management in budgeting and cost control programme, FA is a different representation of cost and tools for managerial performance analysis.

1.5.2 COST STATEMENT

• A general format:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Amount</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening Stock of Raw Material</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>Add: Purchase of Raw materials</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>Add: Purchase Expenses</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>Less: Closing stock of Raw Materials</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>Raw Materials Consumed</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>Direct Wages (Labour)</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>Direct Charges</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prime cost</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>Add : Factory Over Heads:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factory Rent</td>
<td></td>
<td>***</td>
</tr>
</tbody>
</table>
### Cost Statements

<table>
<thead>
<tr>
<th>Add: Factory Over Heads:</th>
<th>***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory Rent</td>
<td>***</td>
</tr>
<tr>
<td>Electricity</td>
<td>***</td>
</tr>
<tr>
<td>Indirect Material</td>
<td>***</td>
</tr>
<tr>
<td>Indirect Wages</td>
<td>***</td>
</tr>
<tr>
<td>Supervisor’s Salary</td>
<td>***</td>
</tr>
<tr>
<td>Factory Insurance</td>
<td>***</td>
</tr>
<tr>
<td>Depreciation (Factory Asset)</td>
<td>***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Works cost incurred</th>
<th>***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add: Opening Stock of WIP</td>
<td>***</td>
</tr>
<tr>
<td>Less: Closing Stock of WIP</td>
<td>***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Works cost</th>
<th>***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add: Administration Over Heads:</td>
<td>***</td>
</tr>
<tr>
<td>Office Rent</td>
<td>***</td>
</tr>
<tr>
<td>Depreciation (Office asset like Furniture fixture)</td>
<td>***</td>
</tr>
<tr>
<td>General Charges</td>
<td>***</td>
</tr>
<tr>
<td>Audit Fees</td>
<td>***</td>
</tr>
<tr>
<td>Bank Charges</td>
<td>***</td>
</tr>
<tr>
<td>Back Office Salary</td>
<td>***</td>
</tr>
<tr>
<td>Other Office Expenses</td>
<td>***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost of Production</th>
<th>***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add: Opening stock of Finished Goods</td>
<td>***</td>
</tr>
<tr>
<td>Less: Closing stock of Finished Goods</td>
<td>***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost of Goods Sold</th>
<th>***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add: Selling and Distribution OH:</td>
<td>***</td>
</tr>
<tr>
<td>Sales man Commission</td>
<td>***</td>
</tr>
<tr>
<td>Sales man salary</td>
<td>***</td>
</tr>
<tr>
<td>Traveling Expenses</td>
<td>***</td>
</tr>
<tr>
<td>Advertisement</td>
<td>***</td>
</tr>
<tr>
<td>Delivery expenses</td>
<td>***</td>
</tr>
<tr>
<td>Sales Tax</td>
<td>***</td>
</tr>
<tr>
<td>Bad Debts</td>
<td>***</td>
</tr>
</tbody>
</table>

| Cost of Sales | *** |

| Profit (balancing figure) | *** |

| Sales | *** |

- Cost Statements for electricity companies have been prescribed in Cost Accounting Records (Electricity Industry) Rules, 2011.

#### 1.5.2.1 Marginal Cost

- Based on an economic concept.
- It is the addition / reduction to the total cost when one more / less unit is produced.
- Computed in situations where the break even point has been reached.
- Industries requiring heavy capital like power, marginal cost is comparatively very low.
- Concept of marginal cost is important for resource allocation.
1.5.3 Contribution
- It is the difference between sales revenue and variable cost.
- It can be expressed in two ways:
  - Sales Revenue – Variable Cost
  - Fixed Cost + Profit
- An important term used with break-even point or break-even analysis is contribution margin. In equation format it is defined as follows:

\[
\text{Contribution Margin} = \text{Revenues} - \text{Variable Expenses}
\]

The contribution margin for one unit of product or one unit of service is defined as:

\[
\text{Contribution Margin per Unit} = \text{Revenues per Unit} - \text{Variable Expenses per Unit}
\]

1.5.4 Cost-Volume – Profit Relationship
- The profit earned by an enterprise is distinctly related to the volume of production and sales.
- For the purpose of cost-volume-profit relationship analysis all costs are analysed into fixed and variable cost.
- Break-even analysis is a technique which presents the relationship between cost, volume and profit. Break-even point signifies the volume of output and sale at which Total sales = Total Cost.

\[
\text{Break – even volume} = \frac{\text{Total fixed cost}}{\text{Unit Selling price} - \text{Unit Variable cost}}
\]

That is,

\[
\text{Break – even volume} = \frac{\text{Total Fixed Cost}}{\text{Contribution per unit}}
\]

- Profit-volume ratio (P/V ratio) is another method of studying Cost – Volume-Profit relationship. P/V ratio measures the rate of change of profit due to change in volume of sales.

\[
\text{P/V Ratio} = \frac{\text{Fixed costs} + \text{Profit}}{\text{Sales}}
\]

A high P/V ratio indicates that a slight increase in sales without increase in fixed cost will result in higher profits.

1.5.4.1 Cost Control & Cost Reduction
- Cost control primarily refers to monitoring and controlling those areas where “inputs” are applied and their utilization in the production process. Control of costs consists in measuring performance and comparing it with the standards. A major requirement of cost control is analysis and investigation of variances and taking necessary corrective steps.

- Cost reduction is a concurrent function of self evaluation and assessment of existing standards of operation and performance. Cost reduction begins where cost control ends. In spite of high level of cost control, there is always a room for reduction in operation cost and improvement in cost standard. A firm's net income is increased when reduction in operating cost in materials, labour and overhead occurs.
1.5.4.2 Cost centre

- The cost control and cost reduction mechanism demands that performance / efficiency of individual or functional department should be assessed continuously. It is, therefore, necessary to define and delimit the control functions, the area of control and responsibility. The concept of 'cost centre' takes shape from the above philosophy.
- Defined as “a location, person or item of equipment connected with an undertaking, in relation to which costs may be ascertained and used for the purpose of cost control.”
- Cost Centre must be a distinct, well defined unit for which various nature of costs are incurred.
- In a power distribution company, transmission and distribution functions can be two separate cost centres. Again, for distribution function, distribution of power at 33 Kv voltage, at 11 kv voltage or at 6 kv voltage may be separate cost centres.

1.5.5 Revenue Expenditure Budget And Budgetary Control

1.5.5.1 Meaning

- Budget is a financial plan of events during a specific future period.
- Budget is influenced by management policies and prevailing market and operating conditions.
- In case of commercial activities, budget is a monetary statement of targets intended to be achieved.
- Budget can be viewed as a medium of planning, co-ordination, communication and control.

1.5.5.2 Kinds of Budget

- Budget can be divided into three groups :
  - Functional Budget
  - Accountability Budget
  - Operating Budget

1.5.5.3 Functional Budget

- Sales Budget
- Purchase Budget
- Inventory Procurement Budget
- R & D Budget
• Capacity Expansion Budget

1.5.5.4 Accountability Budget
• Departmental Budget
• Cost Centre Budget

1.5.5.5 Operating Budget
• Fixed Budget (For predetermined level of activity)
• Flexible Budget (For different volumes of activity / operation)

1.5.5.6 Ultimate advantage
• The budget makes the people concerned at all levels alert and responsible. Fixing responsibility is easier as performance is mapped and actuals are assessed against the budgetary target.

1.5.5.7 Budgetary Control
• Implies continuous comparisons of actuals with the budgeted figures.
• Ensures that when plans are not achieved, corrective actions are taken.
• Provides basis for the comparison of actual vis-a-vis predetermined targets and investigates the deviation.
• Focuses on the best uses of all available resources towards profit maximization and wealth creation.
• Frames a basis for revision of current and future policies.

1.5.6 Capital Budgeting & Capital Rationing

1.5.6.1 What is Capital Budgeting
• A decision making process by which firms evaluate and rank the potential purchase of major fixed assets, building, plant & machinery etc. which are not meant for sell.
• A process in which a business determines whether projects like construction of a new plant or investing in a venture of a separate operation are worth considering.
• A project adds value to the company if it earns a rate of return that exceeds the cost of capital. However, capital budgeting is very challenging in practice. Determining company’s appropriate cost of capital and forecast of incremental cash flow that results from taking of the project are a difficult proposition.
• Capital budget also signifies the estimated amount planned to be expended for capital items in a fiscal period.

“There is capital budgeting involves the planning of expenditure for assets the returns from which will be realized in future time period” – Milton H Spencer

1.5.6.2 Significance
• Necessary because capital for investment in long-term facilities is scarce.
• Maximises the wealth for shareholders.
• Has implications in social sector.
• May result in substantial financial loss in future due to non-judicious decisions.

1.5.6.3 Techniques of evaluation
There are various methods to evaluate the profitability of capital investment proposals. The major methods are:
• Average rate of return (ARR) method
ARR = \frac{\text{Av. PAT}}{\text{Av. Investment}} \times 100

ARR is compared with a predetermined rate of return. An investment project is accepted if the actual ARR is higher than the desired rate of return.

- **Payback Period (PB) method**
  \[ \text{PB} = \frac{\text{Initial Investment}}{\text{Annual Cash Flow}} \]

PB indicates the number of years a firm expects to recover its original investment. Usually, firms use the payback period method as an accept or reject criteria.

- **Net Present Value (NPV) method**
  \[ \text{NPV} = \text{Pv of cash inflows after tax} - \text{Pv of all cash outflows} \]

NPV takes into account the time value of money while appraising investment proposals. If NPV > 0, the project should be accepted and rejected if NPV < 0.

- **Internal Rate of Return (IRR) method**
  \[ \text{IRR} = \frac{\text{Pv of all cash inflows after tax}}{\text{Pv of all cash outflows}} \]

IRR of an investment project is that rate which equates the present value of all future cash inflows from the project to the initial cost of the project.

**1.5.6.4 Cost-overrun of Capital expenditure**

When actual cost is more than the value of works completed up to a certain time period, there is said to be a cost overrun.

\[ \text{Cost overrun} = \frac{\text{Actual cost} - \text{value of works completed}}{\text{Value of works completed}} \times 100 \]

\[ \text{Value of works completed} = (\text{Budgeted cost}) \times \% \text{ of works completed} \]

**1.5.6.5 Capital Rationing**

- Capital Rationing (CR) means distribution of available capital amongst several accepted investment proposals.
- It arises in a situation where a business entity is not in a position to invest and allot capital fund in all profitable projects due to limited financial resources.
- Under such situation, a firm has to reject some viable projects and to select an optimum combination of projects that will yield maximum return to the shareholders.
1.5.6.6 Capital Work-in-Progress (CWIP)
- Refers to that part of capital expenditure work awaiting completion but expenditure incurred during a financial year. CWIP is termed as "Assets under Construction" and shown separately in the balance Sheet.
- Depreciation is not charged on CWIP.
- On completion of construction for commercial use, CWIP is capitalized and transferred to Asset Class concerned.

1.5.6.7 Capital Commitment
- It is a possible liability and outflow of fund in future arising out of capital expenditure decision and jobs in progress. A company has to disclose its capital commitments amount in the financial account.

1.5.6.8 Interest during construction (IDC)
- When an asset is constructed, the companies usually borrow funds from market to finance the project. The interest so paid on such borrowed funds is capitalized during the assets construction phase.
- When the asset is constructed fully and put into use, any additional interest expenses incurred, if any, is not capitalized as part of the cost of asset. This interest is expensed on the income statement.

1.5.6.9 Bridge Finance
- Financial Institutions provide loan for a big project. Financial closure for a project is a time consuming exercise. For kicking off the project at a definite time, the company needs fund. To start the project, company takes some loan from banks until the loan from FIs are finally disbursed. This loan is termed as "Bridge Finance".

1.6 FINANCIAL CONTROL

1.6.1 Meaning
- Financial Control (FC) is a process by which quantitative and qualitative aspects of different investment planning is controlled in a business enterprise.
- FC control process involves the procurement and control of fixed and working capital of the firm through budgetary control, cost control, cash flow control etc.

1.6.1.1 Objectives
- Ensuring efficient and correct utilization of resources.
- Maintaining a balance between cash inflow and outflow.
- Identifying the scope of cost reduction for higher net income.
- Adopting budgetary management and control.
- Planning for efficient use of financial resources.
1.6.1.2 Steps

Step 1: Establishment of standards

Step 2: Measuring performance against standards

Step 3: Correcting the variances from standard

1.6.1.3 Tools
- Budgetary control system
- Standard costing techniques
- Ratio Analysis
- Cost-Volume-Profit analysis
- Internal Audit

1.6.1.4 Internal Audit - A tool of Financial Control
- In the present economic context of complexity, control measures must be sound, adequate and effective for business sustainability, success and growth.
- Internal Audit critically analyses the business situation and highlights major deficiencies in operation and financial control system and thus plays a vital role as a tool of effective managerial control.
- Major internal audit functions are:

1. Independent appraisal of accuracy, reliability, correctness of financial data.
2. Critically analyses the operational activities for efficiency and economy in operation.
3. Comprehensive and constructive appraisal of managerial functions.
2. Evaluates the adequacy of control systems and comments on its function.

2. Emphasises on the core of operation and minimization of wastage.

2. Measures the performance of business as a whole towards the goal achievement.

3. Ensures protection of company’s assets.

3. Reports on resource utilisation scenario.

3. Evaluates the effectiveness and efficacy of framed systems, procedures and methods in business process.

4. Verifies compliances of standards, accounting prudence and statutes.

4. Used to gather decisive information for specific business developments.

4. Focuses on results and cause and effect analysis.

1.6.2 Financial Risk in Business

- Financial risk refers to a situation when business's cash flow are not enough to pay creditors and fulfill other financial obligations. The level of financial risk thus relates less to the business operations and more to the amount of debt, business taken for carrying out the operation.
- High level of debt or other financial liability increases a business's level of financial risk.
- A Company's financial risk is linked with the company's leverage. For a company with high degree of leverage, the financial risk to stockholders is high if a company cannot cover its debt and faces bankruptcy and thus sufficient return to shareholders are uncertain.
- Financial risk can also relate to making investment in other companies within and outside the country.
- There are two types of financial risk broadly - 1) Risk of insolvency, and 2) Risk of variability in the earnings available to equity shareholders.
  - Example of financial risk
    - Interest rate risk on borrowing
    - Amount of credit availability risk
    - Sluggish sales and consequent cash flow risk
    - Market risk

- Financial risk can also be categorized as systematic risk and non-systematic risk. Systematic risk affects the whole economy and all business units within the economic spheres .e.g. losses due to recession. Non-systematic risks are those risks that affect a group of industry / companies. These non–systematic risks can be avoided completely through proper planning.
1.6.3 Accounting Fraud & Window Dressing

1.6.3.1 Accounting Fraud

- **What is it**
  - It is an intentional act of deception involving financial transactions for purpose of personal gain. One of the biggest accounting frauds in history occurred during the Enron scandal (2001), Global Trust Bank (2004) and Satyam Computers (2009).

- **Characteristics**
  - It is intentional
  - Involves falsification of records
  - Misrepresents truth
  - Causes harm to its victims

- **Forms**
  - Teeming and lading - also called lapping, it involves allocation of one customer's payment to another to make books balance or to detract shortfall.
  - Asset misappropriation (theft) and embezzlement - employee takes cash or property from business to cover their tracks.
  - Fraudulent disbursements - involves billing schemes, payroll frauds, cheque tampering etc.
  - Corruption - employee disobeys company policies / business regulations for personal gain.
  - Financial statement fraud - manipulating sales / accounts receivable / stock / cost of goods sold, understating liabilities and expenses, overstating assets, window dressing etc.
1.6.3.2 Window dressing

- **What is it**
  It is a set of actions or manipulations with financial or other information in financial documents (financial statements, reports etc.) to make this information look more attractive to its users. It is an assortment of alterations to make a financial statement so that it appears in a favourable light. It is also known as creative accounting or financial statement fraud.

- **Why is it done**
  - To borrow money.
  - To reduce tax payments.
  - To smoothen financial data.
  - To hide problems/poor management decisions.
  - To show good performance.
  - To shoot up market price of shares.
  - To show good return on investment.
  - To display steady profitability.

- **Forms**
  - Decrease profits by increasing expenses.
  - Record sales or purchases in an inappropriate period.
  - Increase cash account balance by increasing useful life of fixed assets.
  - Changing depreciation method - increases expected life of assets to increase profits.
  - Changing stock valuation method - increases closing stock value to elevate profits.
  - Income smoothing - shows consistent income by shifting income from high income period to low income period.
  - Ambiguity in capital and revenue expenditure - revenue expenditure treated as capital expenditure and vice versa to elevate profits.
  - Sale and lease back - fixed assets are sold to third party but later each year a sum is paid and asset is leased back. Company does not own the asset but still uses it.

1.6.4 Financial Controls, Ifrs And Erp As Enabler

1.6.4.1 Financial Controls

- Financial data analysis and interpretation are the first step of financial decision making process by any investors, analysts and regulators anywhere in the globe. A meaningful decision making exercise can be performed provided the presented financial data in a set of financial statements are reliable, relevant, comparable and exhibit a true and fair view of the state of affairs of the company. Internal financial control system is regarded as the foundation of ensuring data integrity and transparency in reporting a company's financial health.

- Internal financial controls review the practices, procedures and processes being applied to control the financial transactions and safeguarding company's assets.

- At present, CEO/CFO's certification to the Board in respect to submission of true financial statements, compliances of accounting standards and occurrence of any financial fraud is mandatory.

- At present, CEO/CFO's certification to the Board in respect to submission of true financial statements, compliances of accounting standards and occurrence of any financial fraud is mandatory.
1.6.4.2 IFRS (International Financial Reporting Standards)
- IFRS is a new uniform accounting language designed to bring maximum clarity to financial reporting on a global basis.
- It's a global standard in context of preparation of financial statements.
- It makes financial data analysis and interpretation easier to any investor of any part of the world.
- Usage of one standardized format makes it easier for companies to raise capital via international market, compete globally, entering in global contracts and provides comparable financial data.

1.6.4.3 Financial Controls, IFRS and ERP
- Forward looking organisation always look for higher standard of governance and compliances to control business and financial risks.
- In this background, implementation of Enterprise Resource Planning (ERP) acts as a shield against control lacuna and provides best business practices.
- ERP technology acts as a key enabler in embracing IFRS and establishing error-free financial reporting process through its control mechanisms.
- With ERP, companies can automatically take advantage of embedded application tools towards risk mitigation and control assurance.

1.6.4.4 Features & Purpose of ERP
- On-line real time processing system enabling
- Data validation before acceptance
- System based control on transactions
- Simultaneous updation of database.
- Manual controls and preparation of MIS are history now. ERP is a strategic business solution module, based on customized software aided system, that integrates all business functions and allows flow of information across all the departments of the company.
- The primary purpose of implementing ERP is to carry the business more efficiently in a very competitive business environment.
- It ensures high level of customer service, cost reduction, effective supply-chain management and e-commerce.
- Since ERP ensures total integration of operational data and financial data, it supports business growth and helps in creating business innovations.

1.7 TARIFF DETERMINATION FOR POWER DISTRIBUTION COMPANIES

1.7.1 Annual Revenue Requirement (ARR) for Distribution Business
- ARR is the revenue required by an utility, aggregating all operating expenses and return on equity at a predetermined rate.
- The major elements of ARR for a power distribution company are :-
  - Power Purchase Cost
    - O & M Expenses
    - Interest & Finance Charge
    - Interest on consumers' Security Deposits
    - Return on Equity (ROE), usually 16% post tax
    - Income-Tax
- Non-tariff income and income from other business are deducted from total of ARR as calculated by the utility.
1.7.1.1 Other General Conditions
- State Commissions are required to specify the terms and conditions for determination of tariff (u/s 61 of EA, 2003) based on:
  - Commercial principles, ensuring recovery of reasonable cost of electricity.
  - Rewards for efficiency achieved.
  - Safeguarding consumers' interest.
  - In case of granting subsidy to any group of consumers the Govt. concerned should pay in advance to the utility the amount of calculated subsidy. BPL category of subsidized consumer must be consuming electricity <30 units / month and subsidized tariff should be at least 50% of the average cost of supply.
- Equity norms for tariff determination - Debt : Equity Ratio of 70:30
- Operating norms are fixed on the basis of normative parameters as decided by the state commission.
- Benefits under CDM to be taken into account for tariff determination.

1.7.1.2 Accounting System
- The licensee should adopt a proper system of accounts and accounting procedure that would ensure detailed and accurate financial cost, and consumption data on their operations.

1.7.1.3 Efficiency in operation
- Retail tariff should reflect the relative efficiency of distribution companies in processing power at economic and competitive price, controlling theft / pilferage and reducing other distribution losses.

1.7.1.4 Energy Accounting & Auditing
- Present tariff determination system emphasizes on efficient energy accounting and auditing in order to reduce AT & C losses to a very reasonable level.

1.7.2 Corporate Governance And Financial Reporting
- According to Prof. Asish K. Bhattacharyya, transparent financial reporting is essential for sound corporate governance; it is difficult to separate corporate financial reporting from Corporate Governance.
- The importance of Corporate Governance and financial reporting was highly felt all over the world when corporate giants like Enron in UK and World Com in USA collapsed like a house of card in 2001 & 2002.
- A good corporate governance is a pillar of corporate set up projecting maximization of shareholder's value legally, ethically and on a sustainable basis.
- One of the main objectives of good corporate governance is to ensure that financial reporting process and form is of the highest quality.

"Corporate Governance is the procedures and processes according to which an organisation is directed and controlled" - European Central Bank

- Financial reporting is the bridge that links company with the outside parties. The integrity and quality of financial reporting are dependent on the performance and ethical conduct of people involved in managerial functions.
Financial reporting is the bridge that links company with the outside parties. The integrity and quality of financial reporting are dependent on the performance and ethical conduct of people involved in managerial functions.

Failure in governance itself leads to false financial reporting mostly.

Research revealed that there has been a direct relationship between weakness in governance and poor quality of financial reporting, manipulations in income statement, financial fraud and ineffective internal control framework.

1.7.2.1 Corporate Governance And India's Statutes
- The Companies Act, 1956 has made clear legal framework for regulation of all companies in the following areas towards ethical governance:
  - Interested directors not to participate in voting/discussion.
  - Appointment of directors with the approval of shareholders.
  - Mandatory formation of Audit Committee.
  - Contracts with parties having in house director's interest to be documented separately.
  - Central Govt's approval for loan to directors.
  - Power of the Central Govt. to prevent mismanagement of corporate affairs.
  - Listing Agreement under SEBI's direct supervision and various SEBI's Regulations have provided specific compliance requirements by the companies towards achieving high standard of corporate governance and financial reporting and protecting of shareholders' interest. The major requirements are:
    - Cl. 49 disclosure requirements relating to composition of board, code of conduct for board members, role of Audit Committee, CEO / CFO Certification of internal financial controls etc.
    - Disclosure of shareholding patterns.
    - Publication of Quarterly results.
    - Disclosure of price sensitive information.
    - Disclosure of pledged shares.
    - Disclosure of shareholding patterns.
    - Dealing of Qualified Audit Reports.
    - Certification of share reconciliations etc.
    - Substantial acquisition of shares and takeovers procedures.

1.7.3 Stock Market, Foreign Investment, Dividend Policy
1.7.3.1 Stock Market
A stock market is a place where shares of companies are bought and sold. Indian stock market is regulated by SEBI. Sensex and Nifty are two major stock market indexes. Bombay Stock Exchange and National Stock Exchange are two major players in stock market.

1.7.3.2 Foreign Investment
- Foreign Investments are classified into two categories - Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI).
- FDI are those investments through which investor can take part in management and operational function of a company. On the other hand, investment in shares without any control over management and operations are treated as FPI.
- For making portfolio investment in India, the investors have to be registered as a foreign institutional investor (FII) with SEBI.
- Govt. of India prescribes the FDI limit and different ceilings have been prescribed for different sectors.

### 1.7.3.3 Dividend Policy
- A policy through which a company decides how much it will pay to shareholders as dividend.
- A good dividend policy aims at providing a regular and sizeable amount of dividend to shareholders whilst allowing the company to maintain the financial stability and strength for future investment opportunities.
- A company earns profit. But all are not distributed to shareholders. Part of profit is ploughed back as retained earnings. The ratio of actual distribution of dividend and the net distributable profits is called 'Dividend Payout Ratio'.

\[
\text{Dividend Payout Ratio} = \frac{\text{Equity Dividend}}{\text{Earning for Equity Shareholders}}
\]

### 1.7.3.4 Earning per Share (EPS)
- EPS is the net income of a company divided by no. of shares.

\[
\text{EPS} = \frac{\text{Net Earnings}}{\text{No. of shares}}
\]

- Most significant variable in dictating a share's price in share market.
- Basic EPS only takes into account the no. of shares outstanding at any point of time. Diluted EPS, on the other hand, estimates how many shares could theoretically exist after exercising options pertaining to warrants, convertible bonds etc.

### 1.7.3.5 Price Earning Ratio (PE Ratio)
- Indicates the relationship between share price and the company's earnings.
- PE ratio gives an idea of what the market is willing to pay for the Company's earnings.
- \[\text{PE Ratio} = \frac{\text{Market Price of shares}}{\text{EPS}}\]

### 1.7.4 Subsidiary & Holding Company
- A subsidiary company is a company having more than 50% of its shares owned by another company. According to Sec. 4 of the Companies Act, 1956, if the composition of the Board of Directors of a Company is controlled by another company, then the former company is a subsidiary of the latter company.
- If a company has subsidiary company(ies), the company shall present in the Annual Report, the consolidated Financial Statement of holding Company and all subsidiaries, audited by its statutory auditors.
- The Consolidated FS must be prepared in strict compliance with applicable Accounting Standards.
The holding company shall disclose in the Consolidated Balance Sheet, the following information in aggregate for each subsidiary:

(a) Capital, (b) Reserves, (c) Total assets, (d) Total liabilities, (e) Details of investment, (f) Turnover, (g) PBT, (h) PAT, (i) Provision for taxation, (j) Proposed dividend.

In the case of subsidiary companies, the no. of shares held by the holding company must be separately disclosed.

1.7.5 Corporate Tax Liability

1.7.5.1 Taxable Income

The amount of income for a period, determined in accordance with the tax laws, based upon which income tax payable is determined.

1.7.5.2 Provision for Tax

In India, Companies pay income tax on previous year's income i.e. what the company earns in last year, it has to pay tax on next year. But under the law of Income Tax, all Company have to pay tax in advance. On the basis of this advance guess the company makes provisions for Income tax. Later on when IT Dept, calculates the real income tax after assessing actual profit of the previous year, the actual tax is adjusted with the provision of income tax.

When the assessment for a particular year becomes complete, the assessed amount of tax no longer remains a provision, it becomes a known liability. Thus, provision for taxation account carries such an amount of estimated tax which has not been assessed finally.

1.7.5.3 Tax Rate

Domestic companies tax rate is : 30%
- Surcharge : 5% (if total income > ₹ 1 crore)
- Ed. Cess : 2% on IT & Surcharge
- Sec. Ed. Cess : 1% on IT & surcharge

1.7.6 Tax Holiday for Power Generation & Distribution Company

- **Principle**
  
  Sec. 80-IA of the Income - Tax Act, 1961 provides a ten year tax holiday in respect of profits derived by an undertaking engaged in power generation, transmission and distribution or set up for reconstruction of power units or invested in substantial renovation of existing network.

- **Conditions for exemption for power distribution and transmission undertaking**
  
  - Must be a new undertaking set up in any part of India.
  - Starts transmission / distribution by laying a new network or by undertaking substantial renovation of existing network till 31.3.2013.
  - Deduction is allowed only in respect of profits derived from laying of such network or renovated network.
  - For substantial renovation, at least 50% increase in plant and machinery value required.
  - Deductions must be claimed through Return of Income, submitted within the due date.

- **Amount of deduction**
  
  - 100% profit derived from laying of such transmission / distribution network or renovated network.

1.7.6.1 Minimum Alternate Tax (Mat)

Many big companies become zero tax companies due to various concessions provided in tax laws. Therefore, to counter this, MAT was introduced.
As per Sec.115JB of the IT Act, 1961, if a company's taxable income is less than a certain percentage of the book profits, then that much of the book profit will be considered as taxable income and tax has to be paid on that.

The current rate of MAT is 18.5%.

1.7.6.2 Tax On Dividend Distribution (Ddt)
- Dividend declared by a company is subject to DDT to be paid by the Company.
- Tax on proposed dividend is appropriated from the current year's profit.
- The current rate of DDT - 16.22%.

1.7.6.3 Deduction And Collection Of Tax At Source
1.7.7 Tax Deducted at Source (TDS)
- TDS is done at the time of payment of the following nature by any mode by a company provided it exceeds a specified amount:
  - Salaries & wages
  - Interest on debentures, consumers' security deposits and public deposit etc.
  - Payment to contractors for carrying out any work
  - Brokerage to brokers
  - Rent to landlord / landlady
  - Professional / Technical fees to any person
  - Commission to Director
- Tax is deducted at a prescribed rate under different sections of the IT Act.
- Deducted tax must be deposited within the prescribed time.
- A certificate of Tax Deduction is to be given to the payee.
- For TDS at lower rate, the recipient of payment must submit a certificate from appropriate authority.
- If recipient does not furnish his PAN to the Company, tax is deducted at 20% rate.

1.7.7.1 Tax Collection at Source (TCS)
- A company acting as a seller of scrap must collect tax from the buyer of goods at source at a prescribed rate of 1%.
- If goods are utilized for manufacturing or processing for producing any article, no TCS is to be done.
- Tax collected at source is to be deposited to the credit of the Central Govt. within 7 days of next month.
- TCS Certificate is to be issued to the buyer by the company.

1.7.8 Exceptional & Extraordinary Items
1.7.8.1 Exceptional Items
- Items of major non-recurring nature with significant impact and accrue during normal course of business.
- Segregating exceptional items allows investors to differentiate normal business operation transactions from unusual ones.
- Its disclosure improves an understanding of the performance of the company.
- Example: Restructuring cost, Profit / Loss on disposal of one undertaking / unit.
1.7.8.2 Extraordinary Items

- Unusual and unexpected expenditure.
- Do not accrue during the normal course of business or ordinary activities.
- As per Accounting Standard 5, such items are rare.
- Specific disclosure of such events/transactions is made in the financial statement.
- Example: Employee fraud, loss due to natural disaster.

Financial Management Cycle

- Planning and budgeting
- Evaluation and reporting
- Resource allocation
- Operating monitoring safeguarding
Learning Objectives

After studying this unit, you should be able to understand:

- Regulatory framework
- Framework & critical parameters
- Options for tariff determination
- Power purchase issues

MODULE : A2
UNIT-2
DISTRIBUTION TARIFF
CALCULATION
Electricity is a 115 year old commodity in India. In certain parts of the world - Europe and USA, it goes back to 130 years. India was among the forerunners in recognizing the importance of electricity and its development. Public supply in USA and Europe started in early 1880s. In India, supply began in late 1890s in Kolkata.

Legal framework for electricity supply evolved over time in our country. Since electricity was an essential commodity affecting public life, it has all along been regulated. Indian Electricity Act, 1910 was the first comprehensive legislation. After independence, in view of the changed priorities, electricity took a major developmental role. Electricity (Supply) Act, 1948 was enacted to suit the emerging requirements. This Act conceived setting up of State Electricity Boards (SEBs) as also the Central Electricity Authority. 1910 Act and 1948 Act were operative together and had provisions for licensing and tariff regulation, although not in great detail. State Governments (and Central Government) used to control tariff according to their own imperatives.

With passage of time and unhappy financial conditions of many SEBs, it was felt that independent regulation was necessary in the power sector to attract funds from overseas and private sector. A major remodeling of regulatory framework was done in 1998 with the enactment of Electricity Regulatory Commissions Act, 1998. This Act conceived independent State Regulatory Commissions at Central and State levels. Central Regulatory Commission was given the jurisdiction for regulation of Inter-state activities while independent State Regulatory Commissions were mooted for Intra-state activities. The 1998 Act made Central Commission mandatory, but formation of State Commissions was left to individual State Governments.

At this point of time, all three Acts mentioned above were operating simultaneously.

In June 2003, a new Act came into force (The Electricity Act, 2003) repealing all the earlier Acts. Important features of this Act are as follows:

- **Generation segment was delicensed.** No license was now required for setting up a new generation facility. Only large hydro projects were required to obtain technical clearance.
- **Trading of electricity was recognized as a distinct licensed activity,** in addition to transmission and distribution.
- **It was mandatory for every state to either constitute an SERC or join another state in constituting a Joint Electricity Regulation Commission.**
- **The ambit of the Regulatory Commissions was expanded considerably.** Under the new dispensation, all the Regulatory Commissions were given functions of tariff-setting, licensing, and laying down and enforcing the performance standards for licensees, among other powers.
- **Transmission licensees were mandated to provide non-discriminatory open access to their transmission lines.**
- **Load dispatch was functionally segregated from wire business at national, regional and state levels.**
Consumers were to be given the right to choose their suppliers. Such power would flow through the incumbent distribution licensee's network through "open access". However, such consumers were required to pay a surcharge to compensate the licensee for loss of cross-subsidy, if any.

A national level Appellate Tribunal was created to hear the appeals against the orders of the Regulatory Commissions.

The regulators were mandated to rationalize tariff with reduction (and elimination) of cross-subsidies.

Simultaneously, market was allowed to be developed. There was a provision mandating the regulators to adopt the tariff if the same has been discovered through a competitive bidding process.

Tariff for direct sale to a consumer by persons other than the incumbent distribution licensee were to be mutually agreed and kept outside regulation.

There were penal provisions if licensees failed to meet the laid-down standards of performance.

Consumer protection was accorded special focus. In addition to statutory remedy under the Consumer Protection Act, consumers were given the option to represent before Grievance Redressal Forums.

Special Courts were to be set up for expeditious trial of offences related to theft of electricity.

Unbundling of SEBs was envisaged to segregate transmission from retail distribution. Time frame for unbundling was kept flexible.

Regulatory Commissions were mandated to promote renewable sources of energy.

To facilitate supply in rural areas that were largely unserved, the law provided for exemption from license for composite projects of generation and distribution.

The governments were entrusted the function of policymaking and powers for giving policy directions for the guidance of Regulatory Commissions.

This Act crystallised the scope for tariff regulation and also its mechanism for implementation. While the Act gave directions as to the mechanism for determination of tariff, it also carved out certain areas where tariff would not be determined by the regulators - in such cases, market force and mechanism would play.

2.1.2 Regulation of Tariff

Tariff regulation has principally two areas. There are certain transactions for which tariff will have to be determined by the concerned regulators, and secondly, there are areas where light handed regulations would apply, i.e., "adoption of tariff" or "setting caps" will be done by the regulators.

In cases where tariff is to be determined by the regulators, the regulators are to specify through regulations, the detailed procedure for computation of tariff in almost formulaic manner covering issues like "actual or normative" approach, "historic cost", "average cost" and "marginal cost".

Any decisions taken by the regulator will have to be through a consultative process. Suggestions and objections are to be invited from the public after due notice of specific issues.

Apart from the electricity price determination, provisions are there for determining service tariff (network charges) in the form of "wheeling charges" and "transmission charges".
2.2 FRAMEWORK AND CRITICAL PARAMETERS

Generally speaking, tariff setting through regulations is based on allowing reasonable cost and reasonable profit to the utilities after due consideration of efficiency of operation. In determining what is reasonable for allowing costs, regulators often specify certain standards which are called norms for tariff determination. Such norms typically include thermal efficiency, Aggregate Technical & Commercial Losses (AT&C Loss), leveraging ratio (Debt: Equity) and cost of funds both for loans and equity. Important issues like how much Depreciation is to be allowed each year are also spelt out. Norms are set after consulting the stakeholders, licensees or the generating company as the case may be and public consultations.

2.3 OPTIONS FOR TARIFF DETERMINATION

As indicated earlier, there are certain areas where price determination is left to the market forces,

- When the consumer chooses his own supplier other than the Distribution licensee of his area,
- Where a Distribution Company purchases electricity through competitive bidding
- Sale to a Trader.

However, concepts of Trading Margin is there to guard against excessive profit by Traders.

2.4 POWER PURCHASE ISSUES

A distribution licensee has its major proportion of costs in the form of power purchase expenses. Being a major cost item, this is highly relevant for retail tariff determination. Scrutiny of power purchase cost invariably includes dealing with power purchase agreements (PPA). PPA is a contract between the buyer and seller of electricity. Like any other contract, there is an offer and an acceptance mechanism. PPA addresses the following issues.

- Contract duration
- Price / delivery point
- Billing & Payment mechanism
- Payment Security mechanism
- Dispute Resolution mechanism
- Force Majeure
- Any special clause like 'Take or Pay'
- Termination issues
- Other risks

Depending on the nature of power, agreements vary - PPA for a thermal station would be different from that of a hydel station which will again be different for solar or wind powered stations.

2.4.1 Other Expenses

Expenses other than power purchase would be largely "Fixed Cost" in nature and would cover:

- Employee Cost
- Repairs & Maintenance including Consumables
- Insurance
- Other Administrative & General Charges
- Rent, Rates & Taxes
2.4.2 Tariff Design and Cross Subsidy

In determining tariff, the regulators are obliged not to show any "undue preference" to any consumer of electricity. Tariff, however, may vary or technically may be "differentiated" according to consumer's load factor, power factor, voltage, total consumption of electricity during any specified period or the time at which the supply is required or the geographical position of any area, the nature of supply and the purpose for which the supply is required.

Thus, each consumer may pay tariff different from the average tariff. In the Indian context, large industrial and commercial consumers, over the years have been paying much higher tariff with regard to the average tariff. The difference is used to subsidise other classes of consumers like domestic and agriculture. This subsidy being available from within the sector or from with consumers themselves, is termed as 'cross subsidy' as opposed to any external subsidy which flows from a source other than the tariff revenue like Government subsidy, grants etc. Cross-subsidy in a contentious issue and various consumer groups have conflicting views. Electricity Act mandates rationalisation of tariff so that cross subsidy reduces over time.

The Act also provides scope for Government subsidy, if the Government decides to provide relief to any consumer category's tariff determined by Regulators.

2.4.3 Process of Filing Tariff Petition

Tariff application is an elaborate process. This is governed by the regulations of respective Commissions. Utilities apply giving justification for the tariff enhancement it proposes. Also, it has to furnish all the requisite data - information as mandated under the respective regulations. Tariff petitions are large in volume and may run into thousands of pages. After filing of petition, Commissions check whether the petition contains all the requisite information and after such checking and satisfaction, a petition is "admitted". After admission of a petition, documents are thrown open for public scrutiny and comments giving certain timeframe for response. On receipt of such comments, the regulators scrutinize the petition in detail with specific reference to regulations and policy and suggestions/ objections. Normal time frame for tariff determination is about 120 days. However in actuality, such time frame varies.

After an order has been issued out by the Commission, its Gist is published by the Utilities in newspapers and posted on the websites for effecting necessary transparency and disclosure.
2.4.4 Provision for Appeals

Any person aggrieved with any order including tariff order passed by the Commission can move the Appellate Tribunal for Electricity which is located in Delhi with provision for Circuit Benches in metropolitan cities. Such appeal is to be preferred in 45 days' time. Persons aggrieved with the order issued by Appellate Tribunal may prefer appeals to Hon'ble Supreme Court.

2.5 CONCLUSION

Securing reasonable tariff is a must for the utilities' health. Unless revenue is such that the cost is covered and also there is a reasonable margin for profit, new investments cannot flow in. Continuous investment is necessary to keep up with the increasing demand for quality of supply. Thus, an exercise for obtaining a reasonable tariff order is of paramount importance for a Utility.
Learning Objectives

After studying this unit, you should be able to understand:

- IT Applications in Commercial management
- IT applications in Customer Relations Management
- Various IT applications in CESC

MODULE : A2
UNIT - 3
IT APPLICATIONS IN DISTRIBUTION MANAGEMENT
3.1 IT APPLICATION IN DISTRIBUTION MANAGEMENT
(CESC'S EXPERIENCE)

3.1.1 Deployment of IT in Power Utility:
In a power utility the IT enabled applications are required mainly in the areas of Customer services, Regulatory affairs, Distribution systems, Business process, Generation control, Power trading, Financial management, Establishment and HR etc.
To support the functions of the Distribution wing of CESC, the identified mission critical application areas are Induction of new consumers, Fault management, Billing system, Treasury management, CRM, GIS, Theft management, Personnel systems, Medical services for employees, Captive mailing system, ERP, Intranet services and building IT infrastructure.

3.1.2 IT Support in CESC:
Systems are developed and maintained in-house by a strong contingent of IT term, having a Data Centre equipped with most modern high-end computers running on Oracle platform and linked through our own fiber optic back bone (Network) with high band-width.

3.1.3 IT Application in Commercial Management:
The core activities of Commercial in CESC are supported by different IT enabled systems e.g. Meter reading and billing, Resolving billing complaints, Disconnection of supplies, Payment follow-up of outstanding dues, Reconnection of supplies, Voluntary disconnection, Transfer of supply, Refund of Security Deposit after disconnection and closing of accounts, Realization of additional Security Deposit etc.

- 'Meter to Cash' Cycle:
In CESC, we prepare Electricity bills for 26.7 lac consumers every month, after receiving different types of transactions data from eight departments, located at different areas in and around the city of Kolkata and Howrah.
We use to read majority of the LT meters manually, in the Meter Books, by a fleet of ~600 Meter Inspectors everyday and the data for the same are captured through off-line data entry. Presently we are in the process of replacing the Meter Books by the Hand Held Instruments (palm-top computers).
The meters of high-end LT and all HT consumers are read through AMR and CMRI.
The mode of payment of electricity bills in CESC are generally by cash (at our 41 Cash Offices scattered all over licensed area), cheque (across the counter / cheque drop box), by Credit / Debit cards through our website, different e-payment rents and payment through 'Advance Payment Scheme'.
A new consumer gets into the billing system after thorough checking and processing of the application, payment of necessary charges and Security Deposit and installation of the meter. After processing all the said major inputs / information at the respective de-centralized locations, our Core Billing System receives the information / data through our high speed Fiber Optic Network and produces electricity bills alongwith other essential Reports.

- Main Features of CESC's LT Bills:
  - Information on consumption, meter reading date, bill amount, Rebate, etc.
  - Meter related information.
  - Tariff related information.
  - Information on last payment made
  - Information on Security Deposit.
  - Information on Outstanding Dues
• Providing comparative consumption unit for last 6 months vis-à-vis similar months of last year, through histogram.
• Information on sanctioned load.
• Notice to defaulters
• Both sides printing with dynamic information.
• Bar-coded Bills
• Monetization of the bill
• Computer Aided Commercial Activities:

Major Products of the Billing System are Electricity bill, Disconnection notice cum bill, Account of consumers having outstanding dues, Account of disconnected consumers, Account of Security Deposit made by the consumer, Major MIS reports (for Commercial, Corporate Services, Finance Divisions) and Closing of accounts.

The Consumer Service Support that we avail of the Billing System are Redressal of consumer complaints, Online enquiry, Generation of duplicate bills, Correction of bills, Accounting of dishonoured cheques, Refund of Security Deposit etc.

To support the Business Process, the major MIS Reports Generated by the Billing System for Commercial Activities are Category wise sales analysis, Outstanding analysis, Financial reports, Analysis of non-actual bills, Court case / Dispute monitoring, Monitoring of new consumers etc.

The major Sub-System for Customer Service and Operational Control, that we get as Products of Billing System are Computerized complaint handling and monitoring system, Control of meter reading and manpower development of meter inspecting staff, Putting bill information in the website for providing online payment facility through internet etc.

We use Security Deposit Accounting as a part of Billing System, which includes Keeping the account of Security Deposit made by the consumers; Refund of Security Deposit to disconnected consumers after adjusting the outstanding dues, if any; Calculation of interest on Security Deposit for all the consumers at the end of financial year; Tax deduction at source on Security Deposit interest etc.

3.1.4 Electricity Act and Regulator:

The Electricity Act 2003 brought landmark changes in the legislative and policy environment with introduction of National Tariff Policy, Open Access, Power Trading, Private Sector etc.

This Act brought a new paradigm in the areas of customer focus and grievance redressal by introducing electricity supply code, consumer redressal forum, Ombudsman, Appellate Tribunal, Special Courts, SOP etc.

Under the circumstances, IT enabled services are required to meet the stipulated Minimum Standards and enhance quality of services to the consumers.

We, from the Distribution wing, also need to provide the Reports on our Efforts in improving the Consumer Services, Introduction of new Technology, Cost of maintenance of Distribution Network, Establishment Cost, etc on regular intervals to the Regulator, with the help of the IT enabled Systems.

3.1.5 IT Applications in Customer Relations Management:

As a part of enhancing Consumer Services in CESC we use a comprehensive CRM System, developed in-house for our Call Centre, which is integrated with our Complaints Handling System at the back-end. This CRM Software has got the glory of winning International Award.

We provide 24 x 7 Services for 365 days to our Consumers from the referred Call Centre, through 330 telephone lines, with the help of 75 agents. Most of the in-coming calls are tackled through IVR System.
Though the Software is developed and integrated by our IT team, the operational part of it has been outsourced to IBM, to run the Call Centre. The Call Centre activities are linked with our back-office System through our own 1 GB Optical Fiber Network. Consumers may get in touch with our Call Centre through e-mail & SMS Services also.

All the Technical complains received at the Call Centre are forwarded directly to CESC's Service Centre and the Commercial complaints are forwarded directly to the Commercial Department at the Regional Offices. We provide prompt feed-back / guidance to the Consumers, related to their complaints / query, from the Call Centre. We also make calls to the payment defaulters from the Call Center, for follow up of the outstanding dues against electricity bills.

For providing better services to our Consumers, and convenience of maintenance of distribution network, we have developed our own GIS System. Consumer Indexing in GIS map helps us in improving the Consumer Services, in faster manner.

### 3.1.6 Preparation of GIS Map:
- Procuring high resolution Satellite image of our licensed area from Google Earth.
- Survey of land-base of our licensed area.
- Super-imposing the land-base and road maps on Satellite image.
- Measuring Latitude and Longitude of electrical installation (Transformer, Distribution Pillar Box, Substations etc.).
- Accurate placement of all electrical installations on the land-base map.
- Placing the service points on the building foot-prints of all consumers.
- Plotting of HT and LT network separately on the land-base connecting the electrical installations.
- Drawing of 'Isolation' in each of the Pillar Box.

### 3.2 IT SYSTEMS & E-ENABLED APPLICATIONS

#### 3.2.1 Introduction

With the opening up of the power sector in India, power utilities in the country have to adopt necessary measures to enhance efficiency and improve customer satisfaction. The Regulatory Regime is closely monitoring the operations of power utility companies and driving them to attain new heights of operational efficiency by setting stringent targets, goals and also penalties in cases of default. Major reorganization and re-engineering of various internal processes and procedures are going on and IT is a very important tool to help enhance efficiency at all levels of operations. IT activities are thus fast graduating from the role of a facilitator to the role of an essential resource and a key driver.

Enabling the core business operations with information systems at the transaction level would lay the foundation for sustainable reforms. This will ensure world-class practices and controls at the operations level and would bring about sustainable improvements in the overall health of the utilities. This will enhance the overall quality of data, thereby improving the flow of information for decision support. Information Technology (IT) would enable sustainable changes in the operations increasing controls at a transaction level, improving the efficiency of the operations and increasing transparency across the organization.

All the above factors are contributing to the adaptation of appropriate IT-based solutions and ITES at different levels of operations and strategic operational areas.

#### 3.2.2 Customer Satisfaction

Study brings forth the customer perspective in an objective manner which is probably the most reliable way of identifying key issues that the local customer wants the utility to attend. Immediately attending to the customer's key areas of dissatisfaction would result in quick wins for the utility and allow for building up a positive perception within the minds of all stakeholders (including customer, opinion leaders,
employees etc) and make them ready for bigger changes (e.g. smart meters and other innovations that would help improve the quality of service and metering efficiency). When looked into together with other factual information (utility's assets, performance figures, collection efficiency, billing, customer complaints etc) customer satisfaction and preference data can provide solid insight into the investments that, if done, would help improve business productivity and growth.

The Consumer has simple wishes:

- Uninterrupted Power Supply
- Correct Billing
- Quick Response in case of faults

Quality of Supply: Use of IT Applications for Efficient and reliable network management

- Fault Isolation and Service Restoration
- Outage Management System
- Switching Procedure Management

Distribution Management System (DMS) and Outage Management System (OMS) enable utilities to manage and control the isolation and restoration of outages. With DMS, the utility gets abundant real-time information about the distribution grid. Operational systems like OMS are provided to reduce the time and resources necessary to deal with service interruptions improve reliability service levels and increase customer satisfaction.

3.2.3 Economy and Efficiency through IT: A CESC Case Study

3.2.3.1 Data Centre & Applications

Historically, the IT-related activities of CESC were scattered at various departmental levels. With the steep growth of mission-critical systems, the issue of management of all these systems is of prime importance. One of the important steps for efficient management is consolidation of the systems. Consolidation will also lead to better utilization of resources. Another important issue is forming and deploying a suitable Business Continuity Plan for the entire organization so that the impact of a disaster at any particular location can be minimized if not eliminated.

Keeping all these issues in mind, CESC has built one state-of-the-art Data Center (DC) for its IT applications. The DC is equipped with facilities like multiple redundant power sources, advanced fire detection and fighting systems, temperature and humidity controlling mechanisms, water leak detection system, rodent control system, building management and access control system. Strategically positioned cameras are in place to monitor and record all the activities inside the center. Most of the mission-critical IT applications are operational from this data center.

CESC is also building two Disaster Recovery (DR) sites that will plunge in if for some reason the service is not available from the main DC. This activity is a part of the overall BCP initiative of the organization. In the Data Center and the corresponding Disaster Recovery sites, the mission-critical applications are running on a high availability cluster infrastructure ensuring enhanced reliability. The DC and DR sites are interconnected through 10 Giga Bit links.

Various mission critical applications are running from the Data Center including commercial applications like Meter Application & Security Deposit System, Treasury Management System, Payroll System, e-Procurement System as well as the following:

3.2.3.2 ERP System

To help fast and accurate decision-making coupled with adherence to statutory norms, critical business functions like finance, procurement and inventory management have been covered under the ambit of the ERP system.
Specific modules of Oracle 11i are deployed across the organization and running successfully for the last few years. Several bolt-on modules are implemented to achieve smooth availability of data to the main system without disturbing the previously used applications. This enterprise wide application has helped to cut-down processing time and released considerable man-hours for better utilization in business operations.

3.2.4 Knowledge Management Portal
The integrated Knowledge Management Portal helps in collecting, disseminating and analyzing critical data related to power management. This system is the lifeline for the engineering division of the company and generation division in particular.

3.2.5 SOS (Site Office System)
The Mains department looks after the last mile distribution network to ensure that the consumers ultimately get the supply at their premises. Site office activities include, commissioning of the electrical services, fixing up of meters, attending to break-down jobs as well as carrying out various maintenance work. Operational data related to material usage, human resource deployment and other administrative parameters are captured in a homegrown system known as SOS (Site Office System). This application has data exchange/sharing capability with other related applications like the ERP and CRM. These integrated applications work in unison to provide better control and enhance customer service.

3.2.6 Consumer relations Management (CRM) System
With a major focus on customer satisfaction, the company has implemented a comprehensive Consumer Relations Management (CRM) System. The system is designed and developed by in-house team and has used open source software. The application has been selected as a "case study" by one of the leading software vendors. The CRM application caters to the supply related complaints from the 2.5 million consumers. This home grown application is highly customized to suit the typical and diverse requirement of the organization. It is used by the call center agents for interacting with the consumers, the operational personnel at the depot level for delivering service to the consumers and key management personnel for monitoring and management of customer support. The CRM package seamlessly integrates with other computerized systems such as Distribution Management System (DMS), Geographical Information System (GIS) and Site Office System (SOS) with a view to offering a complete and comprehensive solution to the customer through a single point interface.

The application generates vital performance related information that is used for computation of workmen incentive and other regulatory issues. The application is having interface with the Corporate Website.
While the CRM software package lies at the heart of the system, several technologies such as IVRS, Wireless HHI, SMS services and GPS have been deployed and integrated with the core CRM System to make the overall business process highly efficient and effective.

3.2.7 Corporate Website
The CESC corporate web site is developed and maintained by in-house IT resource. The site, apart from publishing general information for consumption of various audience verticals, hosts a number of applications that enable consumers to transact directly with backend systems to pay their electricity bills, lodge billing complaints, opt for e-Bill services, e-procurement etc.
3.2.8 IT Infrastructure Services
The company maintains comprehensive Mailing System for the domain cesc.co.in using its in-house resources. The infrastructure includes the mailing servers for the corporate along with the DNS Servers. Apart from this a corporate Intranet Portal is in place to serve as an umbrella system to host different important IT applications. These are all very critical in nature and operational on a 24 x 7 basis.

3.2.9 CESC Track
Initiatives have been undertaken to computerize important data relating to sketches, maps, EHT, HT, LT underground cables for easy retrieval / updating / modification etc. The CESC Track system tracks all pending jobs in this section since these drawings are the basis for future planning, maintenance & repairs of the HT & LT networks.

3.2.10 Distribution Transformer Management Systems
Thousands of Distribution Transformers are in operation in CESC's licensed distribution area to provide LT supply to 2.5 million consumers. Every year hundreds of distribution transformers are added to provide connection to new consumers. The home grown software Distribution Transformer Management Systems helps to manage the entire life cycle of the equipment covering procurement, bill processing, storing, testing, installation, repairing etc. are also monitored. This system is integrated with Distribution Related Engineering Asset Management System (DREAMS).

3.2.11 LCC Applications (SLIM)
One of the major activities of the Company is the controlling of T&D losses. This activity is spearheaded by the Loss Control Cell. Over the past couple of years, this cell has contributed significantly to the overall success of the Company. This department is using homegrown LCC Applications (SLIM) to support its activities.

3.2.12 Smart Billing in CESC
3.2.12.1 Introduction
The billing system of CESC is a proven, home-grown IT system that caters to the needs of all LT and HT consumers by continuously providing accurate, un-interrupted and mission-critical support and services through optimisation of available resources using state-of-the-art technologies. The system can be broadly divided into 2 parts : LT billing system for LT consumers and HT billing system for HT consumers.

3.2.12.2 History
Computerized billing was introduced in 1977 in CESC - the first in the country. Over the decades, the legacy software was replaced by an Oracle-based LT billing system in 2004 to meet all the requirements specified by the users after due system analysis. This system has the flexibility and scalability to handle unpredictable Regulatory requirements. Oracle-based HT billing was revamped, re-engineered and made operational from 2006. Keeping the growing requirements in view, the billing system was migrated to a high performance, high storage capacity hardware platform SUN E2900. The billing system is integrated with the AMR system to capture billing reading, interruption details etc. for high-end consumers. It supports billing for Time-of-the-day tariff, seasonal tariff for high-end consumers, prepaid metering for low-end consumers. Recently it has been enhanced by incorporating features like billing of consumers having their own sources of electricity generation and supplying the
excess energy to CESC for LT consumers to facilitate generation from renewable energy sources. The system is also integrated with the ERP GL module of Finance Department to transfer post-billing data at the desired granularity.

3.2.12.2.1 The features of the billing system includes:
- Monthly Bill Processing of more than 2.5 millions of low & medium voltage consumers after incorporating all user requirements and regulatory requirements as and when required.
- Monthly Bill Processing of around 1700 High voltage consumers after incorporating all user requirements and regulatory requirements as and when required.
- Implementation of Tariff and Arrear computation and levy of the same as per WBERC tariff order and to provide various data/reports which are required for Tariff fixation.
- Provision for small locality-wise (Book level) billing for LT consumers.
- Regular monitoring of outstanding dues both for HT & LT consumers.
- Generation of Disconnection notice for non-payment during the first month of default.
- Updating and maintenance of security deposit for LT & HT consumers & Maintainable SD calculation.
- SD interest calculation & additional SD instalment bill/notice generation for LT consumers.
- Bank Guarantee & Letter of Credit system for HT consumers.
- Sending electricity bills through e-mail and billing information through SMS to high end consumers immediately after generation of the bill.

The centralized billing system is integrated with the web-based Consumer services system for LT and HT consumers.

3.2.13 Distribution related Engineering Asset Management System (DREAMS)

3.2.13.1 Introduction
In an effort to revamp the engineering asset documentation and maintenance practices throughout the Distribution wing of CESC, a web-based system DREAMS was thought of. The system was developed in-house by the IT department. The vision of DREAMS is to systematize and coordinate activities and practices to enable CESC to optimally manage its assets & their associated performance, maintenance aspects and expenditures over their life cycle for the purpose of achieving the organizational strategic plan.

3.2.13.2 Functionalities
DREAMS provides an integrated Asset Register of major electrical plant and equipment in use in CESC Limited including allied assets such as Substation buildings, premises and Yards with Maintenance Management functionalities encompassing Preventive Maintenance, Condition Monitoring and Condition-based Maintenance and Repair/ Break-Down Maintenance and associated Alerts, Work Orders, Records of all work done & tests carried out and Analysis, Recommendations and Reports. The system has many different Modules to plan, schedule, execute, track and control the equipment maintenance. The Asset Register can be accurately posted with the thousands of equipment in use grouped under a few dozen categories with relevant Asset Descriptors such as Make, Model, Type, Ratings, Purchase & Warranty details, photographs, catalogs etc of each piece of equipment and its associated Preventive Maintenance activities and schedules, Condition Monitoring activities and schedules and results and records of all planned and unplanned maintenance work carried out. The system enables creation, editing and deletion of categories and equipment within each category with all associated attributes and fields related to each equipment and its maintenance requirements and history.
and auto-generate alerts of equipment due for maintenance, issue of Work Orders and allows updating of maintenance and test records and movement (of full or part equipment) tracking. The system is integrated to the EHV Fault/ Outage Management Systems to help in data-backed Root Cause Analysis. It is also integrated to the Distribution Transformer Management System (DTLMS). It will be integrated to CESC’s Distribution Project Management system (DPMS) shortly to facilitate generation of unique asset numbers at the point of procurement for tracking and monitoring of the asset throughout its entire lifecycle. In future, shutdown procedures and switching chits and issue of Permit-To-Work will also be integrated into the system.

3.2.14 AMR DashBoard
This is a web-based system developed in-house by the IT department for monitoring and analyzing information retrieved from static meters pertaining to instantaneous parameters, load survey, events report, meter tampering and interruption. It accepts AMR data in .XML format and displays the data pictorially. It also shows meter reading related statistics region-wise with summary of meters read, not read, details of not-read meters. There is a separate module for monitoring static meters installed at the distribution transformers (DTRs) for the Loss Control Cell (LCC).

3.2.15 Importance Applications For Network Operations
3.2.15.1 Gennet: To capture the basic data regarding generation, fuel consumption, ash evacuation, plant outages. Calculates all derived parameters. Benefits: To capture the basic data regarding generation, fuel consumption, ash evacuation, plant outages. Calculates all derived

3.2.15.2 Log:
Archive of all operational data for every 15 minutes and using them for forecasting, planning for any network outage. Benefits: Provides a backup database of SCADA archives, which can also be easily linked with the other databases for reports & analysis.

3.2.15.3 HT Fault Report:
Data entry, query & publishing of all 11 kV, 6 kV fault. Benefits: Computerisation of HT fault data, which provides online MIS reports.

3.2.15.4 Schedule/Reschedule:
Preparation of daily schedule of system demand, CESC’s generation and Power exchange quantum for every 15 minutes block. Benefits: Daily schedule/ re-schedule of forecasted demand and availability of generation is given to SLDC/ ALDC. This is mandatory under ABT regime.

3.2.15.5 Shedsum:
Enter of Distribution Station-wise load-shedding details. Benefits: Provides the load-shedding schedule, spot shed and half hourly effect on mouse click. Also provides MTD of D/S wise interruption duration. This guides in equitable distribution of interruption hours. Interruption data is also transmitted on real time basis and viewed by the call centre personnel on a bulletin board.
3.2.15.6 Load shedding:
Keeping records of any kind of feeder outage. Benefits: Computerisation of load-shedding & power supply interruption data for getting the necessary reports like loss of unit, average interruption hours etc. on monthly basis. Interruption data on real time basis are viewed by the call centre personnel on a bulletin board.

3.2.15.7 On line UI:
Monitoring of UI. Benefits: Online monitoring of ABT meter data for optimum economic operation

3.2.16 HT & LT Fault Management Systems
HT Fault Management System was developed with the view to digitize each high tension feeder tripping & archive the records in software database management system. The information of a particular tripping are entered in the FMS at the end of each shift (24 X 7 Manning with 3 shifts per day).
LT Fault Management System was developed replicating the HT FMS model. The salient information pertaining to each low tension distributor failure is updated in LT FMS by Network Managers of 10 districts within 48 hours of occurrence.
Learning Objectives

After studying this unit, you should be able to understand:

- Tele Communication infrastructure
- VHF, Fibre Optic, TDM communication systems
- SCADA & DMS
- Feeder Automation
Efficient Power System Management demands rapid and reliable information exchange among Load Dispatch Centre, Generating Stations, EHV Substations, Distribution Stations, Engineering Offices, Regional Offices, Site Offices etc. From inception, CESC has developed its own voice & communication system in addition to outsourced services to facilitate such voice and data communications. CESC has old underground pilot copper cables and a mix of aerial & underground optical fibre for transportation of requisite voice & data. Over the years, the use of pilot cables has reduced due to maintenance issues. In 1995-96 a point to multipoint TDM/TDMA Microwave Radio System was commissioned but was decommissioned in 2008 due to Govt. policies on S-band. Fibre Optic Transmission Systems form the backbone of CESC’s telecommunications network and is the mainstay for most telecommunication links. Various Communication services in CESC are detailed in the following sections.

4.1 VHF COMMUNICATION:

Around 450 licensed VHF radio communication sets are in operation to meet the voice communication requirement at Distribution Stations, Control Room, Call centres, Mobile Maintenance Vehicles and office premises. These VHF sets are also used for contact transfers of around 70 Unmanned Distribution Stations to send an alarm to the Master Control Centre if such contacts make at the Stations – a very useful feature at Stations which do not have any SCADA system at present.

4.2 OUTSOURCED VOICE & DATA COMMUNICATION SERVICES:

CESC has corporate tie-ups with Bharti Airtel and Vodafone for Voice & Data SIM cards and services. More than 1200 voice connections and 14000 data connections are in use with the numbers growing steeply every year. Data connections are used for RMU Automation & AMR applications. Some use static IPs with CESC-specific APNs provided by the Service Providers but most use dynamic IPs with client-initiated VPNs such as M2M Servers. Some managed leased lines are also operational on hire. These are deployed for RMU automation application.

4.3 FIBRE OPTIC CABLE NETWORK IN CESC

As a policy, CESC lays underground armored 48-Fibre Optical Fibre (OF) cables whenever 33kV / 132kV cables are laid thereby saving on road digging and restoration charges. In some special cases OF cables are also laid along with 6kV and 11kV under-ground cables. CESC uses ITU-T G.652D Optical Fibre cables (single mode, step index), both underground and aerial types, with fibre count ranging from (6F/ 12F/ 18F/ 24F/ 48F) and wavelength of 1310 nm and 1550 nm. Around 400 kms of UG cables and 300 kms of OH cables have been laid so far. A 92 km long OPGW (Optical Ground Wire) has also been strung along with the 220 kV transmission circuit between Budge Budge Generating Station and EM Substation. FCPC/SCPC/LCPC connectors are used. Laying, splicing and termination of Optical Fibre Cables are carried out by CESC’s own team of skilled, trained personnel using requisite set-up and equipment. Aerial cables are, however, maintained by an external agency.
Dark fibres are used for telecommunication purpose and also for line differential protection of high voltage feeders.

### 4.4 FIBRE OPTIC TRANSMISSION SYSTEMS

There are 2 separate Telecommunication Transmission systems operating on the Fibre Optic cables: a circuit-switched SDH/PDH system across 33 locations (mostly Generating Stations and Substations and Regional Offices) and a Gigabit Ethernet packet switched network using Routers across 100 odd locations (mostly Offices). The SDH/PDH system, with transport in STM4 (622.08 Mbps) is mainly for real-time communications such as for SCADA systems, protection contact transfers and even voice where latency may be an issue and the Gigabit Ethernet system is mostly used for commercial uses such as Intranet, ERP, Commercial information flow and now even for some SCADA applications.

### 4.5 TDM SDH/PDH COMMUNICATION SYSTEM:

CESC has ring protected ABB make SDH STM4 (622.08 Mbps) & PDH communication system covering 33 sites including Generating Stations, Receiving Stations, important office premises etc. The system has a common Network Management System which can be viewed & controlled from multiple strategic locations. ABB make FOX515T & FOX515 are in use as SDH & PDH equipment. Access side includes TDM Voice, V.24 data, Contact Transfer, E1 and Ethernet. Hardware includes 19” subracks (37 for SDH & 30 for PDH), Maintenance Modules, Fan Modules etc mounted in 54 Panels, 52 Aggregate Module cards, 42 Tributary Modules for E1 ports, 39 Tributary Modules for Ethernet and a host of access-side cards. The equipment are powered by 48V DC battery & charger systems with high back up time. The applications running on the system are as under:

- Around 250 nos dedicated 2-wire Voice connectivity at important locations
- Seamless connectivity between 20 EPABXs at different locations
- Transmission SCADA IEC 60870-5-101 and IEC 60870-5-104 data for 20 stations
- Extension of Distribution Management System terminals over SDH LAN
- APEX metering data
- Tele-protection: Emergency Trip & Emergency Lock Out
- Remote connection for Disturbance Recorders
- Remote connection for Numerical Relays

![Diagram](image.png)
4.5.1 PDH (Plesio-Synchronous Digital Hierarchy):
Digital multiplexer which multiplexes a total 30 nos. of Voice and/or Data channels and the minimum output is E1 (2.048 Mbps) digital signal. The equipment are all almost synchronous. Output can be E1 or its multiple upto 140 Mbps electrical/optical.

4.5.2 SDH (Synchronous Digital Hierarchy):
Worldwide standard higher order multiplexer which multiplexes atleast 63 nos. E1 (2.048 Mbps) PCM/Ethernet (EoS)/ combination of both input signals and the output is 155.52 Mbps (STM 1) electrical/optical. As the name suggests all the equipment connected are synchronized with the same clock. Outputs can go upto STM 64 (9953.28 Mbps).

4.5.2.1 Straight Joint Closure:
Joint Closure for straight jointing of O.F. cable in the run.

4.5.2.2 Terminal Joint Box (TJB):
Joint Box for termination of O.F. cable at a terminal station.

4.5.2.3 Fiber Distribution Frame (FDF):
Fiber Distribution frame mounted with suitable adaptor for interconnection between equipment and fiber. At one end of the adaptor, pigtails (with connector at one end and bare fiber in the other end) from TJB are connected and at the other end Patch cords (with connectors at both ends) from equipment are connected.

4.5.2.4 Advantages of SDH:
Following major advantages are available in an SDH based communication system:
- World Wide standard
- High Transmission Rates
- Simplified Add & Drop Function
- Multiple vendor optical transmission equipment compatible
- Direct access to tributary channel
- High Availability and Capacity Matching: Single Network Management
- Reliability: Protection schemes
- Future Proof Platform for New Services like video conferencing, VOD, CCTV

A set of related photographs including NMS Snapshots for existing SDH/PDH communication system, test & diagnostic equipment etc. used in CESC is depicted below:
4.6 Path Forward:

Transmission SCADA system will be on IEC 60870-5-104 protocol with RTUs reporting at Master Control Centre (at CESC House), Backup Control Centre (at Testing Department) and Communication Control Centre (at Auckland Square) over SDH Optical backbone. Testing with the said configuration is in progress.

The communication architecture for the full blown BCC is depicted below:
CESC has decided to automate all the Distribution Stations (both existing and upcoming D/Ss) as fast as possible and set a target of commissioning 30 to 40 RTUs per year for Distribution Station Automation. Interconnection between DMS & Transmission SCADA servers over ICCP protocol is being considered. Regarding Feeder Automation the company will continue technology trials for better communication solutions before large scale deployment. In between, sites demanding urgent deployment of automated RMUs, optical fibre based communication systems will be considered.

4.7 SCADA/DMS AND FEEDER AUTOMATION

4.7.1 SCADA/DMS

Implementation of a Supervisory Control and Data Acquisition (SCADA) system enables to monitor and control electricity flow in the transmission & distribution network. It helps in maintaining supply/demand balance, reduces cost of operations and enables process efficiencies. SCADA has three major components: Remote Terminal Unit (RTU), Communication Network and Control Centre. A RTU gathers digital and analog data from the field through sensors and sends them to Control Centre via the Communication Network. The servers present at Control Centre receive the data sent by RTUs, process them and make them available through graphical user interface (Human Machine Interface/s). The Operator present at Control Centre can initiate remote commands from HMI terminals to operate field equipment. Several options are available for communication media between the RTUs and the Control Centre but the most preferred is Optical Fibre. Other features of SCADA include time synchronization of field RTU using a GPS based time and frequency system, real time data storage and retrieval, remote equipment configuration and interface with other enterprise IT applications.
Distribution Management System (DMS) comprises of a number of applications which acts as a decision support system for the load despatch operators, field personnel and planning. Improving the reliability and quality of service in terms of reducing outages, minimizing outage time, maintaining acceptable frequency and voltage levels are the key deliverables of a DMS.

SCADA/DMS were earlier typically isolated systems but today they invariably interface with several other Enterprise Applications such as GIS, CRM, Asset Management System etc. CESC Limited installed SCADA, way back in 1995, for Transmission network (220 kV, 132 kV & 33 kV voltage level) for efficient load generation balance, enhancement of network stability, reliability and better fault management. The system has been upgraded in 2005. It is Siemens Spectrum SCADA System with 20 RTUs. CESC has also installed a separate Siemens make, Spectrum system, an offline DMS / Distribution SCADA in 2007, catering to the entire Distribution network of 11 kV, 6 kV, 20 kV & 3.3 kV voltage level to maintain operational safety, easy & fast operation on the network and efficient single window clearance to field engineers. From 2011, RTUs at Distribution Stations and FRTUs at RMUs are being commissioned and integrated with this DMS/DS-SCADA.

4.7.2 DMS Packages

Operators, handling a huge power network, require some decision support tools for secure operation of distribution system. DMS packages form the Decision Support System (DSS) which includes various functions like state estimation, power flow, contingency analysis etc. The DSS estimates the current system topology from the status of circuit breakers and/or isolators and different measurements obtained through SCADA.

**State Estimator** processes SCADA data such as power, voltage & current, and estimates the magnitudes and phase angles of all bus voltages in the actual power system. Using these values, the State Estimator examines the data for obvious errors, determines those portions of the network which are observable, generates artificial measurements at locations where data are required for observability and then computes the estimated system voltages and tap positions of the transformers. State estimators allow the calculation of required variables with high accuracy despite the fact that the measurements may be missing or corrupted.

The goal of a **power flow study** is to obtain complete voltage angle and magnitude information for each bus in a power system for specified load, generator real power and voltage conditions. Once this information is known, real and reactive power flow on each branch as well as generator reactive power output can be analytically determined. A distribution feeder is radial. Hence, iterative techniques commonly used in transmission network power flow studies are not used because of poor convergence characteristics. The ladder iterative technique (or forward-backward technique) is the most suitable method for power flow study of radial systems. These are important for planning future expansion of power systems as well as in determining the best operation of existing systems.

**The Optimal Power Flow** program employs techniques to automatically adjust the power system control settings while simultaneously solving the power flows and optimizing operating conditions within specific constraints. **Contingency analysis** is a software application, which runs in a distribution management system and gives an indication of what might happen to the power system in the event of an unplanned (or unscheduled) equipment outage. With the help of contingency analysis the operator can take some action before or after the event to help the system avoid outage events.

When there is a shortfall in the electricity supply, quick **load shedding** is required to prevent the power system from being unstable. Load shedding can be carried out using frequency information, voltage fluctuations etc. These are accomplished either in automatic or manual mode and are predefined.
Feeder reconfiguration is performed to enhance the quality and reliability of the distribution system by opening/closing tie and sectionalizing switches. Feeder reconfiguration is mainly accomplished for system power loss reduction and for load balancing. Power flow program is used to calculate the overall real power loss for a given system configuration. It ranks it against other configurations and helps to select a configuration for a particular system condition. Especially with the development of semi-automatic/remote control switches, online reconfiguration has become an important component of distribution automation.

Network connectivity analysis is an operator specific functionality which helps the operator to identify or locate the preferred network or component very easily. NCA does the required analysis and provides display of the feed point of various network loads.

The DMS application receives fault information from the SCADA system and processes the same for identification of faults. On running switching management application the results are converted to action plans by the applications. The action plan includes switching ON/OFF the automatic load break switches / Sectionalizers.

Load forecasts form the basis for development of strategic system planning. Accurate load forecasting is critical since the future load characteristics determine the location, size, and timing of future facilities. Three major categories of load forecasting methods are (i) trending methods, which project future load growth based on some type of inference based on past load growth (ii) simulation methods, which attempt to analyze and anticipate the process by which electric load grows and (iii) hybrid methods, which are a mixture of trending and simulation.

There are other tools like fault locator, volt-var control etc. which not only reduce service interruption but also improves its quality and efficiency in terms of voltage regulation, system losses and load demand.

4.7.3 Feeder Automation

In India, Power Utilities are striving hard to enhance the reliability of the power distribution network, power quality, and power system efficiency by implementing Distribution Automation in the HV network. A sub-function, Feeder Automation, offers utilities a system for reducing outage times, shortening restoration times, improving power quality, and reducing operation and maintenance costs. Feeder Automation focuses on aspects such as voltage control, reactive power control and Fault Detection Isolation Restoration (FDIR) from a remote location which automatically detects, isolates the faulted segment and reduces outage time compared to manual travel, thereby improving the reliability of the system.
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