RAGHAV ACADEMY

CMA FINAL GROUP- IV

PAPER -20

STRATEGIC PERFORMANCE MANAGEMENT AND BUSINESS VALUATION

HAND WRITTEN NOTES AND PRACTICALS

BY

CMA UJJAWAL JAIN

THIS BOOK IS DEDICATED TO MY BELOVED PARENTS

MR. ARUN KUMAR JAIN

&

MRS. SEEMA JAIN

THEY ARE MY SUPER GOD

GOD IS GREAT

AND PARENTS ARE GREATEST

A VERY

PRECIOUS THANKS TO

CA RAGHAV GOEL

&

SAKSHI AGARWAL

{ WHOSE BLESSINGS IS ALWAYS WITH ME }

AN EXTREMELY MOTIVATIONAL SONG DURING MY CMA JOURNEY

पिघला दे ज़ंजीरें
बना उनकी शमशीरें
कर हर मैदान फ़तेह ओ बंदेया
कर हर मैदान फ़तेह

घायल परिंदा है तू, दिखला दे ज़िन्दा है तू
बाक़ी है तुझमें हौसला
तेरे जुनूँ के आगे, अम्बर पनाहें माँगे
कर डाले तू जो फैसला
रूठी तकदीरें तो क्या, टूटी शमशीरें तो क्या
टूटी शमशीरों से ही हो
कर हर मैदान फ़तेह, कर हर मैदान फ़तेह
कर हर मैदान फ़तेह रे बंदेया
हर मैदान फ़तेह

Study Note 1 : Conceptual Framework of Performance Management.

→ Differentiate between Performance Management and Performance Appraisal.

	Performance Management	Performance Appraisal
1	It focus on Values and behaviours as well as objectives.	It focus on Quantified objectives.
2	It owned by line Managers.	It owned by the HR department.
3	It does not use any Ratings.	It uses Ratings.
4	It is Flexible Process.	It is fixed Process.
5	It is a Joint Process.	It is a Top down Process.
6	It is a continuous Review on work.	It is an Annual appraisal meeting.
7	It involves less Paper work.	It involves Complex Paper work.

→ Components of Performance Management :-

① Performance Planning :- Performance Planning is the Process of deciding the Targets and Key Performance areas for a year.

② Performance Appraisal and Reviewing :- The appraisee fills up the Self Appraisal form and also describe his/her achievements in Qualifiable Terms.

After which the Appraiser offers the Final Ratings for the Achievements of the Appraisee/employee.

③ Feed back on the Performance :- This is the Stage in which the employee Acquires feed back from the Appraiser about areas of Improvements.

④ Rewarding Good Performance :- During this Stage, an employee is Publicly Recognised for Good Performance and being Rewarded, it will result into bring Motivation.

⑤ Performance improvement Plans :- In this Stage, fresh Sets of Goal are established for an employee or Appraisee for the new Appraisal cycle and new deadline is Provided for Accomplishing Such Goals.

→ Financial Performance Analysis :- It is the Process of Identifying the financial Strengths and weakness of the firm and Short term and long term Growth Prospects.

Financial Performance Analysis involves the use of financial Statements (i.e Balance sheet, Income Statement or Cash Flow Statement).

Explanation :-

① Balance sheet shows the Financial Position i.e Assets and Liabilities of the firm at a given Point of Time.

② Income Statement reflects the Performance of the firm over a Period of Time.

③ Cash Flow Statement demonstrate Cash Accrual for the Period.

Benefits of Financial Performance Analysis :-

① For Trade creditor :- Trade creditors are interested in the liquidity of the firm.

② For Bond holder :- Bond holder are interested in the Cash Flow ability of the firm.

③ For Investor :- Investors are interested in Present and expected Future Earnings as well as Stability of these Earnings.

(4) For Management :- Management are interested in internal control, better financial condition and Better Performance.

Areas of Financial Performance Analysis :-

(1) Working Capital Analysis.
(2) Financial Structure Analysis.
(3) Activity Analysis.
(4) Profitability Analysis.

Tools of Financial Performance Analysis :-

(1) Ratio Analysis : Ratio express the numerical relationship b/w two or more things. This relationship can be expressed as Percentage, fraction or as proportion of numbers.

(2) Comparative Financial Analysis : It Takes place when Financial Statements of Two or more F.Y are given for a company.

We have to compute net Increase / decrease in the Rupee Term as well as in Percentage b/w the such two F.Y.

(3) Common Size Financial Analysis : It is also known as Component Percentage Statement or as Vertical Statement.

In this Analysis Percentage is calculated on the basis of Net Sales in case of Common Size Financial Statement,

and on the basis of Total Assets / Liabilities in case of Common Size Balance sheet.

(4) Trend Analysis : It indicates changes in an item or a Group of items over a period and helps to drawn the conclusion regarding the changes in data.

In this Analysis, the Percentage shall be calculated on the basis of Base year.

→ Supply chain Management :

It is the Management of the flow of Goods and Services and includes all Processes that Transform Raw material into final Products.

Objectives of Supply chain Management :

① To Ensure Smooth functioning of Every element of Production / shipment and distribution from Supplier & Manufacturer to Relatives & Stores.

② Minimise Cost related to Transportation and distribution to inventories of R.M, WIP and F.G.

③ Efficient Mixture of Suppliers, Manufacturers, warehouses and Stores, to ensure Smooth Activity Performed.

Components of Supply chain Management :

1. Plan : In this Step a business organisation Strategies for managing all the resources that go towards the meeting customer demand for Your Product and Services.

2. Source : Choose the Suppliers that will deliver the Goods and Services that you need to create your Product.

3. Make : This is the Manufacturing Step which Schedule the Activities necessary for Production, Testing, Packaging and Preparation for delivery.

4. Delivery : Coordinates the Receipt of order from Customer, develop a network of warehouses, Pick carriers to get Products to customer and Set up an invoicing System to receive Payments.

5. Returns : Create a network for receiving defective and excess Products back from customers who have Problems with delivered Products.

→ Customer Relationship Management (CRM) :

CRM is a business Strategy comprised of Process, organisational change and Technical change whereby a company Seeks to better manage its enterprise around its customers behaviour.

It involves Acquiring and deploying Knowledge about customers and using this information to increase Revenue and achieve cost Reduction through operational efficiencies.

Objectives of CRM :-

1. To understand the Customer.
2. To retain customer through better customer Service.
3. To attract new customer.
4. To win new clients and contracts.
5. To increase Profitability.
6. To decrease Customer Management Cost.

Advantages and benefits of CRM :-

1. Satisfied Customer doesnot considers to leave.
2. Product development can be defined According to current customer's need.
3. A Rapid increase in Quality of Products and Services.
4. The ability to Sell more Product.
5. More time for Customers.
6. Increase the Staff Motivation.

Types of CRM :-

1. ACRM → Analytical Customer relationship Management : It is basically customer data analysis, its evaluation, modeling and Prediction of Customer behaviour.

2. OCRM → Operative Customer relationship Management : It mainly Supports the Actual contact with Customers conducted by Front offices workers including Sale of Products or Services and Marketing.

3. CCRM → Collaborative Customer relationship Management : It enables all company along with the distribution channels as well as all departments in a Company to work together and share information about Customer

Risks of CRM :-

1. Increased expectation from Senior Management to increase Revenues, Reduce costs, increase Market share, which may Put Pressure on the organisation and may potentially compro-mise the internal Control Structure.

2. Increased complexity of Managing Multiple channels, Technologies, Customers Relations and customer definitions.

3. Vital and confidential Customer information may be shared across new networks, System and Plat form.

4. Significant changes to the organisation attitude & beliefs placing heavy Reliance on the organisation's employee for the Successful adoption of the Solution.

→ Customer Profitability :- It is that Profit which the Firms make from Serving a customer or customers over a Specified Period of time.

It is the difference b/w the Revenue Earned from customers and the Cost associated with the Customer Relationship in a Specific Period.

Following issues should be considered when analyzing Customer Profitability :-

1. How to develop reliable customer Revenue and Customer Cost information.

2. How to Recognise future downstream Costs of Customer.

3. How to incorporate a Multi-Period horizon in the analysis.

4. How to Recognise different drivers of Customer costs.

Study Note ② Performance Evaluation and Improvement Tools.

→ Balance Score Card (BSC) : BSC is a Performance Management and Strategy development methodology that helps executives to Achieve the organisa-tion's Mission and overall business strategy.

Nature and characteristic of BSC :-

① Financial : This character is concerned for Profit of the enterprise, it focus on the Financial Measures like operating Profit, Return on Investment, Residual Income, Economic value added etc.

② Customer : This characteristic captures the Ability of the organisation to Provide Quality Goods and Services, the effectiveness of their delivery and overall customer Service and Satisfaction.

③ Internal Business Processes : This characteristic focuses on the internal Business Results that lead to financial Success and Satisfied Customer. Key Processes are monitored to ensure that outcomes will be Satisfactory.

④ Learning and Growth : This Perspective looks at the ability of employee, the Quality of information Systems and the effects of organisational alignment in Supporting Accomplishment of organisation's Goals.

→ Steps in developing BSC :-

1. To identify the key outcomes to the Success / objectives of the organisation.

2. To identify the Process that leads to these outcomes.

3. Develop Key Performance indicators for these Processes.

4. Develop Reliable data capture and its Measurement System.

5. Develop a Mechanism for Reporting these to the Relevant Managers and Staff.

6. Enact improvements Programs to ensure that Performance will be improve.

Types of Information Required for BSC :-

BSC emphasizes that financial and Non-Financial Measures Must be a Part of the information System for employee at all level of the organisation.

BSC can be used to improve strategic Performance in Several ways :-

1. The Process of developing Activity Measures will make individuals and divisions more aware of how their work fits in with the strategy of the business.

2. Individuals and divisions should Receive Regular Reports of their Performance against BSC measures relevant to their area of work.

3. Senior Management should Receives, Regular information on the organisation's overall accomplishments against BSC Measures to ensure that Strategy is being followed.

4. Outside Stakeholders may also have access to BSC Measures, helps them for a more full impression on the organisation's value.

Benefits and limitation of BSC :-

Benefits of BSC are as follows :-

1. It Avoids Management focus on short-term financial Measure.

2. It can Successfully Communicate corporate strategy to the functional heads and forcing them to develop their own Goals to achieve the corporate Missions and Goals.

3. It can Assist all Stakeholders in evaluating the firm if all the Measures are communicated externally.

4. It helps in focusing the whole organisation on the few key things needed to create break through Performance.

5. It helps to integrate various corporate programs like Re-engineering, Customer Service initiative, etc.

6. It helps in clarifying and updating the Budgets.

limitation of BSC are as follows :-

① There is no clear relation b/w BSC and shareholder value.

② It does not lead to a "Single aggregate Summary of control."

③ The Measures may give conflicting Signals and confuse Management because it focus on different fields.

④ It involves Substantial shifts in corporate culture.

→ Bench Marking :-

The Practise of Setting Targets using external information is known as "Bench Marking". It also involves a Comparison of the Actual Results with an established Standard or Target. Bench Marking is the Process with which performance is Sought to be Assessed.

In other words, Bench Marking is a process of Measuring the Performance of a company's, products, Services, or processes against those of another business considered to be the best in the Industry.

Types of Bench Marking :-

1. **Product Bench Marking** : Every organisation buy its Rival's products to find out its features and Performance, Price etc for a comparison with own Product.

2. **Competitive Bench Marking** : This has moved beyond Product-oriented Comparisons, it deals with the Comparison of Processes of functions with their competitors.

3. **Process Bench Marking (External)** : It is the Activity of Measuring Performance and functionability of the business's processes of the organisation with the Excellent Similar business Process.

4. **Internal Bench Marking** : It is an Application of Process Bench Marking within an organisation by Comparing the Performance of Similar business unit.

5. **Strategic Bench Marking** : In this, organisation should create a better Strategy in order to achieve a desired Vision of the organisation.

6. **Global Bench Marking** : It is an Extension of Strategic Bench Marking, it includes a Bench Marking Partner on a Global Scale.

Process of Bench Marking :-

1. Planning : Determination of benchmarking Goal. -Statement on the basis of Products or Services.

2. Collection of data and information : Under take Information and data collection by Selected Method to enable analysis.

3. Analysis of Gap findings : Review the findings and Produce tables, charts, and Graphs to Support the Analysis.

   Identify the Gaps in b/w our Firms and better Performers, and find effective ways to bridge the Gaps.

4. Recomendations : Making and Applying ways to bridge the Gaps, Decide the areas of Improve -ment and implement the Action plans Suitable for the Success of an organization.

5. Monitoring and Reviewing : Evaluating the bench Marking Process undertaken and the Results of the Improvement against objectives on a Regular basis for Continuous Improvements.

Conditions before launching Bench Marking :-

1. Commitment : Senior Managers should support bench-Marking and Must be committed for Continuous Improvements.

2. clarify of objectives : The objectives should be clearly defined at the preliminary Stage. Bench Marking teams should have a clear picture of their Firm's performance before approaching others for comparisons.

3. Appropriate Scope : The Scope of the work should be Appropriate in the light of the objectives, Resource, time Available.

4. Resources : Sufficient Resources must be available to complete Projects within the Required time.

5. Skills : Bench Marking teams should have Appropriate Skills and competence.

6. Communication : Stakeholders, all Staffs, and their representatives should have information of Reasons of bench Marking.

Difficulties in Implementation of Bench Marking:-

① Time Consuming : Bench Marking is time Consuming, it has Significant Requirement of Staff time and Company resources.

② lack of Management Support : Bench Marking implementation requires the direct involvement of all type of Management i.e Top level, Middle level, low level of Management.

③ Protest from Employees : If the employees of an organisation comes at protest then Bench Marking Process is not possible.

④ Paper Goals : Companies can become Pre-Occupied with the Measures. The Goal becomes not to improve Process, but to Match the best Practice at any Cost.

⑤ Copy-Paste Attitude : The key element in benchmarking is the adaption of a best Practice of other competitor for Company's need, But Sometimes Copy-Paste Attitude not be Succeed.

→ Bench Trending : It is the Process of Continuous Monitoring of Performance with a Selected Group of Bench Marking by the business leaders at anywhere in the world to Gain information that will help organisation to Take Actions to Improve its Performance.

Bench Marking is the Process of comparing the cost, time or Quality of whate one organisation does against what another organisation does.

Role of Bench Trending are as follows :-

1. Identify Your Problem areas.
2. Identify other industries that have Similar processes.
3. Identify organizations that are leaders in these areas.
4. Survey companies for Measures and Practices.
5. Visit the "best Practice" companies to identify leading edge Practices.
6. Implement new and improved business practices.

→ Statistical Quality Control (SQC) : SQC is the application of Statistical Techniques and evaluate the Quality of a Product, Service, or processes.

The two Basic categories of SQC are as follows :-

(A) Statistical Process control (SPC).

(B) Acceptance Sampling.

(A) SPC monitors Specified Quality characteristics of a Product or Services to detect whether the Process has changed in a way that will affect product Quality and to Measure the current Quality of Products or Services.

(B) Acceptance Sampling used to accept or reject a batch of items. Based on the numbers of defects in the Sample, the batch either accepted or rejected.

→ Management Information System (MIS) :- MIS is a Systematic process of Providing relevant information in Right time, in Right format to all levels of users in the organisation for effective decision Making.

MIS is also defined to be System of collection, Processing, Retrieving and transmission of data to meet the information requirement of different levels of Managers in an organisation.

Potential impact of Computers & MIS on different levels of Management :-

① The Potential impact of computers on top level Management may be Quite Significant.

② An Improvement Factor which may account for this change is the Fast development in the area of Computer Science.

③ It is believed that in future computers would be able to provide Simulation models to assist top Management in Planning their work activities.

④ Futuristic believe that Top Management will realise the Significance of techniques like Simulation, Sensitivity analysis and Management Science.

⑤ The Application of these techniques to business Problems with the help of Computers would generate accurate, reliable, timely and comprehensive information to Top Management.

(6) Computerised MIS also influence in the develop-
-ment, evaluation and implementation of
a solution to a problem under decision
Making Process.

(7) Potential impact of computers and MIS on Middle
level also be significant. It will bring a Marked
change in the process of their decision Making.

(8) At this Middle level, Most of the decisions will
be Programmed and thus will be made by the
Computer, thereby drastically reducing the requi
-rement of middle level managers.

(9) for example, in the case of inventory control
System, computer will carry Records of all
items in Respect of their Purchase, issue and
balances.

The Reorder level, reorder Quantity for each
item will also be stored in computer and
then computer will inform for the Purchases

(10) The impact of computers and MIS today at
Supervisary level is Maximum.

(11) At Supervisary Management level all managers
are responsible for routine, day-to-day
decisions and activities of the organisation
which do not require Much Judgement
and discretion.

(12) Potential impact of computer and MIS on Supervisary level will completely revolutionise the working at this level. Most of the controls in future will be operated with the help of computers.

(13) Even the need of Supervisary Managers for controlling the operations will be substantially reduced.

(14) Most of the operations / activities now performed manually will be either fully or Partially autom-ated.

objectives of MIS :-

1. To provide the managers at all levels, timely and accurate information for control of business activities.

2. To highlight the critical factors in the operation of the business for appropriate decision Making.

3. To develop a Systematic and Regular process of communication within the organisation on performance in different functional areas.

4. To use the Tools and techniques available under the system for programmed decision Making.

5. To provide best Service to customers.

6. To Gain competitive advantage.

7. To provide information Support for business planning for future.

Softwares of MIS :-

1. Bar coding and decoding.
2. General Pocket radio System.
3. Face Recognition System.
4. Digital Surveying.
5. Computer Aided Manufacturing.
6. E-commerce (used in online bidding, ordering, invoicing etc.).

Three levels of MIS :-

1. Strategic-level information Systems :- It helps Senior Management to tackle and address strategic issues and long-term trends, both within the firm and external environment. These systems are designed to provide Top-Management with information that assist them in Making long-Range planning decisions for the organisation.

2. Tactical-level Information Systems :- It Serve middle level Managers and help in Taking decisions for a Period of 2-3 years. The Managers are typically Concerned with Planning, controlling and use Summarise of Transaction to aid their decision. In other words, these systems provide Middle-level Managers with the Information they need to monitor and control operations.

③ Operational-level information Systems :- They are typically transaction process systems and help in the operational level Managers to Keep Track of elementary Activities and transactions of the organisations Such as Sales, Receipts, Cash deposits, Flow of Materials etc.

Their Purpose is to answer routine Questions and to Track Flow of Transactions. Thus, the Primary Concern of these systems is to collect, validate, and record Transactional data describing the Acquisition or disbursement of corporate Resources.

→ On-line Analytical Processing Tools (OLAP) :-
OLAP is a category of Software technology that enables analyst, Managers and executives to gain insight into data through fast, consistent, interac-tive access to a wide variety of possible views of information that has been transformed from Raw data to Reflect the real dimensionality of the enterprise as understood by the user.

characteristics of OLAP :-

1. Calculations and modeling applied across dimensions, through framework and across members.

2. Trend analysis over sequential time periods.

3. slicing subsets for on-screen viewing.

4. Drills - down to deeper levels of consolidation.

5. Reach - through to underlying detail data.

6. Rotation to new dimensional comparisons in the viewing area.

Types of OLAP :-

1. MOLAP :- MOLAP is a "Multi-dimensional online analytical processing". MOLAP is the classic form of OLAP and is sometimes refered to as Just OLAP. MOLAP stores this data in an optimized Multi-dimensional array storage, rather than in a relational data base. MOLAP tools have a very fast response time and the ability to quickly write back data into the data set.

2. ROLAP :- ROLAP works directly with Relational database. ROLAP tools do not use pre-calculated data cubes but instead pose the query to the standard relation-al database and its tables in order to bring back the data required to answer the questions. ROLAP also has the ability to drill down to the lowest level of detail in the database.

③ HOLAP :- There is no clear agreement across the industry as to what constitutes "Hybrid OLAP", except that a database will divide data b/w relational and specialized storage. HOLAP addresses the shortcomings of MOLAP and ROLAP by combining the capabilities of both approaches. HOLAP tools can utilized both pre-calculated cubes and relational data sources.

Comparison between MOLAP, ROLAP, HOLAP :-

① Some MOLAP implementations are prone to database explosion, a phenomenon causing vast amounts of storage space to be used by MOLAP database when certain common conditions are met : high number of dimensions, pre-calculated results and sparse Multidimensional data.

② MOLAP generally delivers better performance due to specialized indexing and storage optimizations, MOLAP also needs less storage space as compared to ROLAP.

③ ROLAP is generally more scalable. However, large volume pre-processing is difficult to implement efficiently so it is frequently skipped.

④ Since ROLAP relies more on the database to perform calculations, it has more limitations in the special-ized functions it can use.

(5) HOLAP encompasses a range of solutions that attempt to mix the best of ROLAP and MOLAP. It can generally pre-process swiftly, scale well, and offer good function support.

→ Tools to improve productivity and Profitability.

(A) Materials Requirement Planning (MRP or MRP I) :-

MRP is a technique which aims at to ensure that material resources (i.e Raw materials bought in components and in house sub-assembles) are made available Just before they are needed by the next stage of Production or dispatch.

It is basically a system which controls system of inventory so that up-to-date records of the status of large number of items in inventory can be kept.

An MRP system works out outputs from the Master Production schedule, order for external components, Sales demand forecast, inventory or stock records and Bills of Materials.

Aims of MRP :- The aims of MRP are to use of computers in order to :-

1. Determine for final Products what should be produced and at what time.

2. Calculate the required Production of Sub-assemblies.

3. Determine the requirements for Material based on an up-to-date bill of Materials (BOM).

4. Calculate inventories, WIP batch sizes and Manu-facturing & packaging lead times.

5. Generally control inventory by ordering bought-in components and Raw materials relevant to the order received.

Objectives of MRP are as follows :-

1. It determines the Quality and timing of finished goods demanded.

2. It determines time phased requirements of the demand.

3. It computes the inventories, WIP batch sizes and manufacturing & packing lead time.

4. It controls inventory by ordering components and Materials relevant to order received rather than ordering them from stock level point of view.

Features of MRP are as follows :-

1. Material requirement for each assembly and Sub-assembly are determined on the basis of Master production schedule, which is termed as backward technique.

2. Updating of Material requirements is done Regularly to take stock of the changes in production schedule on account of Receipt of new order, cancellation, Machine break down etc.

3. The order points for each assembly and Sub-assembly are determined in advance on the basis of delivery date and lead time.

4. Very little Safety Stocks are maintained under MRP. And under EOQ model, the Safety stocks are maintained to protect the manufacturing operations against future uncertainties.

5. Constant check is being exercised to See that the items have been ordered and received in time.

Data Requirements for MRP are as follows :-

1. Master Production Schedule :- It specifies that Quantity of each finished unit of products to be produced along with the time at which each unit will be required.

2. Bill of Material file :- This file specifies the Sub-assemblies, components and Materials requirement for each item of finished goods.

3. Inventory file :- It maintains details of items in hand for each sub-assemblies, components and Materials required.

4. Routine file :- This files specifies the Sequence of operations required to manufacture components, Sub-assemblies and finished goods.

5. Master Parts file :- It contains information about the production time of Sub-assemblies and components produced internally and lead time for externally procured items.

Conditions / Prerequisites for Sucessful operation of MRP :-

① The latest production and purchasing schedules prepared should be strictly followed day to day changes.

② Raw materials, Sub-assemblies and components required for production should be pre-determined in Quantifiable terms.

③ Work-Force must be appraised of the system and the need for absolute followance to the schedules Prepared.

④ Necessary internal control System should be developed to ensure total followance to the Schedules.

⑤ Accuracy of the data Supplied is vital to the MRP System.

Methods of operation of MRP :-

① Gross Requirements :- The demand for the components or assembly including Customers order and forecasts.

② Scheduled Receipts :- The expected delivery dates and Quantities of shop or purchase order already put in hand.

③ Projected Available Balance :- The number of items projected to be in inventory at the end of each Period.

(opening balance + Receipts made - issued items).

(4) Planned order Release :- The order quantities required to ensure that the projected available balance does not drop below zero at any Pre-set Safety level.

Benefits of MRP are as Follows :-

(1) Significantly decreased inventory levels and corresponding decreases in inventory carrying Costs.

(2) Decreasing the Problem of Storage.

(3) Increased effectiveness of Production Supervisors.

(4) Better customer Services by on time delivery.

(5) closer coordination of the Marketing, engineering and finance activities with the Manufacturing activities.

Manufacturing Resource Planning (MRP II) :

MRP II utilizes software applications for coordinating manufacturing processes from product planning, parts purchasing, inventory control to product distribution. MRP II is a Method for the effective planning of all the resources of a Manufacturing company.

Essentials elements of MRP II :-

1. Demand forecast :- which takes into account firm orders and Sales forecasts.

2. Production Planning :- which converts the demand forecast into a broad Statement of output requirements and the necessary production program.

3. Resource Planning :- which determines the manufacturing resources required to meet the production program.

4. Master Production Schedule :- which is prepared on the basis of the information obtained from the demand forecasting.

5. Bills of Material :- It is storage of basic data for defining Products i.e lists of the components and Material Required to produce the end-product.

6. Shop-Floor Control :- which monitors production against the plan and feeds back which enables the master production schedule and capacity and Material plans to be updated.

→ Enterprise Resource Planning (ERP):
ERP means the techniques and concepts for integra-ted management of business as a whole from the point of view of effective use of Management resources to improve the efficiency of enterprise Management.

Characteristics of ERP are as follows :-

① Flexibility :- An ERP system is Flexible enough to Respond fast to the changing needs of the organization.

② Modular and open :- ERP system has the open architecture i.e any modules can be interfaced or detached without affecting the use of rest of the Modules.

③ Comprehensive :- It Supports various organizational functions and is Suitable for wide range of business organisation.

④ Beyond the company :- It is not confined to the organizational boundaries rather than it is extended to the external business entities connected to the organization with online connectivity.

⑤ Best Business Practice :- It has inbuilt best business Practices applicable worldwide and imposes its own Strategies and logics over existing culture and Processes of the organization.

features of ERP are as follows :-

1. It provide multi-platform, Multi-Facility, multi-mode of manufacturing, multi-currency.

2. It supports strategic and business planning activities, operational planning, execution activities, material & resource planning.

3. It has end-to-end supply chain management to optimize to overall demand and supply.

4. It enhances customer services through increased efficiency in core activities.

5. It bridges the information gap across organization.

6. ERP is the solution for better project management.

7. It allows introduction of latest technology like electronic funds transfer, internet, E-commerce etc.

8. It eliminates business problems like material shortage, productivity, customer service, cash management, Quality, prompt delivery.

Evaluation of ERP Package and its application :-

Evaluation of the right ERP Package is considered as more crucial step, Evaluation and Selection involves :-

1. checking whether all functional aspects of the business are duly covered.

2. checking whether all the business functions and processes are fully integrated.

3. checking whether all the latest information technology trends are covered.

4. checking whether the vendor has customizing and implementing capabilities.

5. checking whether the return on investment is optimum.

Benefits from ERP :

→ Tangibles Benefits of ERP are as follows :- (Monetory term)

1. Lowering the cost of Products and Services purchased.
2. Significant paper and postage cost reduction.
3. Improve the productivity of Process and Personnel.
4. Inventory Reduction.
5. lead time Reduction.
6. Automated ordering and Payment, lowering Paper costs.

→ Intangible Benefits :- (Non-Monetory term)

1. Can reach more vendors, producing more competitive bids.
2. Accurate and faster access to data for timely decisions.
3. Save enormous time and effort in data entry.
4. Uniform Reporting according to Global standards.
5. Improved customer response.
6. Increase organisational transparency and Responsibility.

Reasons for failure of ERP :-

1. lack of effective project Management.
2. Inability to resolve issues and make decisions in timely manner.
3. Resources not available when needed.
4. Software fails to meet business needs.
5. Improper communication.
6. Failure in Gap analyis.
7. Failure to identify future business needs.
8. Failure to make available user-friendly checklist or guidelines.

→ Total Productivity Management (TPM) :-

① TPM provides a system for coordinating all the various improvement activities for the company so that they contribute to the achievement of corporate objective.

② TPM originated as an extension of TQM principles to operations whereby each machine operator is sufficiently trained and motivated to operate and Maintain the machine in Question.

③ TPM is a management process developed for improving productivity by making processes more reliable and less wasteful.

Steps to Start TPM :-

① Identify the key people.

② Management should learn philosophy.

③ Management must promote the philosophy.

④ Training for all the employees.

⑤ Identify the areas where improvement are needed.

⑥ Make an implementation plan.

⑦ Form an autonomous group.

Benefits of TPM are as follows :-

1. A set of new management goals will be developed by the management, using the skills and training provided during the implementation of the TPM.

2. Time bonding and better accountability.

3. Improved Quality and total cost competitiveness.

4. Productivity and Quality team training for problem solving.

5. Motivated People function better all the time.

→ Total Quality Management (TQM) :-

TQM is an active approach encompassing a company-wide operating philosophy and system for continuous improvement of Quality. It demands cooperation from everyone in the company, from the Topmanagement down to workers.

Three Principles of TQM are as follows :-

1. Customer Focus.

2. Managerial leadership.

3. Belief in continuous improvement.

Three core concepts of TQM are as follows :-

① Quality control : It is concerned with the past and deals with data obtained from previous production, which allow action to be taken to stop the production of defective units.

② Quality Assurance : It deals with the present and focuses to create and operate appropriate systems to prevent defects.

③ Quality Management : It concerned with the future and manages people in a process of continuous improvement to the products and services.

Types of Quality Costs :-

① Prevention costs : like Quality engineering, Quality planning, New product Review, process planning, process control, Quality Audit, Tranings etc., these costs inccured to prevent defects.

② Appraisal costs : like Inspections, Reviewing, field testing, Painting, Assembly, welding, molding, etc., these costs are incurred to ensure the Quality of Products/Services meets the customer's needs.

③ External failure costs : like warranty cost, cost of Return, Replacement cost, complaints, loss of sales, Penalties etc., these costs incurred due to external factors.

④ Internal failure costs : like Scrap, Rework, Retesting, loss of time etc., these costs incurred due to internal factors.

→ DU-PONT ANALYSIS :- The DU PONT analyis is a framework for analyzing fundamental performance of the company in terms of its Return on equity.

ROE shall be computed by using following formula :-

$$ROE = \text{Net Profit Margin ratio (\%)} \times \text{Assets Turnover Ratio (\%)} \times \text{Financial leverage (times)}$$

$$= \frac{\text{Net Income}}{\text{Net Sales}} \times \frac{\text{Net Sales}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Total equity}}$$

DU PONT Analyis is a useful technique used to decompose the three drivers :-

(A) Operating efficiencies.

(B) Asset used efficiency.

(C) Financial leverage.

DU-PONT ANALYSIS ILLUSTRATION

ILLUSTRATION 1:

The following financial data for two years has been extracted from the Annual Report 2016-17 of one of the world's largest generic pharmaceutical companies having a strong presence in over 170 countries. Though the company's mission is — 'To be a leading global healthcare company which uses technology and innovation to meet everyday needs of all patients', yet it also wants to keep its shareholders happy by giving them a fair rate of return. For gauging return for shareholders, the company is using Return on Equity (ROE) as one of the metrics of performance evaluation. Because of intense competition, in recent years, its ROE is under pressure and to maintain the level of ROE, the company is changing its business model — in that, it is varying its margins, assets utilization and leverage.

You are required to use suitable DU PONT Analysis using the financial data given below and show how the ROE of the company is changing due to its margins, assets utilization and leverage over a period of two years. You are also required to give your comment on the change on these parameters.

(10 MARKS)

(Rs In Lakh)

Statement of Profit and Loss	2016	2017
Relevant financial data		
Total Revenue	7,125.80	8,431.55
Profit before Tax	1,421.46	2,011.86
Profit after Tax	1,123.96	1,507.11
Dividend	160.58	160.58
Tax on Dividend	26.05	27.29
Retained Earnings	937.32	1,319.24

(Rs In Lakh)

Balance Sheet	2016	2017
ASSETS:		
Fixed Assets	3,346.11	3,768.63
Investments (Current and Non-Current)	1,035.15	2,601.82
Other Net Assets (Current and Non-Current)	3,413.67	3,746.08
Total	7,794.93	10,116.53
EQUITY AND LIABILITIES:		
Share Capital	160.58	160.58
Reserves and Surplus	7,389.70	8,708.94
Net Worth	7,550.28	8,869.52
Loan Funds (Current and Non-Current)	12.20	965.81
Other Current Liabilities	232.45	281.20
Total	7,794.93	10,116.53

DU-PONT ANALYSIS ILLUSTRATION

SOLUTION:

DU PONT ANALYSIS...	2016	2017
Net Profit Ratio	15.77%	17.87%
Assets Turnover Ratio	0.914	0.833
Assets to Equity Ratio	1.032	1.141
Return on Equity	14.88%	16.98%

The Return on Equity (ROE) has increased in 2017 from 14.88% to 16.98% and the main reasons for the increase are- margin and leverage which have increased but due to lower assets utilization ROE has not increased by its full potential. If the Company concentrates on better utilization of the assets, its ROE will further improve.

ILLUSTRATION 2:

The following financial data for three years has been extracted from the Annual Report 2019-2020 of ABC LTD.

You are required to use DU PONT Analysis using the financial data given below and show how the ROE of the company is changing due to change in its margins, assets utilization and leverage

Statement of Profit and Loss	2018	2019	2020
Total Revenue	6,422.73	7,125.80	8,431.55
Profit before Tax	1,151.39	1,421.46	2,011.86
Profit after Tax	960.39	1,123.96	1,507.11
Dividend	224.81	160.58	160.58
Tax on Dividend	36.72	26.05	27.29
Retained Earnings	698.86	937.32	1,319.24

Balance Sheet	2018	2019	2020
ASSETS:			
Fixed Assets	3,120.72	3,346.11	3,768.63
Investments (Current and Non-Current)	570.65	1,035.15	2,601.82
Other Net Assets (Current and Non-Current	3,574.51	3,413.67	3,746.08
Total	7,265.88	7,794.93	10,116.53
EQUITY AND LIABILITIES:			
Share Capital	160.58	160.58	160.58
Reserves and Surplus	6452.37	7389.70	8708.94
Net Worth	6612.95	7550.28	8869.52
Loan Funds (Current and Non-Current)	440.48	12.20	965.81
Deferred Tax	212.45	232.45	281.20
Total	7265.88	7794.93	10116.53

DU-PONT ANALYSIS ILLUSTRATION

SOLUTION:

DuPont Analysis provides the drivers of ROE in terms of margins, assets utilization and leverage thereby provides important information in understanding business model of a company. DuPont Analysis decomposes ROE into three components as given below:

ROE = (PAT / Sales) x (Sales / Assets) x (Assets / Equity)

The above equation shows that ROE is driven by Profit Margin (PAT / Sales), Assets Utilization or Assets Turnover (Sales / Assets) and how much of the assets are financed by equity and debt, i.e. a measure of leverage (Assets / Equity) Using the above decomposition, we obtain various decomposed components of ROE over a period of five years which are given below:

Particulars	2018	2019	2020
ROE	14.527 %	14.878 %	16.989 %
PAT / SALES	14.953 %	15.773 %	17.875 %
SALES TO ASSETS	0.884	0.914	0.833
ASSETS TO EQUITY (NET WORTH)	1.099	1.032	1.141

Raghav ACADEMY

Study Note 3 : Economic Effciency of the Firm - Performance Analysis.

Techniques and Applications of Economics :-

When we Talk about an Economy of a country then we discussed about demand, elasticity of demand, Price determination under various Market.

We also discuss about the Total cost, Average Cost, Marginal cost, Marginal Revenue, Profit Maximi-zation, Revenue Maximization and Cost Minimi-zation as well.

So when we Measure all the above discussed elements then Some techniques and formulas are being used by our Economist as well as by Accountants.

In this chapter we will learn Some of the Techniques to determine those discussed elements Such as Marginal cost, Marginal Revenue, Marginal Profit, Elasticity of demand, Average Cost, Average Revenue, Average Profit, etc.

Such Techniques are as follows :-

- Total Cost (TC) = Fixed cost (FC) + Variable cost (VC)
  or = unit x Per unit cost.
- Marginal Cost = Differentiate Total Cost
- Average Cost = $\frac{\text{Total cost}}{\text{units.}}$
- Average Variable cost = $\frac{\text{Total Variable cost}}{\text{units.}}$
- Average Fixed cost = $\frac{\text{Total Fixed Cost}}{\text{units.}}$
- Total Revenue = units sold x Price Per unit
- Average Revenue = $\frac{\text{Total Revenue}}{\text{units sold}}$
- Marginal Revenue = Differentiate Total Revenue.
- Profit = Total Revenue - Total Cost
- Maximum Profit = Marginal Revenue - Marginal Cost

→ How to find the level of output at which Marginal Cost, Average cost, Average Variable cost, Marginal Revenue, Average Revenue, etc. shall be Minimum or Maximum, as Per Question Required to do.

Following three steps shall be Taken to find out such level of output :-

Step ① :- Differentiate the discussed element.

Step ② :- Equate Step ① to Zero, by which level of output came.

Step ③ :- Again Differentiate Step ①.

Decision Making :-

① If the Value arise on step ③ is positive then the Cost / Revenue etc. shall be Minimum at the output came at step ②.

② If the Value arise on step ③ is Negative then the Cost / Revenue etc. shall be Maximum at the output came at Step ②.

③ If the Value arise on step ③ is Positive as well as Negative (Means the Value is in the form of under Root) then the Cost / Revenue etc. shall be Increase when output is greater than Step ③,

and shall be decrease when output is less than Step ③ output.

Study Note - 3 Economic efficiency of the Firm - Performance Analysis.

→ Demand Schedule : The demand schedule explains the relationship between Price and demand. Demand schedule are of two types :-

a) Individual Demand Schedule.
b) Market Demand Schedule.

Individual Demand Schedule :- Various Quantities of commodity that would be Purchased by an Individual Consumer at different Price is called Individual demand Schedule.

For Example :-

Price (in ₹)	Demand (in unit)
₹ 50	10
₹ 40	20
₹ 30	30
₹ 20	40
₹ 10	50

Market Demand Schedule :- Various quantities of Goods that would be Purchased by all the Consumer in the Market is called Market demand schedule.

For Example :-

Price (₹)	Demand of Products (units) A	B	C	D	E	Market Demand (units)
₹10	35	30	25	25	15	135
₹20	30	25	20	20	10	105
₹30	25	20	20	15	0	80
₹40	20	15	15	10	0	65
₹50	15	10	10	0	0	45

→ Demand Curve : There is inverse relationship b/w Price and Demand, So the Individual demand curve slopes shall be downwards from left to Right.

DEMAND CURVE. (Indirect Relation)

→ Derived Demand : The commodities which are not needed for direct consumption but are demanded to help in the Production of other commodities, are known as Derived Demand.

For Example, the demand for Raw Materials, labour, Machines etc.

→ Determinants of demand on which demand depends :-

① Price of the Commodity.

② Price of Substitutes.

③ Price of Complementary Goods.

④ Income of household.

⑤ Taste and Preferences.

⑥ The amount annually spent on advertisement of the Product and on the Sales Promotion.

→ Exceptions of law of Demand :-

① Giffen Paradox : According to Sir Robert Giffen even though the Price for necessary goods rise but demand for them will not be decrease, Such Goods are called Giffen Paradox.

Example : wheat, Rice, Bread, Milk etc.

② Prestigious Goods : The law of demand will not operate in case of Prestige Goods like diamonds, cars, Gold, etc. The demand for these Goods does not decrease with the rise in the Price as these Goods are attached with status of Public.

③ Speculative Business : The law of demand do not operate in case of the Speculative Business. If People think that the Prices of Goods Increase in the future, now they will buy more units of that commodity.

This is against to the law of demand.

④ Trade cycles : The law of demand do not operate in Periods of Trade cycles. During the Prosperity period People may buy more goods at higher Prices.

In the Period of depression, People buy fewer Goods even the Prices are low.

⑤ Ignorance of the Customers : The law of demand is not applicable in case of the ignorant consumers.

By ignorance People think that high Priced Goods are Qualitative Goods. Therefore the consumers may buy that Goods even at high Prices.

→ Income Demand : Income demand explains the relationship between the Income and demand. Other factors Remains same, when the Income Increases then demand for the commodities will also increases.

Thus, Direct Relationship exist between Income and demand.

For Example :-

Income (₹)	Demand (units)
₹ 100000	5000
₹ 200000	10000
₹ 300000	15000

Diagrammatic Representation :-

Income Demand curve (upward Rising from left to Right)

An Exception of Income Demand :-

Inferior Goods : In case of Inferior Goods when the Income increases then the demands for inferior Goods decreses.

If the Income of the People increases then they Purchase Premium Quality of food Grain like wheat and Rice and they starting dislike the inferior Goods.

Thus, Indirect Relationship exist between Income and Inferior types of Goods.

DEMAND OF INFERIOR GOODS.

→ CROSS DEMAND : If there is a change in the demand for one commodity due to the change in the Prices of related Goods Such as substitutes and complement-ary Goods, this change is known as Cross demand.

Meaning of Substitutes Goods : like Tea and coffee, if the Price of coffee increases then the demand of its Substitutes i.e Demand of Tea will also Increase

Substitute Goods Demand curve (upward from left to Right)

Positive Relation. (Direct relation)

Meaning of complementary Goods : like Car and Petrol, If the Price of Petrol decreases then the demand for cars shall be Increases.

Complementary Goods demand curve. (downward from left to Right)

Indirect Relation.

Expansion or Contraction of Demand :- Expansion or contraction of demand indicates the change in Quantity demanded due to change in the Factors except Price

It means changes in demand due to change in Income, change in Price of a Substitute or complementary goods, change in habits, change in Taste, Technological change etc.

→ Elasticity of Demand :- The rate of change in demand to a change in Price is called elasticity of demand.

If the change in demand is more than the change in the Price then it is called as elastic demand.

Similarly, if the change in demand is less than the change in the Price then it is called as inelastic demand.

$$\text{Elasticity of Demand} = \frac{\text{Proportionate change in Demand}}{\text{Proportionate change in Price.}}$$

$$\text{or} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Types of the Elasticity of Demand : There are three types :-

1. Price elasticity of Demand.
2. Income elasticity of Demand.
3. Cross elasticity of Demand.

Types of Price Elasticity of Demand : There are 5 types :-

1. Perfectly elastic demand. $\varepsilon d = \alpha$
2. Perfectly inelastic demand. $\varepsilon d = 0$
3. Relatively elastic demand. $\varepsilon d > 1$
4. Relatively inelastic demand. $\varepsilon d < 1$
5. Unitary elastic demand. $\varepsilon d = 1$

Perfectly elastic demand ($\varepsilon d = \alpha$) : when a small change in Price brings an infinite change in demand.

Perfectly inelastic demand ($\varepsilon d = 0$) : when a change in Price occurs, but not brings any change in demand.

Perfectly elastic demand ($\varepsilon d > 1$) : when the Proportionate change in demand is more than the Proportionate change in Price.

Relatively inelastic demand ($\varepsilon d < 1$) : when the Proportionate change in demand is less than the Proportionate change in Price.

Unitary elastic demand ($\varepsilon d = 1$) : when the Proportionate change in demand and the Proportionate change in Price are Equal.

→ Income Elasticity of demand : It explains the Proportionate change in demand due to change in the Income.

$$= \frac{\text{Proportionate change in Demand}}{\text{Proportionate change in Price}}$$

Types of Income elasticity of demand :-

① Zero Income elasticity of demand ($\varepsilon_Y = 0$) : when the change in the Income fails to bring any change in demand.

② Negative Income elasticity of demand ($\varepsilon_Y < 0$) : when the demand decreases with the Increase in the Income.

③ Unitary Income elasticity of demand ($\varepsilon_Y = 1$) : when the change in the demand is equal to Proportionate change in Income.

④ High Income elasticity of demand ($\varepsilon_Y > 1$) : when the change in the demand is more than the Proportionate change in Income.

⑤ low Income elasticity of demand ($\varepsilon_Y < 1$) : when the change in the demand is less than the Proportionate change in Income.

→ Cross Elasticity of Demand : The rate of change in the demand for one commodity due to change in the Price of its Substitutes or its complementary Goods is called cross elasticity of demand.

$$= \frac{\text{Percentage change in the demand for commodity (x)}}{\text{Percentage change in the Price of (y) commodity.}}$$

Methods of Measurement of Cross Elasticity of demand:

① Percentage Method :

$$Ed = \frac{\text{Percentage change in Demand}}{\text{Percentage change in Price}}$$

② Total outlay i.e Expenditure Method :

= Price Per unit × Quantity demanded.

③ Point Elasticity Method :

$$Ed = \frac{dQ}{dP} \times \frac{P}{Q}$$

④ Arc Method :

$$Ed = \left[\frac{\Delta Q}{\Delta P}\right] \times \left[\frac{P_1 + P_2}{Q_1 + Q_2}\right]$$

Study Note 4 - Enterprise Risk Management.

→ **CORPORATE FAILURE** : Several techniques have been developed to help in Prediction, why companies fail. However, these are not accurate and donot Guarantee that the Prediction will turn out to be True or not.

These Techniques / Models are NCAER Model, the Z-Score Model, Argenti Model, and the VK model.

→ **NCAER MODEL** : According to NCAER Model, an Industrial undertaking may be financially viable, if its three elements are proved to be positive. The NCAER study on corporate Distress prediction prescribed the following three elements for predicting the stages of corporate Sickness :-

A) Cash Profit Position (a profitability measure)
= Net Profit + Non-Cash Expenses.

B) Net working capital Position (a liquidity measure)
= Current Assets - Current liabilities.

C) Net worth Position (a Solvency measure)
= Equity shareholder's fund - Accumulated loss.

Conclusion :

1) In a firm, if any of the above three elements are found to be Negative → Then it may be considered that the firm has a tendency of becoming Sick.

2) If any two of the above three elements are found to be negative in a firm → Then it may be considered that the firm possesses introduction of Sickness.

3) If all the above three elements are found to be negative in a firm → Then it may be considered that the firm is fully Sick.

→ The Altman Model : Z-Score Model.

Edward I. Altman developed a Multivariate Model of corporate distress Prediction on the basis of Multiple Discriminant Analysis.

In his study, Altman selected 33 failed and 33 Non-failed firms, of which 22 Accounting and Non-Accounting Ratios were taken into consideration which had been deemed to be the Predictors of corporate Distress.

Of the 22 Accounting Ratios, Professor Altman selected 5 Ratios which had been deemed as the best predictors of corporate Distress Prediction.

The Purposes of these five selected Ratios are as follows :-

(i) To Measure liquidity Position of the firms.

$$= \frac{\text{Working Capital (CA-CL)}}{\text{Total Assets}}$$

(ii) To Measure Reinvestment of Earnings of the firms.

$$= \frac{\text{Retained Earnings}}{\text{Total Assets}}$$

(iii) To Measure Profitability of the firms.

$$= \frac{\text{EBIT}}{\text{Total Assets}}$$

(iv) To Measure financial leverage conditions of the firm.

$$= \frac{\text{Market Value of Equity \& Preference}}{\text{Book Value of Total debt}} \text{ or } \frac{\text{Book Value of Equity.}}{\text{Total liabilities.}}$$

The Altman's Z-Score Model further splitted into three categories :-

1. Model 2A introduced in 1968.
2. Model 2B introduced in 1983.
3. Model 2C (Revised Z-Score formula).

→ FORMULA of MODEL 2A (1968) :-

$$\text{Z-Score Value} = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$$

where,

$$X_1 = \frac{\text{Working Capital}}{\text{Total Assets}}$$

$$X_2 = \frac{\text{Retained Earning}}{\text{Total Assets}}$$

$$X_3 = \frac{\text{EBIT}}{\text{Total Assets.}}$$

$$X_4 = \frac{\text{Market Value of Equity \& Preference}}{\text{Book Value of Total Debt.}}$$

$$X_5 = \frac{\text{Sales}}{\text{Total Assets.}}$$

Decision Making :-

if Z-Score Value > 2.99 (Greater than) → then the firm shall be Non-failed or Non-Distressed.

if Z-Score Value < 1.81 (less than) → then the firm shall be failed or Distressed.

if Z-Score Value ≥ 1.81 but upto 2.99 → then the firm shall be the Mixture of failed and Non-failed firm.

→ FORMULA OF MODEL 2B (1983) :-

Z-Score Value $= 0.717x_1 + 0.847x_2 + 3.107x_3 + 0.420x_4 + 0.998x_5$

where,

$$X_1 = \frac{\text{Working Capital}}{\text{Total Assets}}$$

$$X_2 = \frac{\text{Retained Earning}}{\text{Total Assets}}$$

$$X_3 = \frac{\text{EBIT}}{\text{Total Assets}}$$

$$X_4 = \frac{\text{Book Value of Equity}}{\text{Total Liabilities.}}$$

$$X_5 = \frac{\text{Sales}}{\text{Total Assets}}$$

Decision Making :-

if Z-Score Value > 2.90 (Greater than) → then it is a Safe Zone i.e Firm shall be Non-Failed.

if Z-Score Value < 1.23 (less than) → then it is a Distress Zone i.e Firm shall be Failed.

if Z-Score Value ≥ 1.23, upto 2.90 → then it is a Grey Zone i.e it need further Investigation.

FORMULA OF MODEL 2C (Revised Z-Score formula) :-

$$\text{Z-Score Value} = 6.56x_1 + 3.26x_2 + 6.72x_3 + 1.05x_4$$

where,

$$x_1 = \frac{\text{Working Capital}}{\text{Total Assets}}$$

$$x_2 = \frac{\text{Retained Earning}}{\text{Total Assets}}$$

$$x_3 = \frac{\text{EBIT}}{\text{Total Assets}}$$

$$x_4 = \frac{\text{Book Value of Equity}}{\text{Total Liabilities.}}$$

Decision Making :-

if Z-Score Value > 2.60 (Greater than) → then it is a Safe Zone i.e the firm shall be Non-Failed.

if Z-Score Value < 1.10 (less than) → then it is a Distress Zone i.e the firm shall be Failed.

if Z-Score Value ≥ 1.10 but upto 2.60 → then it is a Grey Zone i.e it need further investigation.

Study Note 6 : Valuation Models

Economic Value Added (EVA) :- This analysis is based on the Premise that shareholder value is created by Earning a Return in excess of the company's Cost of Capital. EVA is defined as excess profit of a firm after charging the cost of Capital.

EVA shows a Residual income after charging the Company for the Cost of Capital. It Represents the Value added to the shareholders by generating operating profits in excess of the COC employed in the business.

$$EVA = \underset{(NOPAT)}{EBIT(1-T)} - (WACC \times \text{Capital employed})$$

$$\text{or} = (ROC - WACC) \times \text{Capital employed.}$$

Market Value Added (MVA) :- It is the value added to the business by management since the business was established, over and above the money invested by the owners.

$$MVA = \underset{(\text{Debt} + \text{Equity})}{\text{Market Capitalisation}} - \text{Invested Equity Capital.}$$

→ Total Value of the Firm by FCFF $= \dfrac{FCFF(1+g)}{WACC - g}$.

Here,
FCFF = Free Cash Flow to Firm.
g = Growth Rate.
WACC = Weighted Average Cost of Capital.

→ Value of the Firm by FCFE (equity) $= \dfrac{FCFE(1+g)}{Ke - g}$.

Here,
FCFE = Free Cash Flow to equity.
Ke = Cost of Equity.

→ FCFE = (NOPAT − Interest) + Depreciation and Amortisation − Capital expenditure − change in working Capital − Principal Repayments + Proceeds from new debt issues.

or
FCFE = FCFF + Borrowings − Interest (1−T) − Principal Repaid.

or
FCFE = EPS − (capital expense − depreciation) (1 − debt Ratio) − change in W.C (1 − debt Ratio)

→ Value of the Firm when inflows of Each year are given

$$= \text{P.V of Inflows} + \frac{\text{Terminal inflow}(1+g)}{k_e - g}$$

Terminal inflows are Taken, when inflows continue to Receivable.

→ Value of Equity Firm = Total value of Firm − Preference shares − Debt.

→ P/E Ratio (Normal) $= \frac{MPS}{EPS}$

→ P/E Ratio (for high Growth)

$$= \frac{\text{Payout Ratio} \times (1+g) \times \left(1 - \frac{(1+g)^n}{(1+r)^n}\right)}{(r-g)} + \frac{\text{Payout Ratio} \times (1+g)^n (1+g^n)}{(r-g^n)(1+r)^n}$$

Minimum Price of the warrant
= (Market Price of Common Stock − Exercise Price) × Exchange Ratio

Warrant Premium
= Market Price of Warrant − Minimum Price of warrant

Conversion Ratio = $\frac{\text{Par Value of Convertible Security}}{\text{Conversion Price}}$

Conversion Value = Conversion Ratio × Market Value Per share of the Common Stock.

Conversion Premium = Market Price of Convertible Preferred Stock − Higher of the Security value and conversion value.

Security Value of preferred Stock = $\frac{\text{Dividend}}{\text{Expected Return}}$.

Value of Stock by Net Asset or Intrinsic Method. = $\frac{\text{Net Asset Available to Equity share holders}}{\text{Number of share (equity shares).}}$

Computation of Net Asset Available to Equity shareholder :

Particulars.	(Amount)
Total Market Value or Realisable Value of fixed and current Asset	₹ xxxx
Value of Goodwill	₹ xxxx
Market Value of Non-Trading Investment	₹ xxxx
	₹ xxxx
less : External Liabilities	(₹ xxxx)
less : Preference share capital and arrear cummulative preference dividend.	(₹ xxxx)
Net Asset Available to Equity shareholder	₹ xxxx

Note : Ignore all types of fictitious Asset Such as Preliminary Expense, debit balance of Profit and loss A/c etc.

Yield Value Per share :-

Value of Stock by Capitalisation of Profit $= \frac{\text{Capitalised Value of Profit}}{\text{No. of Equity shares}}$

Capitalised Value of Profit $= \frac{\text{Average Profit (FMPAT)}}{\text{NRR}}$

Value of Stock by Capitalisation of dividend. $= \frac{\text{Capitalised Value of Dividend}}{\text{No. of Equity shares}}$

Capitalised Value of Dividend $= \frac{\text{DIVIDEND}}{\text{NRR}}$

Value of Stock by Percentage of Dividend

$$= \frac{\text{Rate or Percentage of Dividend of Concerned Company}}{\text{Rate or Percentage of Dividend of Industry}} \times \text{Paid up value of one share.}$$

Value of Stock by EPS Method

$$= \frac{\text{EPS of the Concern Company}}{\text{EPS of the Industry}} \times \text{Paid up value of one share.}$$

FAIR VALUE METHOD :-

$$\text{Value Per share} = \frac{\text{Intrinsic Value Per share} + \text{Yield Value Per share}}{2}$$

Study Note - 7 VALUATION OF ASSETS AND LIABILITIES.

PART (1) Valuation of Inventories.

Introduction :-

(1) An Inventory valuation allows a company to Provide a Monetary Value for items that Make up their Inventory.

(2) Inventories are usually the one of the ToP three Asset of Current nature i.e Current Asset of Manufacturing, or / and Trading business.

(3) So Proper Measurement of Inventories is Necessary to assure Accurate Financial Statements.

(4) If Inventory is not Properly Measured then Expenses and Revenues cannot be properly Matched and Cost cannot be Properly measured and a company could make Poor business decisions.

(5) There are three types of Nature of business Activities i.e Trading, Manufacturing, Service provider. They have different Policy for Valuation of Inventory.

(6) A Trader substantially sells Goods in the Same Physical form as that in which it acquires them.

Its cost of Sales is therefore the Acquisition Cost of the Goods that are Sold.

(7) A Manufacturing Company converts Raw Material & Purchared Parts into Finished Goods. Its Cost of Sales Includes the Conversion costs as well as the Raw Material & Parts Costs that it sells.

A Manufacturing Company has three types of Accounts :
→ Material A/c, WIP A/c, finish Goods A/c.

(8) Service organisations furnishes Intangible Services, Service organisation May have Material Inventory such as Equipme-nts of a hospital. Similarly Profesional Service firm may have Intangible Inventories Consisting of Costs that have been incurred on behalf of clients but have not Yet been billed to clients.

These Inventories, often called Jobs in Progress or Unbilled Costs which is correspond to WIP Inventories in a Manufacturing company.

And Service organisations do not have finished Goods Inventory.

VALUATION OF INVENTORIES :-

→ Cost of Inventories : Cost of Inventory can be classified as :-

A) Cost of Purchase,
B) Cost of Conversion and
C) Other Costs incurred in bringing the Inventories to Present location and Condition.

A) Cost of Purchase : Cost of Purchase includes :-

→ Purchase Price, inclusive of Government levies.
→ Import duty and Import related Expenses.
→ Warehousing and Stock Keeping Expenses.
→ Handling cost directly related to the Acquisition.

B) Cost of Conversion of Inventory : Conversion Cost includes :

→ Direct labour.
→ Variable Manufacturing Overheads, on the basis of Normal Capacity.
→ Fixed Manufacturing Overheads, on the basis of Normal Capacity.

C) Other Relevant Costs :- Costs incurred in bringing the Inventories to their Present location and condition such as Designing Cost, Transportation Cost.

→ Costs which are not be considered during Valuation of Inventories :- Certain Costs are excluded in Valuing Inventory are :

A) Abnormal Amounts of Wasted Materials, labour or other abnormal Production Costs.

B) Storage costs unless they are essential to the Production Process.

C) Administrative overheads that do not contribute to bringing Inventories to their Present location and condition.

D) Selling Costs.

VALUATION OF INVESTMENTS - BONDS AND SHARES :-

→ Classification of Investments :-

① An Enterprise that distinguish between Current Asset and long term Asset in its financial statements should present current Investment as Current Assets and long term Investments as Non-current Assets.

② Enterprises that do not distinguish between Current Asset and Non-current Investments in their Balance sheet should Nevertheless make a distinction for Measurement Purposes and determine the Carrying Amount for Investments.

③ Investments held Primarily to Protect, Facilitate or further existing business or Trading relations, often called Trade Investment.

④ Investments that are not made with the Intention that they will be available as additional Cash Resources are classified as long term.

⑤ Other Investments such as Investment Properties which are intended to be held for a number of Years for the Purpose of Generation of Income and Capital Gain, there are classified as Long Term Asset.

→ Cost of Investments :-

① The Cost of an Investment includes Acquisition charges such as brokerages, fees, duties and Bank fees, etc.

② If an Investment is Acquired by issue of shares or other Securities then the Acquisition cost shall be the Fair Value of the Securities issued (not nominal or Par Value).

③ If an Investment is Acquired in Exchange of any another Asset then the Acquisition Cost of the Investment is determined by reference to the Fair Value of the asset Given.

④ Any Interest, Royalties, Dividends and Rentals receivables in Connection with an Investment are generally regard as Income being the RoI.

→ Carrying Amounts of Investments :-

Current Investments should be carried in the Balance sheet either :

→ on Market Value, or
→ the lower of Cost and Market Value, on a Portfolio Basis.

And long term Investments or Assets should be carried in the Balance sheet at either :

→ Cost, or
→ Revalued Amounts or
→ lower of Cost and Market Value in Case of Marketable Securities, on a Portfolio Basis.

Note : Any Decline from Cost to M.V in Case of Permanent Investment (long term) shall be ADJUSTED.

VALUATION OF SHARES :- Following are the Various Methods of Valuation of shares :-

① Dividend Discount Model :- In this Model we find out Present Value of Dividend Receivable in future.

∴ Value Per share = Future Dividend × PVF

or = $\frac{\text{Future Dividend}}{K_e}$, if Dividend receivable are Same in every year.

② Constant Dividend Model / Gordon's Growth Method :- This Model is used to determine the Intrinsic Value of a stock based on a future series of Dividends that Grow at a Constant Rate.

∴ Value Per share = $\frac{D_1}{K_e - g}$

③ Earning Capacity Capitalisation Method :- This Method assumes that an enterprise is expected to Make Profit. Thus, the Capitalisation of the company or its value is equal to the Capitalised value of its estimated Earnings.

∴ Value Per share = $\frac{\text{Value of business} - \text{Outside liabilities}}{\text{No. of shares}}$

and Value of Business = $\frac{\text{Future Maintainable Earnings}}{\text{Capitalisation Factor}}$

↳ 1 ÷ P/E

(4) Yield Method :- Yield refers to the Earnings generated and realized on an Investment over a Particular Period of Time and is expressed in terms of Percentage based on the Invested Amount or on the Current Value or on the face Value of the Security.

Further Yield can be classified as A) Rate of Earning.
B) Rate of Dividend.

∴ Value Per share by Earning Yield = $\frac{\text{Rate of Earning of Company}}{\text{Rate of Earning of Industry}}$ × Paid up Value of Equity share.

and Value Per share by Dividend Yield = $\frac{\text{Rate of Dividend of Company}}{\text{Rate of Dividend of Industry}}$ × Paid up Value of Equity share.

→ What is Future Maintainable Earnings :- FMPAT is calculated after Adjusting Profit for the Year with Some Expenses/losses and with Some Income which is not Incurred in future or which is Realised in future.

→ Formula of P/E ratio. = $\frac{MPS}{EPS}$ ∴ MPS = EPS × P/E ratio

VALUATION OF Goodwill :- Following are the Various Methods for Valuation of Goodwill :-

① On the basis of FMPAT | Average Profits : Under this Method, FMPAT | Average Profit is Multiplied by one or More numbers of years of Purchase as given.

∴ Goodwill = FMPAT / Average Profit × Number of years Purchase.

② On the basis of Super Profits : Under this method, Super Profit is Multiplied by numbers of Year Purchase.

∴ Goodwill = Super Profit × Number of Years Purchase.

And Super Profit = FMPAT / Average Profit − Normal Profit

where, Normal Profit = closing Capital employed on Average basis × NRR.

Computation of closing Average Capital Employed :-

Particulars.	(Amount ₹) C.Y	P.Y
Total Market Value or Realisable Value of fixed Asset and Current Asset.	₹xxxx	₹xxxx
less: External Liabilities	(₹xxxx)	(₹xxxx)
less: Preference share Capital and arrear of Cummulative Preference Dividend	(₹xxxx)	(₹xxxx)
Total closing Capital Employed	₹xxxx	₹xxxx

∴ Average Capital employed $= \frac{C.Y + P.Y}{2}$

or closing Capital employed − 50% of last Year Profit

Note :

① Ignore all type of fictitious Assets Such as Preliminary / Misc. expenses, Dr. balance of P/L A/c etc.

② Don't Take Given Goodwill in Balance sheet.

③ On the basis of Annuity Method : Under this Method, we Taken into Consideration the time Value of Money. The Super Profit shall be Multiplied by Present Value factor. It means we find out Present value of Super Profit.

∴ Goodwill = Super Profit × PVF

④ On the basis of Capitalisation Method : Under Capitalisation Method, we have further two Methods :-

Ⓐ Capitalisation of Average Profit : Under this Method, Actual Capital employed shall be deducted from Capitalised Value of Average Profit.

∴ Goodwill = Required Capital employed − Actual Capital employed.

Ⓑ Capitalisation of Super Profit → Goodwill $= \frac{\text{Super Profit}}{\text{NRR (\%)}}$

Value of Stock by Net Asset or Intrinsic Method. = $\frac{\text{Net Asset Available to Equity share holders}}{\text{Number of share (equity shares).}}$

Computation of Net Asset Available to Equity shareholder :

Particulars.	(Amount)
Total Market Value or Realisable Value of fixed and current Asset	₹ xxxx
Value of Goodwill	₹ xxxx
Market Value of Non-Trading Investment	₹ xxxx
	₹ xxxx
less : External Liabilities	(₹ xxxx)
less : Preference share capital and arrear cummulative preference dividend.	(₹ xxxx)
Net Asset Available to Equity shareholder	₹ xxxx

Note : Ignore all types of fictitious Asset Such as Preliminary Expense, debit balance of Profit and loss A/c etc.

Yield Value Per share :-

Value of Stock by Capitalisation of Profit $= \frac{\text{Capitalised Value of Profit}}{\text{No. of Equity shares}}$

Capitalised Value of Profit $= \frac{\text{Average Profit (FMPAT)}}{\text{NRR}}$

Value of Stock by Capitalisation of dividend. $= \frac{\text{Capitalised Value of Dividend}}{\text{No. of Equity shares}}$

Capitalised Value of Dividend $= \frac{\text{DIVIDEND}}{\text{NRR}}$

Value of Stock by Percentage of Dividend

$$= \frac{\text{Rate or Percentage of Dividend of Concerned Company}}{\text{Rate or Percentage of Dividend of Industry}} \times \text{Paid up value of one share.}$$

Value of Stock by EPS Method

$$= \frac{\text{EPS of the Concern Company}}{\text{EPS of the Industry}} \times \text{Paid up value of one share.}$$

FAIR VALUE METHOD :-

$$\text{Value Per share} = \frac{\text{Intrinsic Value Per share} + \text{Yield Value Per share}}{2}$$

Study Note - 8 Valuation in Mergers and Acquisitions.

→ Meaning of Merger : Merger refers to a situation when two or more existing firms combine together and form a new entity.

Either a new company may be incorporated for this Purpose or one existing company (generally a bigger one) survives and another existing company (which is smaller) is Merged into it.

Laws in India use the term amalgamation for Merger. There are two types of Merger :-

A) Merger through absorbtion.

B) Merger through consolidation.

It means Amalgamation is a legal Accounting Process for Merger of companies.

Merger through absorbtion is a combination of two or more companies into an existing company. All companies except one lose their identity in a merger through absorbtion.

For Example : Robert ltd (buyer) and Alex ltd (seller) are under Merger through absorbtion, after merger Robert ltd survives and Alex ltd Transferred its Assets, Liabilities and shares to Robert ltd and Alex ltd Terminated. It is an Example of Merger through Acquisition.

Merger through consolidation is a combination of two or more companies into a new company.

In this type of Merger, all companies are legally dissolved and a new entity is created. In a consolidation, the acquired company transfer its assets, liabilities and shares to the acquiring company for cash or exchange of shares.

For Example → A Ltd + B Ltd = C Ltd. (new entity).

→ Meaning of Acquisition : Acquisition refers to the acquiring of ownership right in the properties and assets without any combination of companies.

In Acquisition two or more companies may Remain independent, separate legal entity, but there may be change in control of companies. Acquisition results when one company Purchase the controlling Interest in the share capital of another existing company in any of the following ways :

(A) By controlling interest in the other company. By entering into an agreement with a person or persons holding shares of other company.

(B) By subscribing new shares being issued by the other company.

(C) By Purchasing shares of the other company at a stock exchange.

(D) By Making an offer to buy the shares of other company, to the existing shareholders of that company.

FORMULAS TO SOLVE PRACTICAL QUESTIONS OF VALUATION IN MERGER AND ACQUISITION :-

→ COE by CAPM Model (Ke) = RF + β (Market Price of Risk)

Market Price of Risk = RM - RF

→ COE by Dividend Growth Model (Ke) = Expected Dividend Yield + Expected Growth rate.

→ COE by Bond Yield Plus Equity Risk Adjustment (Ke) = Bond Yield + Spread over bond yields.

→ Cost of debt (Kd) after Tax = Kd (1 - Tax)

→ WACC (Weighted Average Cost of capital) = (Kd after Tax x weight of debt) + (COE x weight of equity)

→ Ke (levered firm) i.e with debt = Ke of unlevered firm (as we learn) + (Ke of unlevered firm - Kd) x (1 - Tax) x Debt to Equity Ratio.

→ Cost of Merger :-

(A) When the Merger is financed by Cash :

Cost of Merger = Cash Paid − Market Value of Target company before Merger.

(B) When the Merger is financed by shares :

Cost of Merger = (Number of share issued to Target company × MPS of bidder Company) − Market Value of Target Company before Merger.

True Cost of Merger = (Holding of Target company after Merger) − (Market value of Target company before Merger)

Number of share issued to Target company = (Share of Target Company before merger) × Swap/exchange Ratio

→ Swap Ratio / Exchange Ratio :-

Swap Ratio / exchange Ratio by MPS, EPS, or Book Value per share

$$= \frac{\text{MPS / EPS / BVPS of Target company.}}{\text{MPS / EPS / BVPS of Bidder company.}}$$

Swap Ratio / exchange Ratio by P/E Ratio

$$= \frac{\text{P/E Ratio of Bidder company.}}{\text{P/E Ratio of Target company.}}$$

$$\text{MPS} = \frac{\text{Market Value of shares}}{\text{Number of shares.}}$$

$$\text{EPS} = \frac{\text{Total Earnings Available to Equity (EAE)}}{\text{Number of shares}}$$

$$\text{BVPS} = \frac{\text{Equity shareholder's fund (Net worth)}}{\text{Number of shares.}}$$

$$\text{P/E Ratio} = \frac{\text{MPS}}{\text{EPS}}$$

→ EPS after Merger | Acquisition :-
(New EPS)

$$NEPS = \frac{\text{EAE of Bidder Company before Merger} + \text{EAE of Target Company before Merger} + \text{Synergy effect}}{\text{shares of Bidder company before Merger} + \text{shares offered to Target company.}}$$

→ Equivalent EPS/MPS of Target Company. = New EPS/MPS of Merged Firm. × Swap Ratio.

→ Promotar holding Percentage after Acquisition (%)

$$= \frac{\text{Shares of Promoter in Bidder company} + (\text{Shares of Promoter in Target Company} \times \text{Swap Ratio})}{\text{Shares of bidder company} + (\text{Share of Target Company} \times \text{Swap Ratio})}$$

→ Free Float of Market capitalisation = 1 - Promotar holding Percentage after Acquisition.

→ Holding of Target Company after Merger

$$= \frac{\text{Value of Combined Firm} \times \text{Shares of Target Company issued by bidder company}}{\text{Total shares of Combined Firm.}}$$

→ Shares issued to Target company by bidder company = Shares of Target Company before Merger × Swap Ratio

or $\frac{\text{M.V of Target Company before Merger}}{\text{Pre-Merger MPS of Bidder Company.}}$

STUDY NOTE – 3
ECONOMIC EFFICIENCY OF THE FIRM – PERFORMANCE ANALYSIS

TECHNIQUES AND APPLICATIONS OF ECONOMICS

In all this, economics for managerial decision making, we have discussed demand, elasticity of demand, price determination under various markets etc. Further we have also discussed total cost, average cost, marginal cost, marginal revenue etc. Profit maximization, revenue maximization and cost minimization can be made using the following economic techniques, which are useful in taking several managerial decisions.

Problems are worked out and given as illustrations in the following pages relating to all the above concepts for better understanding. Before those illustrations are worked out, the following terminology should be understood by anybody to go further.

(1) Total Cost (TC) = Fixed Cost (FC) + Variable Cost (VC)
Variable Cost is directly proportional to the number of units produced.
∴ Total Cost = F + kx = C (Say)
Where F is the fixed cost and k the constant of proportionality
Total Cost (c) is expressed as a function of output (x) produced i.e. c = f (x) or c = f (q) or f (u).
Total cost (c) = f (x) + k [k is constant]

(2) Average Cost (AC) $= \frac{\text{Total Cost}}{\text{Total number of units produced (Quantity)}} = \frac{C}{X} = \frac{f(x)+k}{X}$

Average Variable Cost (AVC) $= \frac{f(X)}{X}$ as 'k' is fixed cost.

Average fixed cost (AFC) $= \frac{k}{X}$

(3) Marginal Cost (MC) = **d**ifferential Coefficient of total cost w.r.t quantity
$= \frac{dc}{dx}$

Marginal cost $= \frac{dc}{dx}$ = f (x) because k's derivative is 0

CASE:

(i) When average cost goes upward, $\frac{d}{dx}(\frac{c}{x}) > 0$, i.e. MC > AC.

(ii) When the average cost curve reaches a minimum point i.e. constant $\frac{d}{dx}(\frac{c}{x})$ i.e. MC > AC.

(iii) When AC is falling downwards $\frac{d}{dx}(\frac{c}{x}) > 0$, i.e. MC < AC.

Prove that the Slope of Average Cost Curve is X (MC - AC)

Proof:

Let cost be 'C' and units be 'x'.
Then Average cost (say, y) = $\frac{c}{x}$
To find out the slope, the average cost should be differentiated w.r.to. 'x'.

$$\frac{dy}{dx} = \frac{X\,x\frac{dc}{dx} - c\,x\frac{dx}{dx}}{x^2}$$

$$= \frac{X\,x\frac{dc}{dx} - c}{x^2}$$

$$= \frac{1}{x}\,x\,\frac{dc}{dx} - \frac{1}{x}\,x\,\frac{c}{x}$$

$$= \frac{1}{x}\left(\frac{dc}{dx} - \frac{c}{x}\right)$$

$$= \frac{1}{x}(MC - AC)$$

(4) Total Revenue (TR) = Quantity sold selling price per unit of the commodity = R = px where p is the price per unit and x the number of units sold.

(5) Average Revenue (AR) = $\frac{\text{Total Revenue}}{\text{Quantity Sold}}$

(6) Marginal Revenue (MR) = Differential Coefficient of total Revenue w.r.t quantity = $\frac{dR}{dx}$

(7) Profit (P) = Total Revenue (TR) - Total cost (TC)

(8) For maximum Profit: Marginal Revenue (MR) = Marginal Cost (MC)

Profit = R - C

Marginal profit is the first derivative of profit function.

i.e. where p = profit and x = quantity and marginal profit = $\frac{dR}{dx}$

9) Price Elasticity of Demand.

Price Elasticity of demand is the degree of responsiveness of the demand for a commodity to a change in its price.

Price elasticity of demand = $\frac{\frac{\text{Change in quantity demanded}}{\text{Quantity demanded at original price}}}{\frac{\text{Change in price}}{\text{Original price}}} = \frac{\frac{dx}{x}}{\frac{dp}{p}} = \frac{dp}{p} \div \frac{dp}{p} = 1$

Where x is the quantity demanded at original price and p is the original price per unit.

It may further be noted that if the price increases, quantity demanded will decrease i.e., Corresponding to any change in price, quantity demanded changes in the opposite direction i.e., $\frac{dx}{dp}$ is always negative. But we take only numerical value and hence ignore the sign.

Price elasticity of demand is denoted by E = $\frac{dp}{p} \div \frac{dp}{p} = \frac{dx}{dp} \div \frac{x}{p}$ (numerically)

Show that elasticity of demand = $\frac{AR}{AR - MR}$, where AR and MR are average and marginal revenue respectively at any output.

Proof:

Total Revenue, (say R) = px, AR = $\frac{R}{x} = \frac{px}{x}$ = p

MR = $\frac{d}{dx}(R) = \frac{d}{dx}(px) = p + x\frac{dp}{dx}$

Now, $\frac{AR}{AR-MR} = \frac{p}{p-p-x\frac{dp}{dx}} = \frac{p}{x\frac{dp}{dx}} = -\frac{P\frac{dx}{dp}}{x} = -\frac{\frac{dx}{dp}}{\frac{x}{p}} = -\frac{dx}{dp}\ x\ \frac{p}{x} = |E_p|$ (proved)

(10) If marginal revenue function is given, total revenue function can be found out in the following manner. Here Total Revenue = R & Marginal Revenue = MR

We have MR = $\frac{dr}{dx}$

dx

=> MRdx = dR

=> dR = MRdx

Integrating with respect to x

| dR = | MR dr

=> R = | MR dx + k,

To find out total cost, when marginal cost is given

Here Total Cost = C, Marginal Cost = MC

MC = $\frac{dc}{dx}$

=> dc = MC dx

Integrating with respect to x

| dc = | MC dx

=> c = | MC dx + k

11) Consumer's surplus

Let y = price; f(x) = demand

i.e. y = f(x)

where x_0, p_0 refers to actuals.

:. Consumer's surplus = $\int_0^{x_0} f(x)dx - x_0p_0$

12) Producer's surplus

Producer's surplus = x_0p_0 - $\int_0^{x_0} f(x)dx$

13) Cross demand

If $x_1 = p_1$; $x_2 = p_2$ be the two demand functions of the commodities A & B, then the following results would emerge.

(i) If $\frac{\partial x_1}{\partial p_2}$ *and* $\frac{\partial x_2}{\partial p_1}$ are < 0, then the commodies are complementary

(ii) If $\frac{\partial x_1}{\partial p_2}$ *and* $\frac{\partial x_2}{\partial p_1}$ are > 0, then the commodities are said to be substitutes or competitive.

(iii) If $\frac{\partial x_1}{\partial p_2} > 0\ or < 0$ $\frac{\partial x_2}{\partial p_1}$ < 0 (or) > 0, they are said to be unrelated that means no relationship can be established.

ECONOMIC EFFICIENCY OF THE FIRM – PERFORMANCE ANALYSIS

Illustration 1:
The cost (c) of a firm is given by the function $c = 4x^3 + 9x^2 + 11x + 27$. Find the Average Cost, Marginal Cost, Average Variable Cost, and Average Fixed Cost 'x' being the output.

Solution:

C = Total Cost $= 4x^3 + 9x^2 + 11x + 27$

Average Cost $= 4x^2 + 9x + 11 + \frac{27}{x}$

Marginal Cost $= \frac{dc}{dx} = 12x^2 + 18x + 11$

Average Variable Cost $= 4x^2 + 9x + 11$

Average fixed Cost $= \frac{27}{x}$

Illustration 2:
The Average Cost of a firm is given by the function Average Cost $= x^3 + 12x^2 - 11x$, find the Total Cost, Average Variable Cost & Marginal cost.

Solution:

Average Cost $= x^3 + 12x^2 - 11x$

Total Cost (C) $= x^4 + 12x^3 - 11x^2$

Marginal Cost $= \frac{dc}{dx} = 4x^3 + 36x^2 - 22x$

Illustration 3:
The cost function of a firm is given by $c = x^3 - 4x^2 + 7x$, find at what level of output Average Cost is minimum and what level will it be.

Solution:

Total Cost $= x^3 - 4x^2 + 7x$

Average Cost $= x^2 - 4x + 7$

In order that average cost is minimum $\frac{dy}{dx} = 0$ and the value of $\frac{d^2y}{dx^2}$

i.e. $\frac{dy}{dx} = 2x - 4 = 0$

or, $x - 2 = 0$

$\therefore x = 2$

Again, $\frac{d^2y}{dx^2} = \frac{d}{dx}\left(\frac{dy}{dx}\right) = \frac{d}{dx}(2x - 4)$

$= \frac{d^2y}{dx^2} = 2$ which is positive so the function will have minimum values.

Minimum:

Average Cost $= x^2 - 4x - 7$

$= 4 - (4 \times 2) + 7$

$= 11 - 8 = 3$

Illustration 4:
The Average Cost function (AC) for a certain commodity is given by $AC = 2x - 1 + \frac{50}{x}$ in terms of output x, find the output for which (i) Average cost is increasing (ii) Average cost is decreasing (iii) Find the total cost (iv) Marginal Cost.

Solution:
In order to a function is said to be increasing (or) decreasing its derivation must be zero.

$\frac{dy}{dx} = 2 - 50x^{-2} = 0$, wherey =AC $2x - 1 + 50/x$

$\Rightarrow 2 - \frac{50}{x^2} = 0$

$\Rightarrow 2x^2 - 50 = 0$

$\Rightarrow x^2 - 25 = 0$

$\therefore x = +5$

When $x > 5$ it is increasing

When $x < 5$ it is decreasing

Total Cost = $(2x - 1 + \frac{50}{x})\, x = 2x^2 - x + 50$

Marginal Cost = $\frac{dy}{dx}(2x^2 - x + 50) = 4x - 1$

Illustration 5:

The Cost function of a particular firm $c = \frac{1}{3}x^3 - 5x^2 + 75x + 10$, find at which level, i) The Marginal Cost attains its minimum ii) What is the marginal cost of this level?

Solution:

$c = \frac{1}{3}x^3 - 5x^2 + 75x + 10$

Marginal Cost $= \frac{dc}{dx}$

$= \frac{1}{3}(3x^2) - 5(2x) + 75$

$= x^2 - 10x + 75$ (y say)

In order that the MC to be at minimum its 2nd derivative value must be positive

$= \frac{dy}{dx} = 2x - 10 = 0$

or $2x = 10$

$x = 5$

$\frac{d^2y}{dx^2} = 2$, which is positive when $x = 5$ MC is minimum

$\therefore$ Minimum Marginal Cost $= 5^2 - 10 \times 5 + 75$

$= 25 - 50 + 75 = 50$

Illustration 6:
The cost function 'c' for the commodity 'q' is given by $C = q^3 - 4q^2 + 6q$ find Average Variable Cost and also find the value of q for which average variable cost is minimum.

Solution:

$C = q^3 - 4q^2 + 6q$

Average Variable Cost = $q^2 - 4q + 6$ ('y' say)

=> $\frac{d}{dq}(q^2 - 4q + 6) = 0$

=> $2q - 4 = 0$

$\therefore q = \frac{4}{2} = 2$

$\frac{d^2C}{dq^2} = 2 > 0$, positive

$\therefore$ Average Cost is minimum at q = 2

Illustration 7:
The cost function 'c' of a firm = $\frac{1}{3}x^3 - x^2 + 5x + 3$, find the level at which the marginal cost and the average variable cost attain their respective minimum.

Solution:

$C = \frac{1}{3}x^3 - x^2 + 5x + 3$

Marginal Cost = $\frac{dc}{dx} = \frac{1}{3}3x^2 - 2x + 5$

$= x^2 - 2x + 5$ ('y' say)

$\frac{dy}{dx} = 2x - 2 = 0$

$\therefore x = 1$

$\frac{d^2y}{dx^2} = 2$, which is positive

$\therefore$ Marginal cost is minimum value at x = 1

Average Variable Cost = $\frac{1}{3}x^2 - x + 5$ (y say)

$\frac{d}{dx}\{\text{Average Variable Cost}\} = \frac{2}{3}x - 1 = 0$

=> $\frac{2}{3}x = {}^{1}$

$x = \frac{3}{2}$

$\frac{d^2y}{dx^2} = \frac{2}{3}$, positive

Average Variable Cost is minimum at output x = —

Illustration 8:

Cost = $300x - 10x^2 + \frac{1}{3}x^3$, Calculate

(i) Output at which Marginal Cost is minimum

(ii) Output at which Average Cost is minimum

(iii) Output at which Marginal Cost = Average Cost.

Solution:

(i) Cost = $300x - 10x^2 + \frac{1}{3}x^3$

Marginal Cost = $\frac{dc}{dx} = 300 - 20x + x^2$ (say, y)

In order that MC is minimum first derivate must be equal to zero and 2nd derivate must be positive.

$\therefore \frac{dy}{dx} = 2x - 20 \Rightarrow 2x = 20$

$x = 10$

$\frac{d^2y}{dx^2} = 2$, which is positive. It is minimum at x = 10.

(ii) Average Cost = $300 - 10x + \frac{1}{3}x^2$ (y say)

$\therefore \frac{dy}{dx} = -10 + \frac{2}{3}x = 0$

$x = 30/2 = 15$

$\frac{d^2y}{dx^2} = \frac{2}{3} > 0$

$\therefore$ Average Cost is minimum of output at x = 15

(iii) Output at which Marginal Cost = Average Cost

$300 - 20x + x^2 = 300 - 10x + yx^2$

$-20x + 10x + x^2 - \frac{1}{3}x^2 = 0$

$-10x + \frac{2}{3}x^2 = 0$

$\frac{-30x + 2x^2}{3} = 0$

$2x^2 - 30x = 0$

$2x(x - 15) = 0$

$x - 15 = 0$

$\therefore x = 15$

Illustration 9:

Cost Function C = $\frac{3}{5}x\frac{15}{4}$ find

(i) Cost when output is 5 units

(ii) Average Cost of 10 units

(iii) Marginal cost.

Solution:

$C = \frac{3}{5}x + \frac{15}{4}$

i) Cost when output is 5 units

$\frac{3}{5}x5 + \frac{15}{4} = 3 + \frac{15}{4} = 6.75$

ii) Average Cost of 10 units

Average Cost $= \frac{3}{5} + \frac{15}{4x}$

$= \frac{3}{5} + \frac{15}{10x4} = \frac{3}{5} + \frac{15}{40}$

$= \frac{3}{5} + \frac{3}{8} = \frac{24+15}{40} = \frac{39}{40} = 0.975$

iii) Marginal Cost $= \frac{dc}{dx}$

$= \frac{3}{5} = 0.6$

Illustration 10:

The Revenue function of a firm given by R = (2200 - 3x) $\frac{x}{2}$, find the firm's marginal revenue function. **Solution:**

R = (2200 - 3x) $\frac{x}{2} = \frac{2200x}{2} - \frac{3}{2}x^2 = 1100x - \frac{3}{2}x^2$

MR = $\frac{dr}{dx}$ = 1100 - 3x

Illustration 11:

Given C = $x^3 - 10x_2 + 9x$; R = $12x^2 + 11x - 4$. Find the total profit and hence marginal profits.

Solution:

C $= x^3 - 10x^2 + 9x$

R $= 12x^2 + 11x - 4$

Total Profit = R - C = $12x^2 + 11x - 4 - x^3 + 10x^2 - 9x$

$= -x^3 + 22x^2 + 2x - 4$

$= -(x^3 - 22x^2 - 2x + 4)$ (Say P)

Marginal Profit $\frac{dp}{dx} = (3x^2 - 44x - 2)$

Illustration 12:
A manufacturer can sell "x" items (x > 0) at a price of (330 - x) each; the cost of producing 'x' items is + 10x + 12. How many items should he sell to make the maximum profit? Also determine the maximum profit.

Solution:

Given price (P) = 330 - x
Cost (C) = $x^2 + 10x + 12$
Output = $x \geq 0$
Revenue (R) = P_x = $330x - x^2$
Profit = R - C = $330x - x^2 - x^2 + 10x - 12$
= $320x - 2x^2 - 12$ (say y)

In order that maximum profit is attained

$\frac{dy}{dx} = 0$, and

$\frac{d^2y}{dx^2}$ = positive

$\frac{dy}{dx} = 320 - 4x = 0$

= - 4x = -320
x = 80
$\frac{d^2y}{dx^2}$ = -4, which is negative

Therefore profit is maximum at x = 80 units
Maximum profit = $320 (80) - 2(80)^2 - 12$
= 12,788

Illustration 13:
The efficiency (E) of a small manufacturing concern depends on the number of workers (W) and is given by 10E = + 30W - 392, find the strength of the worker, which give maximum efficiency.

Solution:

Given 10E = $\frac{-w^3}{40} + 30W - 392$

Efficiency (E) = $\frac{-w^3}{400} + 3W - \frac{392}{10}$

$\frac{de}{dw} = \frac{1}{400} x\, 3W^2 + 3 = 0$

$3W^2 = 1200$
$W^2 = 400$
W = 20

$\frac{d^2E}{dw^2} = \frac{-6w}{400}$
$\frac{d^2E}{dw^2}$ at w = 20 = $\frac{-6\,(20)}{400} = \frac{-6}{20} < 0$

Maximum efficiency at w = 20.

Illustration 14:

A firm assumes a cost function c(x) = x($\frac{x^2}{10}$ + 200), x is a monthly output in thousands of units. Its revenue function is given by R (x) = ($\frac{2200-3x}{2}$) x Find

i) If the firm decides to produce 10,000units per month, the firms cost and Marginal cost.
ii) If the firm decides to produce Marginal cost of 320, the level of output per month, and cost of the firm.
iii) The marginal revenue function.
iv) If a decision is taken to produce 10,000 units each month, the total revenue and marginal revenue of the firm.
v) If the firm produces with a marginal revenue of 1040, the firm's monthly output and monthly revenue.
vi) The firm's profit function and marginal profit function.
vii) The output required per month to make the marginal profit = 0, and find the profit at this level of output.
viii) Find the marginal revenue and the marginal cost at the output obtained in
ix) and comment upon the result.

Solution:

C = x ($\frac{x^2}{10}$ + 200) = $\frac{x^2}{10}$ + 200x

X = '000 units p.m.

R = ($\frac{2200-3x}{2}$) x = $\frac{2200x-3x^2}{2}$

i) if firm's output - 10,000 units per month.

Cost = 10 ($\frac{100}{10}$ +200) = 2100

MC = $\frac{dc}{dx}$ = $\frac{3x^2}{10}$ + 200

Marginal Cost (at x = 10) = $\frac{3\ (100)}{10}$ + 200 = 230

ii) i.e., MC = 320

$\frac{3x^2}{10}$ + 200 = 320

$3x^2$ + 2000 = 3,200

$3x^2$ = 1200

x^2 = 400

$\sqrt{400}$ = 20

Total cost = $\frac{20^3}{10}$ + 200 x 20 = 4,800

iii) Marginal Revenue

= MR = $\frac{dr}{dx}$ = $\frac{2200}{2}$ − $\frac{6x}{2}$

= 1100 - 3x

iv) Total revenue at x = 10

is $\frac{2200 \text{ x } 10 - 3(100)}{2}$ = $\frac{22000-300}{2}$ = $\frac{21700}{2}$

= 10,850
Marginal Revenue = 1100 - 3 x 10 = 1070

v) Given, MR = 1040
i.e. 1100 - 3x = 1040
-3x = - 60
x = 20
Monthly Revenue $= \frac{2200 \text{ x } 20}{2} - \frac{3 \text{ x } 400}{2}$

= 22000 - 600 = 21400

vi) Profit = R - C = $\frac{2200x}{2} - \frac{3x^2}{2} - \frac{x^2}{10}$ - 200x

Profit $\frac{-x^2}{10} - \frac{3x^2}{2}$ + 900x (say p)

Marginal Profit = $\frac{dp}{dx} = \frac{3x^2}{10} - \frac{6x}{2} + 900$

vii) MP = 0 (given)

$\frac{-3x^2}{10} - 3x + 900 = 0$

$x^2 + 10x - 3000 = 0$
$x^2 + 60x - 50x - 3000 = 0$
x (x + 60) - 50 (x + 60) = 0
x (x-50) (x + 60) = 0
∴ x = 50 or x = -60
Profit = R - C = $\frac{2200x}{2} - \frac{3x^2}{2} - \frac{x^2}{10}$ - 200x
Profit, at output x = 50
= 28750

viii) Marginal cost at x = 50
$= \frac{3x^2}{2} + 200 = \frac{3\,(2500)}{10} + 200 = 950$

Marginal Revenue = at x = 50
1100 - 3x = 1100 - 3 x 50 = 950
Profit will be maximum at MC = MR

Illustration 15:

A radio manufacturer produces 'x' sets 6per week at total cost of Rs. $x^2 + 78x + 2500$. He is a monopolist and the demand function for his product is $x = \frac{(600-p)}{8}$, when the price is 'p' per set show that maximum net revenue is obtained when 29 sets are produced per week what is the monopoly price.

Solution:

Cost (C) = $x^2 + 78x + 2500$

Demand (D) X = (600 - P) / 8

8x = 600 - P

∴ P = 600 - 8x

Total Revenue per 'x' sets

Price x i.e., $600x - 8x^2$

Maximum revenue is obtains at MC = MR

Marginal Cost = $\frac{dc}{dx}$ = 2x + 78 - (i)

Marginal Revenue = $\frac{dr}{dx}$ = 600 - 16x - (ii)

Equation (i) & (ii)

2x +78 = 600 - 16x

or, 18x = 522

x = $\frac{522}{18} = 29$

Monopoly price 600 - 8x

600 - 8 x 29

= 600 - 232 = 368

Illustration 16:

The demand function for a particular commodity is $y = 15\ e^{-x/5}$, where 'y' is the price per unit and 'x' is the no. of units demanded, determine the price and quantity for which revenue is maximum.

Solution:

Demand function y $= 15\ e^{-\frac{x}{5}}$

Total Revenue (TR) $= yx = 15e^{-x/5} . x$

$= 15xe^{-x/5}$

In order that Revenue is maximum $\frac{dR}{dx} = 0$

And $\frac{d^2R}{dx^2}$ = negative

$R = 15xe^{-x/5}$

$\frac{dr}{dx} = 15\ [e^{-x/5} + xe^{-x/5}(-\frac{1}{5})]$

$= 15\ [e^{-x/5} - \frac{xe^{-x/5}}{5}]$

Now $15e^{-x/5}\ [1- \frac{x}{5}] = 0$

or, $1 - \frac{x}{5} = 0$

or, $1 = \frac{x}{5}$

$\therefore x = 5$

$\frac{d^2R}{dx^2} = 15\,[\frac{x}{25}e^{-\frac{x}{25}} - \frac{e^{-\frac{x}{5}}}{5} - \frac{e^{-\frac{x}{5}}}{5}]$

$= 15\,[\frac{x}{25}e^{-\frac{x}{25}} - \frac{2e^{-\frac{x}{5}}}{5}]$

$\frac{d^2R}{dx^2}$ at $x = 5\,[\frac{1}{5e}e^{-\frac{x}{25}} - \frac{2}{5e} = -ve = \frac{-1}{5e} < 0$

Illustration 17:

$P = \frac{150}{q^2+2} - 4$ represents the demand function for a product where 'p' is the price per unit per 'q' units; determine the marginal revenue function.

Solution:

$P = = \frac{150}{q^2+2} - 4$

Revenue (R) $= \frac{150q}{q^2+2} - 4q$

$MR = \frac{dr}{dq} = \frac{q^2+2(150) - 150q\ x\ 2q}{(q^2+2)^2}$

$MR = \frac{150q^2 - 300\ x\ 300q^2}{(q^2+2)^2} - 4 = \frac{300-150q^2}{(q^2+2)^2}$

Illustration 18:

A manufacturer can sell 'x' items per month, at price P = 300 - 2x. Manufacturer's cost of production Rs. Y of 'x' items is given by Y = 2x + 1000. Find no. of items to be produced to yield maximum profit per month

Solution:

Units	= x
Price	= 300 - 2x
Revenue (R)	= Px = $300x - 2x^2$
Cost (C)	= 2x + 1000
Profit (z)	= $300x - 2x^2 - 2x - 1000$

$-2x^2 + 298x - 1000$

$\frac{dx}{dz} = -4x + 298 = 0$

$-4x = -298$

$x = \frac{298}{4} = 74.5$

$\frac{d^2z}{dx^2}$ = -4 which is Negative

$\frac{d^2z}{dx^2}$ = < 0

Profit is maximum at x = 74.5 units

Illustration 19:

The price (P) per unit at which company can sell all that it produces is given by the function P(x) = 300 - 4x. The cost function is 500 + 28x, where 'x' is the number of units, find x, so that profit is maximum.

Solution:

P	= 300 - 4x
R	= P(x) = 300x - $4x^2$
C	= 500 + 28x
Profit (Rs.)	= R - C
Profit	= 300x - $4x^2$ - 500 - 28x
	= $-4x^2$ + 272x – 500
$\frac{dz}{dx}$	= -8x + 272 = 0
	= -8x = -272
X	= $\frac{272}{8} = 34$
$\frac{d^2z}{dx^2}$	= -8 which is Negative
	Profit is maximum at x = 34 units.

Illustration 20:

If 'n' be the no. of workers employed the average cost of production is given by

C = 24n + [$\frac{3}{2(n-4)}$] Show that n = 4 ¼ will make C minimum.

Solution:

C = 24n + [$\frac{3}{2(n-4)}$] = 24n + $\frac{3}{2}$ $(n - 4)^{-1}$

if, $\frac{dc}{dn}$ = 0, then Cost is minimum, $\frac{d^2c}{dn^2}$ = Positive

$\frac{dc}{dn}$ = 24 + $\frac{3}{2}$ x -1 $(n - 4)^2$ = 0

24 -$\frac{3}{2}(n-4)^{-2} = 0$

$(n - 4)^{-2}$ = 16

$\frac{1}{(n-4)^2} = 16$

$(n - 4)^{-2}$ = 16 = 1

$(n - 4)^2 = \frac{1}{16}$

n – 4 = $\frac{1}{4}$

n = $\frac{1}{4} + 4 = 4\frac{1}{4}$

$\frac{d^2c}{dn^2} = 0 + \frac{-3}{2}\ x - 2\ (n-4)^{-3}$

= 3 (n – 4)^3

= 3 ($\frac{17}{4} - 4$)$^{-3}$

= 3 ($\frac{3}{(\frac{1}{4})^3}$) which is positive

Hence condition is satisfied and cost will be minimum at n = 4%.

Illustration 21:

A firm has revenue function given by R = 8D, where R = Gross Revenue and D= Quantity sold, production cost function is given by C = 15000 + 60 ($\frac{D}{900}$)^2. Find the total profit function and the number of units to be sold to get the maximum profit.

Solution:

R = 8D

C = 15000 + 60 ($\frac{D}{900}$)^2

Profit (P) = 8D - 15000 - 60 ($\frac{D}{900}$)^2

To find number of units to get the maximum profit

$\frac{dp}{dD} = 0$ and $\frac{d^2p}{dD^2}$ should be - ve

$\frac{dp}{dD} = 8$ and $\frac{60.2D}{810000} = 0$

8 - $\frac{1200D}{810000} = 0$

D = $\frac{27000\ x\ 8}{4} = 54000$

$\frac{d^2p}{dD^2} = \frac{-4}{27000}$ which is –ve

P is maximum, at D = 54000

Illustration 22:

The total cost function of a firm C = 3 - 5x2 + + 10, where C is total cost and 'x' is the output. A tax @ Rs. 2 per unit of output is imposed and the producer adds it to his cost. If the demand function is given by P = 2530 - 5x, where Rs. 'P' is the price per unit of output, find the profit maximising output and the price at the level.

Solution:

Given (C) $= \frac{x^3}{3} - 5x^2 + 28x + 10 + 2x$

P $= 2530 - 5x$

Revenue $= xp = 2530x - 5x^2$

Profit $= 2530x - 5x^2 + 5x^2 - 28x - 10 - \frac{x^3}{3} - 2x$

$= \frac{x^3}{3} + 2502x - 10 - 2x$

$= -\frac{x^3}{3} - 10 + 2500x$

$\frac{dp}{dx} = \frac{-3x^2}{3} + 2500 = 0$

$X^2 = 2500$

$\therefore x = \sqrt{2500} = 50$

$\frac{d^2p}{dx^2} = -2$, which is Negative

$\therefore$ Maximum profit is at x = 50 units

Price 2530 - 5 x 50 = 2280

Illustration 23:

Find the Elasticity of Demand for the following:

(i) $P = \frac{10}{(x+2)^2}$

(ii) $P = \frac{4}{(2x+1)^2}$

(iii) $x \cdot p^n = K$, where n, k are constant.

Solution:

(i) $P = \frac{10}{(x+2)^2} = 10\,(x + 2)^2$

Differentiating w.r.to x

$\frac{dp}{dx}\,10\,(-2)\,(x + 2)^{-3} = -20\,(x + 2)^{-3}$

$\frac{p}{x} = \frac{10}{x(x+2)^2}$

Elasticity of demand $|E_p| = [\frac{dx}{dp} x \frac{p}{x}]$

$\frac{p}{x} = \frac{1}{20(x+2)^{-3}} = \frac{(x+2)^3}{20}$

$[\frac{dx}{dp} x \frac{p}{x}] = \frac{(x+2)^3}{20} \text{ x } \frac{10}{x(x+2)^2}$

$= \frac{(x+2)}{2x}$

(ii) $P = \frac{4}{(2x+1)^2} = 4\,(2x + 1)^{-2}$

$\frac{dp}{dx} = 4 \text{ x } -2 \text{ x } (2x + 1)^{-3} = -\frac{8}{(2x+1)^3}$

$\frac{dp}{dx} = -\frac{8}{(2x+1)^3}$

$\frac{dx}{dp} = -\frac{(2x+1)^3}{8}$

$\frac{p}{x} = \frac{4}{x(2x+1)^2}$

Elasticity of demand $|E_p| = \frac{(2x+1)^3}{8} x \frac{4}{x(2x+1)^2} = \frac{(2x+1)}{2x}$

(iii) $xp^n = k$

Or, $x = \frac{k}{p^n}$

Or, $\frac{x}{p} = \frac{k}{p^n xp}$

Or, $\frac{x}{p} = \frac{k}{p^{n+1}}$

Or, $\frac{x}{p} = \frac{p^{n+1}}{k}$

Again, $x.p^n = k$

Differentiate both sides w.r. to x

$x.p^{n-1}\frac{dp}{dx} + p^n = 0$

or $\frac{dp}{dx}$, $xnp^{n-1} = -p^n$

or $\frac{dp}{dx} = \frac{-p^n}{x.n.p^{n-1}}$

or $\frac{dp}{dx} = \frac{-x.n.p^{n-1}}{p^n}$ …..2

now $|E_p| = \frac{xn}{p} x \frac{p^{n-1}}{k}$

$= \frac{xnp^n}{k}$

Illustration 24:

The Demand curve for x is given by the equation P = 24 – ½ $\sqrt{q}$, where P and q denote price and quantity respectively. Find the point price elasticity for P = Rs. 20.

Solution:

Demand P = 24 - $\frac{1}{2}\sqrt{q}$

$\frac{dp}{dq} = \frac{1}{2} x \frac{1}{2\sqrt{q}} = \frac{1}{4\sqrt{q}}$

$\frac{dp}{dq} = 4\sqrt{q}$

$\frac{p}{q} = \frac{24 - 2\frac{1}{2}\sqrt{q}}{q} = \frac{24 - \frac{1}{2} x\, 8}{64} = \frac{24-4}{64} = \frac{20}{64}$

$|E_p| = \frac{dp}{dq} x \frac{p}{q} = \frac{-4\sqrt{q}\ x\ (24 - \frac{1}{2}\sqrt{q}}{q}$

When p = 20, then q,

P - 24= $\frac{-1}{2}\sqrt{q}$

- 2 (p - 24) = $\sqrt{q}$

- 2 (20 - 24) = $\sqrt{q}$

$- 40 + 48 = \sqrt{q}$

$\sqrt{q} = 8$
$\therefore q = 64$

Illustration 25:
The Demand function is x = 100 + 4p + $10p^2$, where x is demand for the commodity at price 'p' compute marginal quantity demand, average quantity demand and hence elasticity of demand, at p = 4.

Solution:

$X = 100 + 4p + 10P^2$

Marginal quantity demand = $\frac{dx}{dq}$

$\frac{dx}{dq} = 4 + 20P$ (1)

Average Quantity demand = $\frac{x}{p} = \frac{100}{p} + 4 + 10p$ -> (2)

$E_p = \frac{dx}{dq} x \frac{x}{p} = \frac{4+20p}{\frac{100}{p}+10p+4} = \frac{(4+20p)p}{100+10p^2+4p}$

at P = 4

$= \frac{(4+80)4}{100+160+16} = \frac{28}{23}$

Illustration 26:
Find an expression for price elasticity in the case of following demand functions and evaluate it at the price P = 20

(i) 12Q + 7P = 216
(ii) Q = 2500 - 8P - $2P^2$
(iii) Q = $\frac{64}{p^6}$

(iv) Q = $\frac{5p}{(1-3p)^2}$

Solution:

(i) 7P = 216 - 12Q

p $= \frac{216-12Q}{7} = \frac{1}{7}(216 - 12Q)$

$\frac{dp}{dq} = \frac{1}{7}x - 12 = \frac{-12}{7} = \frac{dQ}{dp} = \frac{-7}{12}$

$\frac{p}{Q} = \frac{1}{7}\left(\frac{216}{Q} - 12\right)$

$E_p = [\frac{-7}{12}x(\frac{216}{Q} - 12)]$

$E_p = [\frac{-1}{12}x(\frac{216-12Q}{Q} - 12)]$

At p = 20, Q is
12Q = 216 - (7 x 20) = 216 -140 = 76

Q $= \frac{76}{12} = 6\frac{1}{3}$

E_p at P = 20

$E_p = \frac{1}{12}\left[\frac{216-12x\frac{76}{12}}{\frac{76}{12}}\right]$

$= \frac{1}{2}\left(\frac{140x12}{76}\right) = \frac{140}{76} = \frac{35}{19}$

(ii) Q $= 2{,}500 - 8p - 2p^2$

At p $= 20,$

$\frac{dQ}{dp} = -8 - 4p = -8 - 80 = -88$

$\frac{Q}{P} = \frac{2500}{p} - 8 - 2P$

$= 125 - 8 - 40 = 77$

$\frac{Q}{P} = \frac{1}{77}$

$E_p = 88 \text{ x } \frac{1}{77} = \frac{8}{7}$

(iii) Q $= \frac{Q}{p^6}, \frac{dQ}{dp} = \frac{64\,x-6}{p^7}$

$\frac{Q}{p} = \frac{64}{p^7} = \frac{p}{Q} = \frac{p^7}{64}$

Ep $= \frac{64\,x\,6}{p^7} x \frac{p^7}{64} = 6$

(iv) Q $= \frac{5p}{(1-3p)^2} = 5p\,(1-3p)^2$

$\frac{dQ}{dp} = \frac{(1-3p)^2 5 - 5p\,x\,(-2)(1-3p)^{-3}}{(1-3p)^4}$

$= \frac{5(1-3p)^2 + 30p\,(1-3p)}{(1-3p)^4} = \frac{5\,(1-3p)+30p}{(1-3p)^3}$

$\frac{Q}{P} = \frac{5}{(1-3p)^2} = \frac{P}{Q} = \frac{(1-3p)^2}{5}$

$E_p = \frac{5(1-3p)+30p}{(1-3p)^3} x \frac{(1-3p)^2}{5}$

$= \frac{5-15+30p}{5(1-3p)} x \frac{1-3p+6p}{1-3p} = \frac{1+3p}{1-3p}$

$= \frac{1+60}{1-60} = \frac{61}{-59}$

Illustration 27:
The total revenue from sale of 'x' units is given by the equation R = 100x - $2x^2$, calculate the point price elasticity of demand, when marginal revenue is 20.

Solution:

R = 100x - $2x^2$

Price (P) = 100 - 2x

MR = $\frac{dR}{dx}$ = 100 - 4x

$\frac{p}{x} = \frac{100}{x} - 2$

$\frac{dp}{dx}$ = -2 = $\frac{dx}{dp} = \frac{1}{2}$

$E_p = \frac{1}{2}x(\frac{100}{x} - 2)$

$= \frac{50}{x} - 1$

$= \frac{50}{20} - 1$

$= \frac{5}{2} - 1$

$= \frac{5-2}{2} = \frac{3}{2}$

MR = 20, x is .....

100 - 4x = 20

4x = 80

X = 20

Illustration 28:
Prove that the elasticity of demand for the following is constant x = $3(p^{-2})$, Where P and X are the price & quantity demanded respectively.

Solution:

EP = - $[\frac{dx}{dp} x \frac{p}{x}]$

Differentiate w.r.to 'x'

= 1 = 3 (-2 . p^{-3}) $\frac{dp}{dx}$

= 1 = $-6p^{-3} \frac{dp}{dx}$

$= \frac{dx}{dp} = \frac{6}{p^3}$ - Equation (1)

Now $= \frac{x}{p} = \frac{3}{p^3}$

$= \frac{p}{x} = \frac{p^3}{3}$ - Equation (2)

From equations (1) & (2)

Ep $= \frac{dx}{dp} x \frac{p}{x}$

$= \frac{6}{p^3} x \frac{p^3}{3}$

= 2 (proved)

Illustration 29:

The total cost (C) and the total revenue (R) of a firm are given C (x) = x^3 + 60x2 + 8x; R(x) = $3x^3$ - 3x2 + 656x, x being output determine, the output for which the firm gets maximum profit. Also obtain the maximum profit.

Solution:

C $= x^3 + 60x^2 + 8x$

R $= 3x^3 - 3x^2 + 656x$

Profit $= 3x^3 - 3x^2 + 656x - x^3 - 60x^2 - 8x$

$= 2x^3 - 63x^2 + 648x = (p)$

Derivative w.r.to x

$\frac{dp}{dx} = 6x^2 - 126x + 648 = 0$

$x^2 - 21x + 108 = 0$

$x^2 - 9x - 12x + 108 = 0$

$x(x - 9) - 12(x - 9) = 0$

$(x - 12)(x - 9) = 0$

x = 12 or 9

$= \frac{d^2p}{dx^2} = 2x - 21$

at x = 9

$\frac{d^2p}{dx^2} = 18 - 21 = -3 < 0$

∴ P is maximum at x = 9

at x = 12

$\frac{d^2p}{dx^2} = 24 - 21 = 3 > 0$

∴ P is minimum at x = 12

$P = 2x^3 - 63x^2 + 648x$

at x = 9

Profit $P = 2(9)^3 - 63(9)^2 + 648(9)$

7292 - 63 x 81 - 648 x 9 = 2187

Illustration 30:

A monopolist has demand curve x = 106 - 2p and average cost curve (AC) = 5 + x/50. The total revenue is (R) = xp, determine the most profitable output and maximum profit.

Solution:

x = 106 - 2p => x - 106 = -2p

p $= \frac{x - 106}{-2} = \frac{106 - x}{2}$

R $= \frac{106x - x^2}{2}$

Total Cost $= 5x + \frac{x^2}{50}$

Profit $= \frac{106x - x^2}{2} - 5x + \frac{x^2}{50}$

$\frac{dp}{dx} = \frac{(106 - 2x)}{2} - 5 - \frac{2x}{50} = 0$

$\frac{dp}{dx} = -53 - x - 5 - \frac{2x}{50} = 0$

48 $= x\,(1 + \frac{1}{25})$

x $= \frac{1200}{26}$

$\frac{d^2p}{dx^2} = \frac{-26}{25} < 0$

.. P is maximum at x = $\frac{1200}{26}$

Illustration 31:

The total cost function of a manufacturing firm is given by C = $2x^3$ - x2 + 3x + 5 and the Marginal Revenue = 8 - 3x, X = output, determine the most profitable output of the firm.

Solution:

$C = 2x^3 - x^2 + 3x + 5$

$MR = 8 - 3x$

$MC = \frac{dc}{dx} = 6x^2 - 2x + 3$

Profit maximum at MC = MR

$6x^2 - 2x + 3 = 8 - 3x$

$6x^2 + x - 5 = 0$

$6x^2 + 6x - 5x - 5 = 0$

$6x (x + 1) - 5 (x + 1) = 0$

$(x + 1) (6x - 5) = 0$

$X = -1$

or $6x - 5 = 0 = \frac{5}{6}$

$x = \frac{5}{6}$

∴ Most Profitable output of the firm is $\frac{5}{6}$

Illustration 32:

A company is planning to market a new model of a doll. Rather than setting the selling price of the doll based only on production cost estimation management polls the retailers of the doll to see how many dolls they will buy for various prices. From this survey, it is determined at the unit demand function (the relationship between the amount 'x' each retailer would buy and the price he would pay) is x = 30000 - 1500P. The fixed cost of the production of the dolls are found to be Rs. 28,000 and cost of Material & labour to produce each doll is estimated to be Rs. 8 per unit. What price should the company charge retailer in order to obtain a maximum profit? Also find the maximum profit.

Solution:

$x = 30000 - 1500P$

$x - 30000 = -1500P$

$p = \frac{30000 - x}{1500}$

Revenue $= \frac{30000 - x^2}{1500}$

$C = 8x + 28000$

Profit (y) $= \frac{30000x - x^2}{1500} - 8x - 28000$

$\frac{dy}{dx} = \frac{1}{1500} (30000 - 2x) - 8 = 0$

$= 30000 - 2x - 12000 = 0$

$-2x = -18000$

$x = \frac{18000}{2} = 9000$

$\frac{d^2y}{dx^2} = -2$, which is Negative

Profit $= \frac{30000\ x\ 9000 - 9000^2}{1500} - 72000 - 28000$

$= 180000 - \frac{810000}{15} - 72000 - 28000$

$= 180000 - 54000 - 72000 - 28000 = 26000$

Illustration 33:

Assume that for a closed economy E = C + I + G; Where E= total expenditure on consumption goods, I = Exp. on Investment goods and G = Govt. Spending. For equilibrium, we must have E = Y, Y being total income received.
For a certain Economy, it is given that C = 15 + 0.9Y, where I = 20 + 0.05Y and G = 25. Find the equilibrium values of Y, C and I. How will these change, if there is no Government spending.

Solution:

E = 15 + 0.9Y + 20 + 0.05Y +25
E = 60 + 0.95Y = (1)
As given E = Y = 60 + 0.95Y
0.05Y = 60

Y $= \frac{60}{0.50} = 1200$

C = 15 + 0.9 x 1200 = 1095
I = 20 + 0.05 x 1200 = 80
When there is no government spending.
Y = 35 + 0.95Y
or, 0.05Y = 35

∴ Y $= \frac{35}{0.05} = 700$

C = 15 + 630 = 645
I = 20 + 35 = 55

Illustration 34:

A demand function of an item is P = 8/(x+1) - 2 and supply function is P = (x+3)/2, determine the equilibrium price and consumer's surplus.

Solution:

Equilibrium price = Demand = Supply

$= \frac{8}{x+1} - 2 = \frac{x+3}{2}$

$= \frac{8-2\,(x+1)}{x+1} = \frac{x+3}{2}$

= (8 - 2x - 2)2	= (x + 3) (x +1)
16 - 4x - 4	= x^2 + 4x + 3
- x^2 - 8x + 9	= 0
x^2 + 8x - 9	= 0
x^2 - x + 9x - 9	= 0
x (x - 1) + 9 (x - 1)	= 0
(x - 1) (x + 9)	= 0
x = 1, x	= -9
Price	$= \frac{1+3}{2} = \frac{4}{2} = 2$

Consumer's surplus = Consumer willing to pay - Consumer actually paid

$= \int_0^1 \left(\frac{8}{(x+1)} - 2\right) dx - [2x1]$

$= \int_0^1 [8\log(x+1) - 2x] - 2$

= [8 log 2 -2] -2

= 8 log 2 - 4

Illustration 35:

The demand function for a particular brand of pocket calculator is stated below, $P = 75 - 0.3Q - 0.05Q^2$, Find the consumer's surplus at a quantity of 15 calculators.

Solution:

Price $= 75 - 0.30\,(15) - 0.05\,(15^2)$
$= 75 - 4.5 - 0.05\,(225)$
$= 75 - 15.75 = 59.25$

Consumer's surplus

$$= \int_0^{15}(75Q - 0.3Q - 0.05Q^2)dQ - (59.25\ x\ 15)$$

$$= \int_0^{15}(75Q - \frac{0.3Q^2}{2} - \frac{0.5Q^2}{2}) - (59.75 \text{ x } 15)$$

$= [(1125 - 33.75 - 56.25) - 0] - 888.75$
$= 1035 - 888.75$
$= 146.25$

Illustration 36:

The demand and supply function under perfect competition are $Y = 16 - x^2$ and $Y = 2(x^2 + 2)$ respectively. Find the market price, consumer's surplus and producer's surplus.

Solution:

Under perfect competition market price is: demand = supply i.e.

$16 - x^2 - 2x^2 - 4 = 0$
$-3x^2 + 12 = 0$
$-3x^2 = -12$
$.-.\ x^2 = 12/3$
$x = \sqrt{\frac{12}{3}} = 2$ units

Consumer's surplus $= \int_0^2 (16 - x^2)\,dx - (12 \text{ x } 2)$

$$= \int_0^2 \left(16x - \frac{x^2}{3}\right)$$

$$= 32 - \frac{8}{3} - 24$$
$= 5\ 1/3$

Producer's surplus = Producer actually received - Producers willing to receive
$= (2 \text{ x } 12) - \int_0^2 2\,(x^2 + 2)\,dx$

$$= 24 - \frac{2}{0}\left(\frac{2x^3}{3} + 4x\right)$$

$$= 32 - \frac{16}{3} - 8 - 0$$

$$= 32 - \frac{16}{3}$$
$= 26\ 2/3$

Illustration 37:
The demand function is Y = 85 - 4x - x^2, 'y' is the price and 'x' is the quantity demand. Find the consumer's surplus for Y = 64.

Solution:

Quantity is 85 - 4x - x2 = 64
= - x^2 - 4x + 21 = 0
= x^2 + 4x - 21 = 0
= x^2 + 7x - 3x - 21 = 0
= x (x + 7) - 3 (x + 7) = 0
= (x - 3) (x + 7) = 0
.-. x = 3 or x = -7, not acceptable

Consumer's surplus $= \int_0^3 (85 - 4x - x^2)\, dx$ - (3 x 64)

$= \int_0^3 \left(85x - \frac{4x^3}{2} - \frac{x^2}{2}\right) - 192$

= 255 - 18 - 9 - 192
= 36

Illustration 38:
Find whether the following commodities are complementary or competitive (or) substitutes, where P_1, P_2 and X_1 X_2 are prices and quantities respectively of the two commodities.

(i) $x_1 = P_1^{-1.7}.\, P_2^{0.8}$; $x_2 = P_1^{0.5}.\, P_2^{-2}$

(ii) $x_1 = \frac{4x^3}{p_1^2 p_2}$; $x_2 = \frac{16}{p_1 p_2^2}$

(iii) $x_1 = P_1^{-8}.\, P_2^{1.2}$; $x_2 = P_1^{0.2}.\, P_2^{-0.6}$

(iv) $x_1 = P_1^{-1.1}.\, P_2^{0.3}$; $x_2 = P_1^{0.2}.\, P_2^{-0.6}$

(v) $x_1 = 1 - 2P_1 + P_2$; $x_2 = 5 - 2P_1 - 3P_2$

(vi) $x_1 = \frac{P_2^{0.6}}{P_1^{1.5}}$; $x_2 = \frac{P_1^{0.1}}{P_2^{0.1}}$

Solution:

(i) $x_1 = P_1^{-1.7}.\, P_2^{0.8}$; $x_2 = P_1^{0.5}.\, P_2^{-2}$

Differentiate partially x_1 w.r.to p_2

$\frac{\partial x_1}{\partial \rho_1} = P_1^{-1.7}(0.8)P_2^{0.2}$

$= \frac{0.5}{P_1^{1.7}.P_2^{0.2}}$ which is greater than zero

Again differentiating partially x_2 w.r.to p_1

$$\frac{\partial x_2}{\partial \rho_1} = \frac{1}{p_2^{0.2}}(0.5)P_1^{0.5}$$

$$= \frac{0.5}{P_2^{0.2}.P_1^{0.5}}$$ which is greater than zero

Hence the commodities are substitutes.

(ii) $x_1 = \frac{4x^3}{p_1^2 p_2}$; $x_2 = \frac{16}{p_1 p_2^2}$

Partially differentiating x_1 w.r.to p_2

$\frac{\partial x_1}{\partial \rho_1} = \frac{-4}{p_1^2 . p_2^2}$ which is less than zero

Again partially differentiating x_2 w.r.to p_1

$\frac{\partial x_2}{\partial \rho_1} = \frac{-16}{p_1^2 . p_2^2}$ which is also less than zero

Therefore, commodities are complementary.

(iii) $x_1 = P_1^{-8} . P_2^{1.2}$; $x_2 = P_1^{0.2} . P_2^{-0.6}$

Differentiating partially x_1 w.r.to p_2

$\frac{\partial x_1}{\partial \rho_2} = P_1^{-0.8}(1.2)P_2^{0.2}$ which is greater than zero

Similarly differentiating partially x_2 w.r.to p_1

$\frac{\partial x_2}{\partial \rho_1} = P_2^{-0.6}(0.2)P_1^{0.8}$

$= \frac{(0.2)p_2^{0.6}}{P_1^{0.8}}$ which is greater than zero

Therefore the commodities are substitutes.

(iv) $x_1 = P_1^{-1.1} . P_2^{0.3}$; $x_2 = P_1^{0.2} . P_2^{-0.6}$

Differentiate partially x_1 w.r.to p_2

$\frac{\partial x_1}{\partial \rho_2} = \frac{p_1^{-1.1}(0.3)}{p_2^{0.7}} = \frac{(0.3)}{P_1^{1.1} . P_2^{0.7}}$ which is greater than zero.

Similarly differentiate partially x_2 w.r.to p_1

$\frac{\partial x_2}{\partial \rho_1} = P_2^{-0.6}(0.2)P_1^{0.8}$

$= \frac{(0.2)p_2^{0.6}}{P_1^{0.8}}$ which is also greater than zero.

Therefore, the commodities are substitutes.

(v) $x_1 = 1 - 2P_1 + P_2$; $x_2 = 5 - 2P_1 - 3P_2$

Differentiating partially x_1 w.r.to p_2

$\frac{\partial x_1}{\partial \rho_2} = 1$ which is greater than zero.

Similarly, differentiating partially x_2 w.r.to p_1

$\frac{\partial x_2}{\partial \rho_1} = -2$ which is less than zero.

Therefore, the relationship between the commodities cannot be established.

(vi) $x_1 = \frac{P_2^{0.6}}{P_1^{1.5}}$; $x_2 = \frac{P_1^{0.1}}{P_2^{0.1}}$

Differentiating partially x_1 w.r.to p_2

$$\frac{\partial x_1}{\partial \rho_2} = \frac{1}{p_1^{1.5}} (0.6)\, P_2^{-0.4}$$

$$= \frac{(0.6)}{P_1^{1.5}.P_2^{0.4}}$$ which is greater than zero.

Similarly, differentiating partially x_2 w.r.to p_1

$$\frac{\partial x_2}{\partial \rho_1} = \frac{1}{P_1^{0.1}} \cdot \frac{1}{P_1^{0.9}}$$

$$= \frac{0.1}{P_2^{0.1}.P_1^{0.9}}$$ Which is greater than zero.

Therefore, the commodities are substitutes.

Illustration 39:

K ltd. sells output in a perfectly completive market. The average variable cost function K Ltd is

$AVC = 300 - 40Q + 2Q^2$

K ltd has an obligation to pay Rs. 500 irrespective of the output produced. What is the price below which K Ltd has to shut down its operation in the short run?

Solution:

A firm has to shut down its operation, if the price is less than average variable cost.

Under perfect competition

P = MR

i.e. Price is equal to marginal revenue. The firm will continue its operation under the short run so long as price is atleast equal to average variable cost.

Thus the equilibrium price which the firm will shut down is the minimum AVC i.e. the average variable cost

. $AVC = 300 - 40Q + 2Q^2$

AVC is minimum where $\frac{d\,(AVC)}{dq} = 0$

i.e. $\frac{d\,(AVC)}{dq} = -40 + 4Q = 0$

i.e. Q = 10 units.

when the firm is producing 10 units,

$AVC = 300 - 40Q + 2Q^2$

$= 300 - 40(10) + 2\,(10)^2$

$= 300 - 400 + 200 = 100$

If the price falls before Rs. 100 the firm has to shut down its operation in short run.

Illustration 40:
J ltd is operating in a perfectly competitive market. The price elasticity of demand and supply of the product estimated to be 3 and 2 respectively. The equilibrium price of the product is Rs. 100. If the government imposes a specific tax of Rs. 10 per unit, what will be the new equilibrium price?

Solution:
Distribution of tax burden between buyers and sellers is in ratio of elasticity of supply to elasticity of demand .

Thus tax burden borne by the buyer = Rs. 10 x $\frac{2}{5}$ = Rs. 4.

If the tax burden borne by buyer is Rs. 4, new equilibrium price will be 100 + 4 = Rs. 104

Illustration 41:
The total cost function for a monopolist is given by TC = 900 + 40 Q^2. The demand function for the good produced by the monopolist is given by 2Q = 48 - 0.08 P. What will be the profit maximising price?

Solution:

Demand function is given by

2Q = 48 - 0.08 P
or , 2Q - 48 = - 0.08 P
or, 48 - 2Q = 0.08 P
or, P = 600 - 25Q

TR = PQ
= 600Q - 25Q^2

TC is given by,
TC = 900 + 40 Q^2

The first order condition for profit maximisation is MR = MC

TR = 600Q - 25Q^2

MR = $\frac{dTR}{dQ}$ = 600 - 50Q

MC = $\frac{d(TC)}{dQ}$ = 80Q

For maximising profit
MR = MC
i.e. 600 - 50Q = 80Q
Q = $\frac{600}{130}$ = 4.6 units
Equilibrium Price =
P = 600 - 25 Q = 600 - 25(4.6)
= 600 – 115 = Rs. 485
i.e. profit maximising price is Rs. 485

Illustration 42:
S Ltd. a monopolist aims at profit maximisation. The fixed cost of the firm is Rs. 200 and the average variable cost of the firm is constant at Rs. 30 per unit. S Ltd. sells goods in West Bengal and Kerala. The estimated demand function for the goods in west Bengal and Kerala are:

$P_w = 40 - 2.5\ Q_w$
$P_k = 120 - 10\ Q_k$

If price discrimination is practiced by S ltd., what will be the profit maximising output?

Solution:
When price discrimination is practiced profit maximising condition is

MR_w = MC..... (1)
MR_k = MC.....(2)
Now, P_w = 40 - 2.5 Q_w
TR_w = 40 Q_w -2.5 Q_w^2
MR_w = 40 - 5Q_w
and P_k = 120 - 10 Q_k
TR_k = 120Q_k - 10Q_k^2 MR_k = 120 - 20 Q_k

Since average variable cost is constant at Rs. 30 per unit, then
MC = 30

$40 - 5Q_w = 30$
$Q_w = 2$ units
& $120 - 20\,Q_k = 30$
i.e. $Q_k = \frac{90}{20} = 4.5$ units
Thus profit maximising output in west Bengal will be 2 units and in Kerala will be 4.5 units.
Thus profit maximising output for the monopolist = 2 + 4.5 = 6.5 units.

Illustration 43:

The total cost function of a monopolist is given by

$$C = 50 + 40x = 50 + 40\,(x_1 + x_2)$$

The total demand is given by

$$P = 100 - 2x$$

The demand function of the segmented market are

$$P_1 = 80 - 2.5x_1$$
$$P_2 = 180 - 10\,x_2$$

If the price discrimination is practised by the monopolist, what will be the equilibrium output in each segment and what will be the price?

Prove that the market with the higher elasticity will have the lower price.

Solution:

The firm aims at the maximisation of profit .

$n = R_1 + R_2 + C$
$R_1 = P_1x_1 = (80 - 2.5x_1)x_1$
$= 80\,x_1 - 2.5x_1^2$

$MR_1 = 80 - 5x_1$.....(1)
$R_2 = P_2x_2 = (180 - 10x_2)\,x_2$
$= 180x_2 - 10x_2^2$

$MR_2 = 180 - 20x_2$ .....(2)
$C = 50 + 40x$
$= 50 + 40(x_1+x_2)$

$MC = \frac{dc}{dx_1} = \frac{dc}{dx_1} = \frac{dc}{dx} = 40$..... (3)

Equating (1) & (3)
$80 - 5x_1 = 40$
$x = 8$
and, equating (2) & (3)
$180 - 20x_2 = 40$
$x_2 = 7$
Total output = 8 + 7 = 15 units
$P_1 = 80 - 2.5x_1$ = Rs. 60
$P_2 = 180 - x_2$ = Rs. 110
The elasticities are
i.e. $= \frac{dx_1}{dp_1} . \frac{p_1}{x_1}$
Now $P_1 = 80 - 2.5x_1$
$x_1 = 32 - 0.4\,P_1$
$\frac{dx_1}{dp_1} = 0.4$

then e1 = 0.4 x $\frac{60}{8}$ = 3

Similarly $e_2 = \frac{dx_2}{dp_2} . \frac{P_2}{x_2}$ = 1.57

Thus $e_1 > e_2$ and accordingly $p_1 < p_2$

i.e. market with the higher elasticity will have the lower price.

Illustration 44:

6,000 pen drives of 2 GB to be sold in a perfectly competitive market to earn Rs. 1,06,000 profit, whereas in a monopoly market only 1,200 units are required to be sold to earn the same profit. The fixed costs for the period are Rs. 74,000. The contribution per unit in the monopoly market is as high as three-fourths its variable cost.

Determine the target selling price per unit under each market condition.

Solution:

Calculation of selling price

		(Rs.)
Units	**Perfect competition 6,000**	**Monopoly 1,200**
Contribution (1,06,000 + 74,000)	1,80,000	1,80,000
Contribution p. u.	30	150
Variable cost p. u. (150 ÷ ¾)	-	200
Variable Cost p. u.	200	-
Selling price p. u.	230	350

Illustration 45:

C Ltd. is about to introduction a new product with the following estimates:

Price per unit (in rupees)	30.00	31.50	33.00	34.50	36.00	37.50	39.00
Demand (in thousand units)	400	380	360	340	315	280	240

Costs:

Direct materials	Rs.12 p. u. Selling expenses	10% on ale
Direct labour	Rs.3 p. u. Fixed production overheads	Rs.14,40,000
Variable overhead	Rs.3 p. u. Administration expenses	Rs.10,80,000

Judging from the estimates, determine the tentative price of the new product to earn maximum profit. **Solution:**

Statement for Determining Tentative Price of the New Product, from estimates, to earn maximum profit

Price p. u. (Rs.) (Rs.18 p. u. + 10% of selling price)	**Demand (in lakhs of unit)**	**Sales revenue (in Rs. Lakhs)**	**Variable costs (in Rs. Lakhs)**	**Contribution (in Rs. Lakhs)**
(a)	**(b)**	**(c)**	**(d)**	**(c)- (d)**
30.00	4.00	120.00	84.00	36.00
31.50	3.80	119.70	80.37	39.33
33.00	3.60	118.80	76.68	42.12
34.50	3.40	117.30	72.93	44.37
36.00	3.15	113.40	68.04	45.36
37.50	2.80	105.00	60.90	44.10
39.00	2.40	93.60	52.56	41.04

The tentative price of the new product should be Rs.36 per unit. At this price the profit of C Ltd. is maximum, the maximum profit of the concern comes to Rs. 20,16,000.

Working Notes:

Maximum Profit = Maximum contribution - (Fixed production overhead + Administration expenses)
= Rs.45,36,000 - (Rs.14,40,000 + Rs.10,80,000)
= Rs.45,36,000 - Rs.25,20,000
= Rs.20,16,000

Illustration 46:

H M Ltd. Manufactures an alloy product 'Incop' by using iron and Copper. The metals pass through two plants, X and Y. The company gives you the following details for the manufacture of one unit of Incop:

Materials	Iron: 10 kgs. @ Rs.5 per kg.	Copper: 5 kg. @ Rs.8 per kg.
Wages	3 hours @ Rs.15 per hour in Plant X	5 hours @ Rs.12 per hour in Plant Y
Overhead recovery	On the basis of direct labour hours	
Fixed overhead	Rs.8 per hour in Plant X	Rs.5 per hour in Plant Y
Variable overhead	Rs.8 per hour in Plant X	Rs.5 per hour in Plant Y
Selling overhead	(fully variable) Rs.20 per unit	

(i) Find out the minimum price to be fixed for the alloy, when the alloy is new to the market. Briefly explain this pricing strategy.

(ii) After the alloy is well established in the market. What should be the minimum selling price? Why?

Solution:

Calculation of Total cost for manufacture of one unit of 'Incop' alloy product

		(Rs.)	
Materials			
Iron	(10 kg. x Rs.5)	50	
Copper	(5 Kg. x Rs.8)	40	90
Wages			
X	(3 hours x Rs.15)	45	
Y	(5 hours x Rs.12)	60	105
Variable overhead - production			
X	(3 hours x Rs.8)	24	
Y	(5 hours x Rs.5)	25	49
Variable overhead - Selling			20
Total variable cost			264
Add: Fixed overhead			
X	(Rs.8 x 3 hours)	24	
Y	(Rs.5 x 5 hours)	25	49
Total Cost			**313**

(i) If pricing strategy is to penetrate the market, the minimum price for a new product should be the variable cost i.e. Rs.264. In some circumstances, it can also be sold below the variable cost, if it is expected to quickly penetrate the market and later absorb a price increase. Total variable cost is the penetration price.

(ii) When the alloy is well established, the minimum selling price will be the total cost - including the fixed cost i.e. Rs. 313 per unit. Long-run costs should cover at least the total cost.

Illustration 47:

C. Ltd., an Indian company, has entered into an agreement of strategic alliance with Z Inc. of United States of America for the manufacture of personal computers in India. Broadly, the terms of agreement are:

(i) Z will provide C with kits in a dismantled condition. These will be used in the manufacture of the personal computer in India. On values basis, the supply, in terms of the FOB price will be 50% thereof.

(ii) C will procure the balance of materials in India.

(iii) Z will provide to C with designs and drawings in regard to the materials and supplies to be procedure in India. For this, C will pay Z a technology fee of Rs. 3 crores.

(iv) Z will also be entitled to a royalty at 10% of the selling price of the computer fixed for sales in India as reduced by the cost of standard items procured in India and also the cost of imported kits from Z.

(v) C will furnish to Z detailed quarterly returns.

Other information available:

(i) FOB price agreed $510. Exchange rate to be adopted $1 = Rs. 47.059
[Note - In making calculations, the final sum may be rounded to the next rupee].
(ii) Insurance and freight – Rs. 500 per imported kit;
(iii) Customs duty leviable is 150% of the CIF prices; but as a concession, the actual rate leviable has been fixed at 30% of CIF;
(iv) The technology agreement expires with the production of 2,00,000 computers;
(v) The quoted price on kits includes a 20% margin of profits on cost to Z;
(vi) The estimated cost of materials and supplies to be obtained in India will be 140% of the cost of supplies made by Z.
(vii) 48% of the value in rupees of the locally procured goods represent cost of the standard items.
(viii) Cost of assembly and other overheads in India will be Rs. 2,000 per personal computer.

Required - Calculate the selling price of a personal computer in India bearing in mind that C has targeted a profit of 20% to itself on the selling price.

Solution: Working Notes:

(1) FOB price of dismantled kit
FOB price of dismantled kit (in $) = 510
FOB price of dismantled kit (in Rs.) ($510 x Rs. 47.059) = 24,000

(2) Cost of a dismantled kit to Z Inc.
If Rs. 120 is the S.P. of kit to Z Inc. then its C.P. is Rs. 100
If Rs. 24,000 is the S.P. then C.P. is = 24,000 x 100/120 = Rs. 20,000

(3) Cost of local procurements
140% of the cost of supplies made by Zinc. = 140% x Rs. 10,000* = Rs. 14,000
*Being 50% of cost of a dismantled kit to Z Inc.

(4) Landed cost of dismantled kit

	(Rs.)
FOB price (50% x Rs. 24,000)	12,000
Add: Insurance and freight	500
CIF price	12,500
Add: Customs duty (30% x Rs. 12,500)	3,750
Landed cost of a dismantled kit	16,250

(5) Cost of the standard items procured locally
48% of the cost of locally procured goods = Rs.14,000 x 48/100 = Rs.6,720

(6) Royalty payment per computer:
Let x = Selling price per unit of personal computer
y = Royalty paid per computer
Since 20% is the margin of profit on S.P. it means a margin of 25% on C.P.,
Therefore we have:
x = 1.25 (Rs.32,250 + Rs.150+ y) and
y = 10% [x-(Rs.6,720 + Rs.16,250)]
On solving the above equations we get
x = Rs.43,000
y = Rs.2003.43 or Rs.2,000 (approx.)

Statement Showing the Selling Price of a Personal Computer in India	**(Rs.)**
Landed cost of a dismantled kit	16,250
Cost of local procurement	14,000
Cost of assembly and other overheads per computer	2,000
Total cost of manufacture	32,250
Technology fee per computer (Rs.3,00,00,000/2,00,000 computer)	150
Royalty payment per unit	2,000
Total cost	34,400
Profit (20% on selling price or 25% on total cost)	8,600
Selling price per computer	43,000

ECONOMIC EFFICIENCY OF THE FIRM – PERFORMANCE ANALYSIS

MARKET FACTORS AFFECTING PRICING DECISIONS

The traditional economic theories of pricing, based on demand and supply are of little use to businessmen in setting prices for their goods. The traditional economists rarely considered the influence exercised by middlemen, rival producers change in Government economic policies, taxation, etc., all of which are really important in price determination.

Under marginal principle of MC = MR, price and output are determined on the basic assumption of profit maximization. Some economists - Hall and Hitch of the Oxford University - rejected the assumption of profit maximization as unrealistic and inapplicable to actual business conditions. In their empirical study of actual business behaviour, Hall and Hitch found that business firms are either ignorant of the concepts of MR and MC or they do not actually calculate MR and MC. Naturally, they do not determine price and output at the point of equality of MR and MC. Besides, business firms are afraid of charging high prices in the short period much above their average costs of production, lest their price policy, resulting in supernormal profits, attract potential competitors to enter the industry and compete away the profits in the long run. High prices and high profit margins may attract public and Government reaction and possible intervention. In other words, in real life, firms would like to avoid entry of rivals and sharing of the market and for this, they would be prepared to forgo supernormal profits in the short period. Often, firms will be interested in getting a large share of the market rather than maximum profit. Sometimes, business firms are influenced by consideration of charging the "right price" with a "just profit margin".

Factors influencing Price of a Product:

Generally, marketers consider the following factors in setting price:

1. Target customers: Price of product depends on the capacity of buyers to buy at various prices, in other words, influence of price elasticity of demand will be examined.
2. Cost of the product: Pricing is primarily based on, how much it costs to produce and market the product, i.e., both the production and distribution cost.
3. Competition: Severe competition may indicate a lower price than when there is monopoly or little competition.
4. The law: Government authorities place numerous restrictions on pricing activities.
5. Social responsibility: Pricing affects many parties, including employees, shareholders and the public at large. These should be considered in pricing.
6. Market position of the firm: The position of the market may also influence the pricing decision of the firm. It is only why the different producers of identical products sell their products at different prices.
7. Distribution channel policy: The prices of products will also depend upon the policy regarding distribution channel. The longer the channel, the higher would be the distribution costs and consequently higher the prices.
8. Price elasticity of Demand: Price elasticity refers to consequential change in demand due to change in price of the commodity. It is the relative responsiveness to the changes in price. As there an inverse relationship between price and demand for product, the demand will increase with fall in price.
9. Economic environment: In recession, prices are reduced to a sizeable extent to maintain the level of turnover. On the other hand, prices are charged higher in boom period to cover the increasing cost of production and distribution.

There are different types of methods of pricing. The main pricing practices can be classified into following broad categories:

(1) Competition Oriented Pricing:

(a) Going Rate Pricing:

Another method of pricing adopted by small firms - which are price followers - is known as going rate pricing. Under this system, a firm sets its price according to the general pricing structure in the industry or according to the price set by the price leader. In a sense, each firm has "monopoly" power over its produce and it can, if it chooses, fix a monopoly price and face all the consequences of monopoly. In practice, however, it prefers the easier and more practical method of choosing price going in the market. It will change its price only when other firms do the same. Such a price policy is useful and safe to a firm under certain circumstances. For instance, the firm may not have an accurate idea of its costs or it may like to play safe and not provoke the larger firm to go for cut- throat

competition. Besides, it is difficult for each firm to calculate the full implication of change in costs and prices and it is much better to follow the same pattern of pricing adopted by others. Even a large firm may be satisfied with going rate pricing lest a change in price by it unnecessarily disturbs the whole market. No firm would like to "spoil" the common market by reducing the price.

(b) Trade Association Pricing:

To avoid uncertainties of pricing decision and the downward pressure on prices which competition exerts, firms frequently come to the express or implied agreements to maintain prices at a similar level. Though express (or, overt) agreements are generally declared as illegal, the firms can easily and safely enter into an implied (or, tacit) collusion. Individual firms, however, may frequently find it worthwhile to break out of any such agreements, but this leads to the following possible alternatives:

(i) The price-cut may spark off a price war between the firms which will go on until one or all firms give up the struggle; or

(ii) If the firm breaking out of the collusion is able to keep its rivals in the dark about the price-cut, it can gain out of the price-cut only when either the original customers of this firm are unaware or are in some way loyal to this firm. But such situations are generally rare.

(c) Customary Pricing:

There are certain goods whose prices tend to be fixed more or less in the minds of consumers-these are known as the "Charm" prices. Change in costs of production - if the change is moderate - will not affect the price, as the firms will not and cannot change the price. Accordingly, a rise in cost of production may probably lead to reduction in quality of the product but not to a rise in price. Likewise, a fall in cost of production may not be accompanied by a decline in price. Pricing in this case may be known as customary pricing.

(d) Price Leadership:

If often happens that in an industry there is one or many big firms whose cost of production is low and they dominate the industry. In such a situation, the small firms will not like to enter into price war with these big firms. The former may, therefore, follow the price fixed by the leader. For example, Cadbury may be accepted as a leader in the chocolate industry, Hindustan Lever in the soap industry, and so on. Small firms may change the price only when there is a general change in the cost of production and the price leader has recognized and adjusted his price on that basis. In fact, the price leadership pattern is adopted as a strategy of co-existence - each firm catering to its market.

It is not necessary that the price charged by small firms must equal that charged by the price- leader. There might be some difference in their prices (though it cannot be significant) but any change in the price is always in the same direction for both the price-leader and the followers, and is generally in the same proportion too. As a result, both will have their own markets to cater, thus avoiding diversion of customers.

(e) Sealed - bid Pricing:

This method is more popular in tenders and contracts. Each contracting firm quotes its price in a sealed cover called 'tender'. All the tenders are opened on a scheduled date and the person, who quotes the lowest price, other things remaining the same, is awarded the contract.

(2) Demand Oriented Pricing:

(a) Differential Pricing or Price Discrimination

There are many bases on which the open price discrimination is practiced. These are discussed below:

- Time Price Differentials: It is a general practice to use the expression "the demand for a product or service", but it is important to note that demand also has a time dimension. The demand may shift in fairly short-time intervals. For example, demand for telephone facilities is more in the day time rather than at night.
- Use Price differentials: Different buyers have different uses of a product or a service. For example railways can be used for long-haul or short-haul freight traffic. Railways can also be used for

transporting different types of commodities. Electricity can similarly, be used for industrial or residential purposes.

- Quality price Differentials: If the product caters to that group of consumers who are concerned about its quality, then the quality becomes a significant determinant of demand elasticity. The seller has, therefore, to create differences in quality to sell his product. It must be emphasized here that the differences in quality basically depend upon the buyers' understanding of the quality. Sellers use many devices to create quality differences.
- Quantity Differentials: When the seller discriminates on the basis of the quantity of purchase, it is known as quantity differentials. Quantity discounts are price concessions based on the size of the lot purchased at one time and delivered at one location. These discounts are thus related to size of a single purchase. The size of the lot purchased is measured in terms of either physical units or monetary units. Sometimes, discounts are according to the trade status, i.e., wholesaler, retailer, jobber, etc.

(b) Perceived Value Pricing:

Perceived value pricing refers to fixing the price on the basis of a buyer's perception of the value of the product.

(3) Pricing based on other Economic Considerations:

(a) Administered Pricing:

Administered prices are the prices which are fixed and enforced by the Government. The term administered prices was introduced by Keynes.

Characteristics of administered prices:

1. They are fixed by Government
2. They are statutory i.e., legally enforced by the Government
3. They are regulatory in nature
4. They are meant as corrective measure
5. They are the outcome of the price policy of the Government.

(b) Dual Pricing:

Dual pricing is a system in which there are two prices for the same commodity at the same time - one is a controlled price fixed by the Government and the other is a free market price based on conditions of demand and supply. The controlled price is fixed price while the free market price is a fluctuating price. Generally, the Government fixed the prices of a commodity - say, sugar - at a level which will cover the cost of production and permit a reasonable margin of profit. But this controlled price is obviously lower than the free market price because of the existence of excess of demand over supply. The controlled price is mainly for the benefit of lower incoacme groups and it many often be fixed so low that the producers may incur a small margin of loss. The producers are compelled to sell part of their output at the controlled rate to the weaker sections of the community but are permitted to sell the surplus stocks in the market at the free market price which is much higher. This enables the producers to make up their loss in the controlled market or increase their volume of profit. Besides, the general consumers are given a chance to satisfy their demand fully from the market.

(c) Shadow Pricing:

The producer has to decide two questions - 1) how much of each product should be produced to maximize profits? 2) What price is worth paying for additional quantities of a scarce resource? To decide the second question "What price is worth paying for additional quantity of a scarce resource", very often "shadow prices" are used. Shadow prices are not prices obtained by observing the real world. Shadow prices are "imputed values". The shadow price shows the marginal contribution of the factors of production employed. It is calculated by using the "simplex method". These imputed values show the increase in profit which would result if an additional unit of that scarce factor is used. The imputed value is the reduction in contribution if that scarce factor is removed.

(d) Multiple Product Pricing:

Now-a-days, multiple production is a common phenomenon. Almost all firms have more than one product in their line of production. Pricing of products under those conditions is known as multi-product pricing. The major problem in pricing of multiple products is that each product has a separate demand curve. But all of them are produced under one organisation by interchangeable production facilities, they have only one inseparable marginal cost curve. Hence marginal rule of pricing cannot be applied. E.W. Clemens suggests a solution to this problem as - third degree price discrimination under monopoly. As a discriminating monopoly tries to maximize its revenue in all its markets so does a multi-product firm in respect of each of its products.

Even the most specialized firms produce a commodity in multiple models, styles and sizes, each so much differentiated from the other that each model or size, may be considered a different product.

For example:

Refrigerators - 165 liters, 200 liters, 250 liters, single door model, two door model, bottom racks, top racks models etc.

Television sets - 14 inches, 20 inches, 21 inches, 25 inches, 27 inches, color - black & white, remote model, without - remote model, flat screen model, digital sound two speakers, four speakers, home theater systems etc.

(4) Pricing Policies Based on Market Conditions:

(a) Perfect Competition:

A firm can only sell its product at the market price and nothing above it. In the long run, for an efficient firm, the sales price is just equal to the average cost. Normal profit is made. There is no excess profit.

(b) Monopoly:

Monopolies are almost always nationalized enterprises for which the criterion of maximization of profit is not justifiable. In reality, a firm enjoys monopoly position only because it has succeeded in eliminating or absorbing its competitors. It is therefore probable that, initially, it was better organized and more efficient.

The technical advantages which benefit large firms in certain branches of industry can also neutralize, at least partly, the harmful effects of a monopoly. Finally, "any defacto monopoly must be prepared to defend itself, on the one hand, against the emergence of substitute competitors and, on the other, against the competition of substitute products, which imposes a limitation on its profit realization".

In general, to prevent the entry of new firms, a monopolist must set entry-preventing prices, i.e., it should hold prices at a level which will tend to discourage new firms from entering that particular branch of industry. This presupposes an implicit estimation of production costs of possible competitors, and of the profits which will be required to attract them.

On the contrary, in order to fight the competition of substitute products, a monopoly must establish its price policy on the basis of a demand curve which will actually take those products into account. When the uses of goods produced by a monopoly are many, the degree of monopoly can vary enormously from one use to another. In case of coal, for instance, sales range from the industrial market- in which the fuel oil competition is extremely active - to blast furnace coke market - in which coal enjoys a technical monopoly.

So profit maximization demands that management collect more detailed econometric data in the environment of monopoly, than in that of perfect competition.

(c) Temporary Monopoly:

This situation occurs more frequently. A firm invents a new product and places it on the market. For quite some time the demand will remain low, as consumers are not yet aware of the product. The firm will enjoy a de facto monopoly under the protection of its patents. Then, as the product enters into common usage, demand develops rapidly. Additional firms try to enter the market. They develop new production methods. Gradually, prices and production techniques tend to stabilize. So at the end, the market evolves towards an ordinary competitive one.

A firm which invents a new product must determine a strategy relating to prices and production which leads to a maximum effective income. Following J. Dean, we may consider two extreme cases: that of skimming of demand and that of creating a demand market.

(d) Skimming Price Policy:

When the product is new but with a high degree of consumer acceptability, the firm may decide to charge a high mark up and, therefore, charge a high price. The system of charging high prices for new products is known as price skimming for the object is to "skim the cream" from the market. There are many reasons for adopting a high mark-up and, therefore, high initial price:

i) The demand for the new product is relatively inelastic. The high prices will not stop the new consumers from demanding the product. The new product, novelty, commands a better price. Above all, in the initial stage, cross elasticity of demand is low.

ii) If life of the product promises to be a short one, the management may fix a high price so that it can get as much profit as possible and, in as short a period as possible.

iii) Such an initially high price is also suitable if the firm can divide the market into different segments based on different elasticities. The firm can introduce a cheaper model in the market with lower elasticity.

iv) High initial price may also be needed in those cases where there is heavy investment of capital and when the costs of introducing a new product are high. The initial price of a transistor radio was Rs. 500 or more (now Rs. 50 or even less).

(e) Duopoly:

This is the case where there are only two firms in an industry. Each duopolist can choose his production in such a way as to maximize his income for a given value of output. Each duopolist has no interest in modifying his behaviour as long as the other does not modify this.

If both duopolists attempt to take one another's reactions into account, the problem is no longer predetermined. Duopoly is often characterized by instability. Duopolists eliminate their competitors through price wars or through agreements. Duopolists can as sure themselves by cooperating, a total income greater than the sum of the revenues that each can insure for himself by non- cooperative behaviour.

(f) Oligopoly:

In oligopolistic situations, entrepreneurs attempt to avoid price wars which are ruinous for the industry. Being aware of the fact that their rivals can do the same, they refrain from seeking to increase their share of the market through price cuts. As a result, oligopoly can attain a certain stability characterized by: a) the 'price leadership' of a firm, b) the reduction of hidden prices, and c) competition in fields other than that of price (like promotion, packaging, etc.).

Now, about the lowering of hidden prices. It can assume various forms. It is contingent upon the customer, upon the size of the order, upon the geographical area and the existence of inferior brands. This policy has the advantage that it precedes adjustments of official prices and in this way contributes to the stability of oligopolists.

Finally, non-price competition is a substitute for price competition. It is much less dangerous because its effects are felt in the long run. So the possibilities of reactions from competition are more limited.

(g) Monopolistic competition:

In this type of market, price policies are extremely varied because of product differentiation. Each firm is faced with a separate demand curve and a market price.

The Role of Demand in Pricing Decisions:

How a business firm's buyers respond to a change in price is an important consideration, for the eventual effect on sales volume and revenue is determined by the degree of buyer's demand sensitivity to price changes. However, price - setters of ten miss the following four points:

1. Market Vs Firm Elasticity:

ECONOMIC EFFICIENCY OF THE FIRM – PERFORMANCE ANALYSIS

Price elasticity of demand is a measure of the degree to which buyers are sensitive to price changes. In any market characterized by several functionally substitutable products, there are actually two demand schedules: 1) demand for the general product (primary demand) and 2) demand for the firm's specific offering (secondary demand). In general, secondary demand is found to be more price elastic. But a seller may sometimes mistake relatively inelastic market or primary demand as elastic secondary demand.

2. Demand for buyer's Output:

The Market for buyer's products may actually be price-elastic. So a reduction in price by a firm would raise demand for its product. Hence, manufacturers selling to such buyers, and whose product represents a significant portion of these buyers product costs may curtail sales opportunities by eliminating discounts or low margin products.

3. Likelihood of Competitive Entry:

K.B. Monroe has pointed out that "an emphasis on high-price strategies may encourage the entry of competitors when entry barriers are minor and when demand is actually price-elastic. Moreover, high prices or rapidly increasing prices may force buyers to reconsider their need and, perhaps, actively seek out competitive substitutes.

4. Demand Consequences of a Product Line:

Most firms sell a wide variety of products requiring a variety of different marketing strategies. Within a product line there are usually some products that are functional substitutes for each other and some products that are functionally complementary. For example, a photographic product line includes such items like cameras, films, flash bulbs, projectors, screens and other accessories. Because of the demand interrelationships and because there are usually several price-market targets, the product line pricing problem throws a major challenge before the marketing executives.

Short Questions & Answers:

Q.1. The necessary condition for equilibrium position of a firm is:

A. MC > MR; B. MC > Price;
C. MC = MR; D. MC is falling; E. MC = AC.

Answer: E. MC = AC

Q.2. At the point of equilibrium of firm (under perfect competition):

A. MC curve must be rising; B. MC curve must be falling;
C. MR curve must be rising; D. None of these.

Answer: A. MC curve must be rising

Q.3. Normal profit is:

A. Part of total cost; B. Part of economic profit;
C. Total revenue minus total cost; D. Total revenue minus implicit cost.

Answer: A. Part of total cost

Q.4. Economic profit is:

A. Part of total cost; B. Total revenue minus total cost;
C. Total revenue minus explicit cost; D. Total variable cost minus total fixed cost.

Answer: B. Total revenue minus total cost

Q.5. The basic goal of a firm is to:

A. Maximize revenues; B. Maximize welfare of its employees;
C. Maximize profit; D. Maximize output.

Answer: C. Maximize profit

ECONOMIC EFFICIENCY OF THE FIRM – PERFORMANCE ANALYSIS

Q.6. A firm earns economic profit when total profit exceeds:

A. Normal profit; B. Implicit costs;
C. Explicit costs; D. Variable costs.

Answer: A. Normal profit

Q.7. A firm's total revenue is equal to:

A. Total quantity produced times marginal cost;
B. Total quantity produced times market price;
C. Marginal revenue times total quantity produced;
D. Market price divided by total quantity produced.

Answer:
B. Total quantity produced times market price.

Q.8. A firm's marginal revenue is defined as:

A. The ratio of total revenue to total quantity produced;
B. The additional output produced by lowering price;
C. The additional revenue received due to technical innovation;
D. The additional revenue received when selling one more unit of output.

Answer: D. The additional revenue received when selling one more unit of output.

Q.9. In order to maximize profits, a firm should produce at the output level for which:

A. Average cost is minimized; B. Marginal revenue equals marginal cost;
C. Marginal cost is minimized; D. Price minus average cost is as large as possible.

Answer: B. Marginal revenue equals marginal cost.

Q.10. If a firm is a price taker, its marginal revenue is:

A. Equal to market price; B. Less than market price;
C. Greater than market price;
D. A multiple of market price that may be either greater than or less than one.

Answer: A. Equal to market price.

Q.11. Which of the following is a characteristic of a perfectly competitive market?

A. Firms are price setters;
B. There are few sellers in the market;
C. Firms can exit and enter the market freely;
D. All of these.

Answer: C. Firms can exit and enter the market freely

Q.12. Which of the following is NOT a financial objective of pricing?

A. Corporate growth; B. Return on investment;
C. Profit maximization; D. None of these

Answer: A. Corporate growth

ECONOMIC EFFICIENCY OF THE FIRM – PERFORMANCE ANALYSIS

State if the following statements are true or false:

Q.13. A monopoly is a market structure in which there is not only one producer/seller for a product.
Answer: False.

Q.14. A perfectly competitive firm produces the profit- maximizing quantity of output that equates marginal revenue and marginal cost.
Answer: True.

Q.15. A monopolist can sell more of his output only at a lower price and can reduce the sale at a high price.
Answer: False.

Q.16. In Monopolistic competition, pricing policies are extremely varied because of product differentiation.
Answer: True.

Fill in the blanks:

Q.17._Price Policy is the system of charging high prices for new products to "skim the cream" from the market.
Answer: Skimming

Q.18. Dual pricing is a system in which there are_prices for the same commodity at the same time.
Answer: two

Q.19. The term administered prices was introduced by_.
Answer: Keynes

Q.20. Sealed - bid pricing method is more popular in_and_.
Answer: tenders, contracts

NCAER MODEL ILLUSTRATIONS

ILLUSTRATION 1.

BALANCE SHEET (EXTRACT) OF Q LTD. AS ON 31 MARCH 2014.

Liabilities	Rs. in Crores	Assets	Rs. in Crores
Equity Shares	20.80	Fixed Assets	105.60
Long-term Liabilities Current	104.00	Current Assets	57.60
Liabilities	78.40	Profit & Loss A/c	40.00
	203.20		**203.20**

Additional Information:

(i) Depreciation written off Rs. 8 crores.
(ii) Preliminary Expenses written off Rs. 1.60 crores.
(iii) Net Loss Rs. 25.60 crores. Ascertain the stage of sickness.

Solution:

The NCAER Study on Corporate Distress Prediction prescribed the following three parameters for predicting the stage of Corporate Sickness:

(i) Cash profit position (a profitability measure)
(ii) Net working capital position (a liquidity measure)
(iii) Net worth position (a solvency measure)

In the given case, we need to judge the above-mentioned parameters to ascertain the stage of sickness of the company.

(i) Cash profit = Net profit + (Non-cash expenses/losses debited to Profit & Loss A/c) - (Non-cash incomes/Gains credited to Profit & Loss A/c)
Here, Cash Profit = Net Profit + Depreciation Written Off + Preliminary Expenses Written Off
= Rs. [(25.60) + 8+ 1.60] = (Rs. 16 crores)

(ii) Net Working Capital = Current Assets - Current Liabilities
= Rs. [57.60 - 78.40] = (Rs. 20.80 crores)

(iii) Net Worth = Share Capital + Reserves & Surplus - Miscellaneous Expenditure - Profit & Loss A/c (Dr.)
Here, Net Worth = Equity Share Capital - Profit & Loss A/c (Dr.)
= Rs. [20.80 - 40.00] = (Rs. 19.20 crores)

Prediction about Corporate Sickness: As per NCAER Research Study, out of mentioned three parameters, if any one parameter becomes negative in case of a firm, it can be predicted that the firm has a tendency towards sickness.

In the given company, all the three parameters [as calculated under (a), (b) and (c)] show negative value. Therefore, it can strongly be predicted that the company is a sick company and its stage of sickness is 'fully sick'. Immediate necessary drastic revival measures are essentially required for the survival of the company.

NCAER MODEL ILLUSTRATIONS

ILLUSTRATION 2: The following financial information has been taken from the Annual Report 2019 of a Stress Limited.

Balance Sheet of Stress Limited as at March 31, 2019

ASSETS:	(Rs.in Crores)
Non-Current Assets	
Property, Plant and Equipment	1,654.11
Intangible Assets	375.15
Other Non-Current Assets	388.18
	2,417.44
Current Assets	
Inventories	128.56
Financial Assets excluding Cash and Cash Equivalent	85.36
Cash and Cash Equivalent	6.85
Other Current Assets	568.93
Total Current Assets	789.70
Total Assets	3,207.14
EQUITY AND LIABILITIES:	
Equity	
Equity Share Capital	362.75
Other Equity	(568.94)
Net Worth	(206.19)
Non-Current Liability	
Financial Liabilities	1,203.00
Provisions	112.63
Other Non-Current Liabilities	46.59
Total Non-Current Liabilities	1,362.22
Current Liabilities	
Financial Liabilities	1,721.65
Provisions	95.25
Other Current Liabilities	234.21
Total Current Liabilities	2,051.11
Total Equity and Liabilities	3,207.14

Additional Information:

- **Depreciation written off — Rs. 28 crores.**
- **Preliminary Expenses written off — Rs. 11.60 crores.**
- **Net Loss during the FY 2018-19 — Rs. 58.70 crores.**

NCAER MODEL ILLUSTRATIONS

Using the NCAER Model for Corporate Distress Prediction, you are required to ascertain the stage of sickness.

Solution:

The NCAER Study on Corporate Distress Prediction prescribed the following three parametersfor predicting the stage of Corporate Sickness:

(i) **Cash profit position (a profitability measure)**

(ii) **Net working capital position (a liquidity measure)**

(iii) **Net worth position (a solvency measure)**

If anyone of the above mentioned parameters becomes negative in case of a firm, it can be predicted that the firm likely to move towards sickness. If all the three parameters are negativethen it shows that the company is fully under corporate distress. In order to decide in the given case, the stage of sickness, we have to calculate all the three above mentioned parameters.

- **Cash profit position: It means that we have to calculate cash from operating activities. In the given case, Cash from Operating Activities = Net Profit + Depreciation Written Off + Preliminary Expenses Written Off = Rs. [(58.70) + 28.00 + 11.60] crores = Rs. (19.10) crores which is negative.**

- **Net Working Capital: Net Working Capital = Current Assets - Current Liabilities = Rs. [(128.56 + 85.36 + 6.85 + 568.93) - 2,051.11] crores = Rs. (1,261.41) crores which is also negative.**

- **Net Worth: Net Worth = Equity Share Capital + Other Equity = Rs. (362.75 - 568.94) crores = Rs. (206.19) crores which is also negative.**

Thus, we find that in this case, all the three parameters are negative and hence, we can conclude that the company is a sick company and its stage of sickness is fully sick. Therefore, immediate necessary drastic revival measures are essentially required for the survival of the company.

ALTMAN'S Z-SCORE MODELS ILLUSTRATIONS

ILLUSTRATION 1.
From the information given below relating to Bad Past Ltd., calculate Altman's Z-score and comment:

$(\frac{\text{Working capital}}{\text{Total assets}})$ = 25%

$(\frac{\text{Retained earnings}}{\text{Total assets}})$ = 30%

$(\frac{\text{Earnings before interest \& } taxes}{\text{Total assets}})$ = 15%

$(\frac{\text{Market value of equity}}{\text{Book value of total debt}})$ = 150%

$(\frac{\text{Sales}}{\text{Total assets}})$ = 2 times

Solution:

As per Altman's Model (1968) of Corporate Distress Prediction

$Z = 1.2\ X_1 + 1.4\ X_2 + 3.3\ X_3 + 0.6\ X_4 + 1.0\ X_5$

Here, the five variables are as follows:

X_1	= Working Capital to Total Assets	= 25%
X_2	= Retained Earnings to Total Assets	= 30%
X_3	= EBIT to Total Assets	= 15%
X_4	= Market Value of Equity Shares to Book Value of Total Debt	=150%
X_5	= Sales to Total Assets	= 2 times

Hence, Z-score = (1.2x25%) + (1.4x30%) + (3.3x15%) + (0.6x150%) + (1x2)
= 0.30 + 0.42 + 0.495 + 0.90 + 2.00 = 4.115

Note: As the calculated value of Z-score is much higher than 2.99, it can be strongly predicted that the company is a non-bankrupt company.

Raghav ACADEMY

ALTMAN'S Z-SCORE MODELS ILLUSTRATIONS

ILLUSTRATION 2.
From the information given below relating to Unfortunate Ltd., calculate Altman's Z-score and comment:

$(\frac{\text{Working capital}}{\text{Total assets}})$ = 0.45

$(\frac{\text{Retained earnings}}{\text{Total assets}})$ = 0.25

$(\frac{\text{Earnings before interest \& } taxes}{\text{Total assets}})$ = 0.30

$(\frac{\text{Market value of equity}}{\text{Book value of total debt}})$ = 2.50

$(\frac{\text{Sales}}{\text{Total assets}})$ = 3 times

Solution:

As per Altman's Model (1968) of Corporate Distress Prediction:

$Z = 1.2\ X_1 + 1.4\ X_2 + 3.3\ X_3 + 0.6\ X_4 + 1.0\ X_5$

Here, the five variables are as follows:

X_1	= Working Capital to Total Assets	= 0.45
X_2	= Retained Earnings to Total Assets	= 0.25
X_3	= EBIT to Total Assets	= 0.30
X_4	= Market Value of Equity Shares to Book Value of Total Debt	= 2.50
X_5	= Sales to Total Assets	= 3 times

Hence, Z-score = (1.2 x 0.45) + (1.4 x 0.25) + (3.3 x 0.30) + (0.6 x 2.50) + (1 x 3)
= 0.54 + 0.35 + 0.99 + 1.50 + 3 = 6.38

Note: As the calculated value of Z-score is much higher than 2.99, it can be strongly predicted that the company is a non-bankrupt company (i.e., non-failed company).

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ALTMAN'S Z-SCORE MODELS ILLUSTRATIONS

ILLUSTRATION 3.

Using Altman's Multiple Discriminant Function, calculate Z-score of S & Co. Ltd., where the five accounting ratios are as follows and comment about its financial position:

Working Capital to Total Assets	= 0.250
Retained Earnings to Total Assets	= 50%
EBIT to Total Assets	= 19%
Book Value of Equity to Book Value of Total Debt	= 1.65
Sales to Total Assets	= 3 times

Solution:

As the Book Value of Equity to Book Value of Total Debt is given in the problem in place of Market Value of Equity to Book Value of Total Debt, the value of Z-score is to be computed as per Altman's 1983 Model of Corporate Distress Prediction instead of Altman's 1968 Model of Corporate Distress Prediction that we followed earlier.

As per Altman's Model (1983) of Corporate Distress Prediction,

$Z = 0.717\ X_1 + 0.847\ X_2 + 3.107\ X_3 + 0.420\ X_4 + 0.998X_5$

Here, the five variables are as follows:

X_1	= Working Capital to Total Assets	= 0.250
X_2	= Retained Earnings to Total Assets	= 0.50
X_3	= EBIT to Total Assets	= 0.19
X_4	= Book Value of Equity Shares to Book Value of Total Debt	= 1.65
X_5	= Sales to Total Assets	= 3 times

Hence, Z-score = (0.717 x 0.25) + (0.847 x 0.50) + (3.107 x 0.19) + (0.420 x 1.65) + (0.998 x 3)

= 0.17925 + 0.4235 + 0.59033 + 0.693 + 2.994 = 4.88

Note: As the calculated value of Z-score is much higher than 2.9, it can be strongly predicted that the company is a non-bankrupt company (i.e., non-failed company).

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ALTMAN'S Z-SCORE MODELS ILLUSTRATIONS

ILLUSTRATION 4.

From the information provided relating to a company, calculate Altman's Z-score and comment on the financial condition of the company:

Particulars	Rs.
Equity Share Capital (of Rs. 10 each)	2,00,000
12% Preference Share Capital (of Rs. 100 each)	1,00,000
Fixed Assets	3,00,000
Current Assets	2,00,000
Fictitious Assets	25,000
Current Liabilities	1,00,000
10% Debentures	2,00,000
General Reserve	75,000
Profit & Loss A/c (Cr.)	50,000
Sales	10,00,000
Earnings before Tax	1,30,000
Interest on Debentures	20,000
Market Value of each Equity Share	15
Market Value of each Preference Share	150

Solution:

As per Altman's Model (1968) of Corporate Distress Prediction

$Z = 1.2\ X_1 + 1.4\ X_2 + 3.3\ X_3 + 0.6\ X_4 + 1.0\ X_5$

Here, the five variables are as follows:

X_1 = Working Capital to Total Assets $= \left(\frac{Rs.1,00,000}{Rs.5,00,000}\right) = 0.20$

X_2 = Retained Earnings to Total Assets $= \left(\frac{Rs.1,00,000}{Rs.5,00,000}\right) = 0.20$

X_3 = EBIT to Total Assets $= \left(\frac{Rs.1,50,000}{Rs.5,00,000}\right) = 0.30$

X_4 = Market Value of Equity and Preference Shares to Book Value of Total Debt

$= \left(\frac{Rs.4,50,000}{Rs.3,00,000}\right) = 1.50$

X_5 = Sales to Total Assets $= \left(\frac{Rs.10,00,000}{Rs.5,00,000}\right) = 2$ times

Hence, Z-score $= (1.2 \times 0.20) + (1.4 \times 0.20) + (3.3 \times 0.30) + (0.6 \times 1.50) + (1 \times 2)$

= 0.24 + 0.28+0.99 + 0.90 + 2 = 4.41

ALTMAN'S Z-SCORE MODELS ILLUSTRATIONS

NOTES:

1. Calculation of Working Capital

Working Capital = Current Assets - Current Liabilities
Here, Working Capital = Rs. (2,00,000-1,00,000) = Rs. 1,00,000

2. Calculation of Total Assets

Total Assets = Fixed Assets + Current Assets
Here, Total Assets = Rs. (3,00,000 +2,00,000) = Rs. 5,00,000

3. Calculation of Retained Earnings

Retained Earnings = Reserves & Surplus - Miscellaneous Expenditure
= General Reserve + Profit & Loss A/c (Cr.) - Fictitious Assets
= Rs. (75,000 + 50,000 - 25,000) = Rs. 1,00,000

4. Calculation of Earnings before interest & Tax (EBIT)

EBIT = EBT+ Interest on Debts
Here, EBIT = Rs. (1,30,000 + 20,000) = Rs. 1,50,000

5. Calculation of Market Value of Equity & Preference Shares

Market Value of Equity Shares	20,000 shares x Rs. 15	Rs. 3,00,000
Market Value of Preference Shares	1,000 shares x Rs. 150	Rs. 1,50,000
		Rs. 4,50,000

6. Calculation of Book Value of Total Debts

Book Value of Total Debts = Long-term Debts + Current Liabilities
Here, Book Value of Total Debts =10% Debentures + Current Liabilities
= Rs. (2,00,000 + 1,00,000) = Rs. 3,00,000

As the calculated value of Z-score is much higher than 2.99, it can be strongly predicted that the company is a non-bankrupt company (i.e., non-failed company).

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ALTMAN'S Z-SCORE MODELS ILLUSTRATIONS

ILLUSTRATION 5.
Using Altman's Model, compute the value of Z from the provided data (Balance Sheet extract):

Liabilities	Rs.	Assets	Rs.
Share Capital (@ Rs. 10 each)	2,00,000	Fixed Assets	4,20,000
Reserves & Surplus	60,000	Inventory	1,80,000
10% Debentures	3,00,000	Book Debts	70,000
Sundry Creditors	80,000	Loans & Advances	20,000
Outstanding Expenses	60,000	Cash at Bank	10,000
	7,00,000		**7,00,000**

Additional Information:

(i) Market value per share Rs. 12.50.
(ii) Operating Profit (20% on sales) Rs. 1,40,000.

Solution

S per Altman's model (1968) of Corporate Distress Prediction
$Z = 1.2\ X_1 + 1.4\ X_2 + 3.3\ X_3 + 0.6\ X_4 + 1.0\ X_5$

Here, the five variables are as follows:

X_1 = Working Capital to Total Assets $= \left(\frac{Rs.1,40,000}{Rs.75,00,000}\right) = 0.20$

X_2 = Retained Earnings to Total Assets $= \left(\frac{Rs.60,,000}{Rs.7,00,000}\right) = 0.0857$

X_3 = EBIT to Total Assets $= \left(\frac{Rs.1,40,000}{Rs.7,00,000}\right) = 0.20$

X_4 = Market Value of Equity and Preference Shares to Book Value of Total Debt
$= \left(\frac{Rs.2,50,000}{Rs.4,40,000}\right) = 0.568$

X_5 = Sales to Total Assets $= \left(\frac{Rs.7,00,000}{Rs.7,00,000}\right) = 1$ times

Hence, Z-score = (1.2 x 0.20) + (1.4 x 0.0857) + (3.3 x 0.20) + (0.6 x 0.568) + (1 x 1)
= 0.24 + 0.11998+ 0.66 + 0.3408 + 1 = 2.36078

ALTMAN'S Z-SCORE MODELS ILLUSTRATIONS

Notes:

1. Calculation of Working Capital

Working Capital = Current Assets - Current Liabilities

Here, Working Capital = (Inventory + Book Debts + Loans & Advances+ Cash at Bank) - (Sundry Creditors +Outstanding Expenses)

= Rs. (1,80,000 + 70,000 +20,000+10,000)-(80,000 + 60,000)

= Rs. 1,40,000

2. Calculation of Total Assets

Total Assets = Fixed Assets + Current Assets

Here, Total Assets = Rs. [4,20,000 + (1,80,000 + 70,000 + 20,000+10,000)]

= Rs. 7,00,000

3. Calculation of Retained Earnings

Retained Earnings = Reserves &Surplus = Rs. 60,000

4. Calculation of Earnings before Interest & Tax (EBIT)

EBIT = Operating Profit = Rs. 1,40,000

5. Calculation of Market Value of Equity

Market Value of Equity Shares = 20,000 shares x Rs. 12.50 = Rs. 2,50,000

6. Calculation of Book Value of Total Debts

Book Value of Total Debts = Long-term Debts + Current Liabilities

Here, Book Value of Total Debts = 10% Debentures + (Sundry Creditors + Outstanding Expenses)

= Rs. [3,00,000 + (80,000 + 60,000)] = Rs. 4,40,000

7. Calculation of Sales

Here, Operating Profit = 20% on Sales = Rs. 1,40,000

Hence, Sales = 100/20 x Rs. 1,40,000 = Rs. 7,00,000

As the calculated value of Z-score lies between 1.81 and 2.99, which is marked as Grey Area, it is predicted that the company consists of both bankrupt and non-bankrupt elements (i.e., a mixture of failed & non-failed elements) and, therefore, requires further investigation to determine its conclusive solvency status.

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ALTMAN'S Z-SCORE MODELS ILLUSTRATIONS

ILLUSTRATION 6.

Following is the extract of a Balance Sheet of a company as on 31 March, 2014:

Liabilities	Rs.	Assets	Rs.
Equity Share Capital (X 100)	4,00,000	Fixed Assets	10,00,000
Reserves & Surplus	2,25,000	Trade Investment	2,00,000
12% Debentures	3,00,000	Stock	1,25,000
10% Bank Loan	2,00,000	Debtors	75,000
Current Liabilities	3,00,000	Preliminary Expenses	25,000
	14,25,000		**14,25,000**

Additional Information

(i) Net sales for 2013-14 were Rs. 20,00,000.
(ii) Price-Earnings Ratio is Rs. 10.
(iii) Dividend Pay-out Ratio is 50%.
(iv) Dividend per Share in 2013-14 is Rs. 20.
(v) Corporate Tax Rate is 50%.

Using Altman's Model, calculate the Z-score of the company and interpret the result.

Solution:

As per Altman's Model (1968) of Corporate Distress Prediction —

$$\mathbf{Z = 1.2\ X_1 + 1.4\ X_2 + 3.3\ X_3 + 0.6\ X_4 + 1.0\ X_5}$$

Here, the five variables are as follows:

X_1 = Working Capital to Total Assets $= \frac{(1,00,000)}{14,00,000} = (0.07143)$

X_2 = Retained Earnings to Total Assets $= \frac{2,00,000}{14,00,000} = 0.1429$

X_3 = EBIT to Total Assets $= \frac{3,76,000}{14,00,000} = 0.2686$

X_4 = Market Value of Equity and Preference Shares to Book Value of Total Debt

$= \frac{16,00,000}{80,000} = 2.00$

X_5 = Sales to Total Assets $= \frac{20,00,000}{14,00,000} = 1.4286$ times

Therefore, Z-score = {1.2 x (-) 0.07143} + (1.4 x 0.1429) + (3.3 x 0.2686) + (0.6 x 2) + (1 x 1.4286)

= - 0.0857 + 0.2001 + 0.8864+ 1.2+1.4286 = 3.6294

ALTMAN'S Z-SCORE MODELS ILLUSTRATIONS

Notes:

1. Calculation of Working Capital

Working Capital = Current Assets - Current Liabilities

Here, Working Capital = (Stock + Debtors) - Current Liabilities

= Rs. [(1,25,000 + 75,000) - 3,00,000]

= (Rs. 1,00,000)

2. Calculation of Total Assets

Total Assets = Fixed Assets + investments + Current Assets

Here, Total Assets = Rs. [10,00,000 + 2,00,000 + (1,25,000 + 75,000)]

= Rs. 14,00,000

3. Calculation of Retained Earnings

Retained Earnings = Reserves & Surplus - Preliminary Expenses

= Rs. (2,25,000 - 25,000)

= Rs. 2,00,000

4. Calculation of Earnings before Interest & Tax (EBIT)

Dividend Payout Ratio $= \frac{\text{Dividend per share (DPS)}}{\text{Earnings per share (EPS)}}$

Here dividend payout ratio = 50% and DPS in 2013 - 14 = Rs. 20.

20

Hence, EPS $= \frac{\text{DPS}}{\text{Dividend payout ratio}} = \frac{50}{50\%}$ = Rs. 40

Here, number of equity shares = $\frac{\text{Rs.4,00,000}}{\text{Rs.100}}$ = 4,000

Particulars	Rs.
Earnings available to equity shareholders = 4,000 x Rs. 40	1,60,000
Add: Corporate tax added back 50/ 50 x 1,60,000	1,60,000
Earnings before Tax (EBT)	3,20,000
Add: Interest on loan added back:	
On Debentures (12% on Rs. 3,00,000) — Rs. 36,000	
On Bank Loan (10% on Rs. 2,00,000) — Rs. 20,000	56,000
Earnings before Interest & Tax (EBIT)	3,76,000

5. Calculation of Market Value of Equity Shares

Price Earnings Ratio = $\frac{\text{Market value per equity shares (MPS)}}{\text{Earnings per share (EPS)}}$

Here, Price Earnings Ratio = 10 and EPS in 2013 – 14= Rs. 40

Hence, Market Value per Equity Share (MPS) = Price Earnings Ratio x EPS

= 10 x Rs. 40 = Rs. 400

Market Value of Equity Shares = 4,000 shares x Rs. 400 = Rs. 16,00,000

6. Calculation of Book Value of Total Debts

Book Value of Total Debts = Long-term Debts + Current Liabilities

Here, Book Value of Total Debts = 12% Debentures +10% Bank Loan + Current Liabilities

= Rs. (3,00,000 + 2,00,000 + 3,00,000) = Rs. 8,00,000.

As the calculated value of Z-score is much more greater than 2.99, it can be strongly predicted that the company is a non-bankrupt company (i.e., non-failed company).

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ALTMAN'S Z-SCORE MODELS ILLUSTRATIONS

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ILLUSTRATION 1

Earnings per share: Rs. 3.15

Capital Expenditure per share: Rs.3.15

Depreciation per share: Rs.2.78

Change in working capital per share: Rs.0.50

Debt financing ratio : 25%

Earnings, Capital expenditure, Depreciation, Working Capital are all expected to grow at 6% per year. The beta for stock is 0.90. Treasury bond rate is 7.5%. A premium of 5.50% is used for market.

Calculate value of stock.

Solution:

Estimating value

Long term bond rate 7.5%

Cost of equity = 7.5% + (0.90 × 5.50%) = 12.45%

Expected growth rate 6%

Base year FCFE = Earning per share – (Capital Exp. – Dep.)(1 – Debt Ratio) – Change in working capital (1 – Debt Ratio)

= 3.15 – (3.15 – 2.78) (1 – 0.25) – 0.50 (1 – 0.25) = 2.49

Value per share = 2.49 × 1.06 / (0.1245 – 0.06) = Rs.41.

ILLUSTRATION 2

Assume that the following details are given for a company:

Sales - Rs.1,00,000; Costs - Rs.75,000; Depreciation - Rs.20,000; Tax - 35%; Change in Net Working Capital - Rs.1,000; Change in Capital Spending - Rs.10,000

The Free Cash Flow to Firm (FCFF) for the given data can be calculated as follows:

Sales - Costs - Depreciation	Rs.5,000
Less: Tax	Rs.1,750
PAT	Rs.3,250
Add: Depreciation	Rs.20,000
Less: Change in Net Working Capital	Rs.1,000
Less: Change in Capital Spending	Rs.10,000
Free Cash Flow to Firm (FCFF)	Rs.12,250

ILLUSTRATION 3

If in the above example if interest of Rs.1,000 is given and the company resorts to net borrowing of Rs.5,000 in the year, we can find FCFE as follows:

We first find Free Cash Flow to Firm (FCFF) for the given data:

Sales - Costs - Depreciation - Interest	Rs.4,000
Less: Tax (using same rate as in the previous problem)	Rs.1,400
PAT	Rs.2,600
Add: After tax interest i.e. 1,000 (1– 0.35)	Rs.650
Net Operating Profit after Tax	Rs.**3,250**
Add: Depreciation	Rs.20,000
Less: Change in Net Working Capital	Rs. 1,000
Less: Change in Capital Spending	Rs.10,000
Free Cash Flow to Firm (FCFF)	Rs.**12,250**
Less: After tax Interest Expense i.e. I x (1-T)	Rs.650
Add: Net Borrowing	Rs.5,000
Free Cash Flow to Equity (FCFE)	Rs.**16,600**

ILLUSTRATION 4

Shyam Ltd. has announced issue of warrants on 1:1 basis for its equity share holders. The current price of the stock Rs.10 and warrants are convertible at an exercise price of Rs.11.71 per share. Warrants are detachable and are trading at Rs.3. What is the minimum price of the warrant? What is the warrant premium? Now had the current price been Rs.16.375, what is the minimum price and warrant premium? (Consider warrants are tradable at Rs.9.75)

Minimum Price = (Market Price of Common Stock – Exercise Price) × Exchange Ratio = (Rs.10.00 – 11.71) × 1.0 = Rs.1.71

Thus, the minimum price on this warrant is considered to be zero, because things simply do not sell for negative prices.

Warrant premium = Market price of warrant - Minimum price of warrant = Rs.3 - 0 = Rs.3

Minimum price = (Market price of common stock - Exercise price) × (Exercise ratio)

= (Rs.16.375 - 11.71) x 1.0

= Rs.4.665

Warrant premium = Market price of warrant - Minimum price of warrant = Rs.9.75 - 4.665 = Rs.5.085.

ILLUSTRATION 5

Amit Ltd. is issuing 5% Rs.25 par preference shares that would be convertible after three years to equity shares at Rs.27. If the current market price of equity shares is Rs.13.25, what is the conversion value and conversion premium? The convertibles are trading at Rs.17.75 in the market? Assume expected return as 8%.

Solution:

Conversion ratio = Par value of conversion security conversion price = 25/ 27 = 0.9259

Conversion value = (Conversion ratio) x (Market value per share of the common stock)

= (0.9259) × (Rs.13.25) = Rs.12.27

Now let us find the value as straight preferred stock = 1.25/8 = Rs.15.63

Conversion Premium (in absolute terms) = (Market Price of the convertible preferred stock) – (Higher of the security value and conversion value)

= Rs.17.75 - Rs.15.63 = Rs.2.12.

LLLUSTRATION 6

ABC Ltd Company currently sells for Rs.32.50 per share. In an attempt to determine if ABC Ltd is fairly priced, an analyst has assembled the following information.

- The before-tax required rates of return on ABC Ltd debt, preferred stock, and common stock are 7.0 percent, 6.8 percent, and 11.0 percent, respectively.
- The company's target capital structure is 30 percent debt, 20 percent preferred stock, and 50 percent common stock.
- The market value of the company's debt is Rs.145 million and its preferred stock is valued at Rs.65 million.
- ABC Ltd's FCFF for the year just ended is Rs.28 million. FCFF is expected to grow at a constant rate of 4 percent for the foreseeable future.
- The tax rate is 35 percent.
- ABC Ltd has 8 million outstanding common shares.

What is ABC Ltd's estimated value per share? Is ABC Ltd's stock under priced?

Solution:

The weighted-average cost of capital for ABC Ltd is

WACC = 0.30(7.0%) (1 - 0.35) + 0.20(6.8%) + 0.50(11.0%) = 8.225%

The firm value is

Firm value = FCFF0 (1 + g) / (WACC - g)

Firm value = 28(1.04) / (0.08225 - 0.04) = 29.12/0.04225 = Rs.689.23 million

The value of equity is the firm value minus the value of debt minus the value of preferred stock:

Equity = 689.23 - 145 - 65 = Rs.479.23 million. Dividing this by the number of shares gives the estimated **value per share of Rs.479.23 million / 8 million shares = Rs.59.90**. The estimated value for the stock is greater than the market price of Rs.32.50, so the stock appears to be undervalued.

ILLUSTRATION 7

Sandip Corporation is considering for going public but is unsure of a fair offering price for the company. Before hiring an investment banker to assist in making the public offering, managers at Sandip have decided to make their own estimate of the firm's common stock value. The firm's CFO has gathered data for performing the valuation using the free cash flow valuation model. The firm's weighted average cost of capital is 12 percent, and it has Rs. 14,00,000 of debt at market value and Rs.5,00,000 of preferred stock at its assumed market value. The estimated free cash flows over the next five years, 2009 through 2013, are given below. Beyond 2013 to infinity, the firm expects its free cash flow to grow by 4 percent annually.

Year	Free Cash Flow
2012	Rs. 2,50,000
2013	Rs. 2,90,000
2014	Rs. 3,20,000
2015	Rs. 3,60,000
2016	Rs. 4,00,000

(a) Estimate the value of Sandip Corporation's entire company by using the free cash flow approach.

(b) Using (a), along with the data provided above, to find Sandip Corporation's equity share value.

(c) If the firm plans to issue 2,00,000 shares of equity, what is its estimated value per shares ?

Solution:

(a) The total value of the firm equals = Rs. 40,88,547.

(b) Of this amount, Rs.1.4 million is debt and Rs.0.5 million is preferred stock, so the equity value is Rs.21,88,547.

(c) With 2,00,000 shares, the price per share would be Rs.10.94.

ILLUSTRATION: 8

True Value Ltd. (TVL) is planning to raise funds through issue of common stock for the first time. However, the management of the company is not sure about the value of the company and, therefore, they attempted to study similar companies in the same line which are comparable to True value in most of the aspects.

From the following information, you are required to compute the value of TVL using the comparable firms approach.

(Rs. in crore)

Company	True value Ltd. (Rs.)	Jewel-value Ltd. (Rs.)	Real value Ltd. (Rs.)	Unique value Ltd. (Rs.)
Sales	250	190	210	270
Profit after tax	40	30	44	50
Book value	100	96	110	128
Market value		230	290	440

TVL feels that 50% weightage should be given to earnings in the valuation process; sales and book value may be given equal weightages.

Solution:

The valuation multiples of the comparable firms are as follows:

Particular	Jewel-value Ltd.	Real value Ltd.	Unique value Ltd.	Average
Prices/Sales ratio	1.21	1.38	1.63	1.41
Price/Earnings ratio	7.67	6.59	8.80	7.69
Price/Book value ratio	2.40	2.64	3.44	2.83

Applying the multiples calculated as above, the value of TVL can be calculated as follows:

Particular	Multiple Average	Parameter (Rs. cr.)	Value (Rs. cr.)
Prices/Sales	1.41	250	352.50
Price/Earnings	7.69	40	307.60
Price/Book value	2.83	100	283.00

By applying the weightage to the P/S ratio, P/E ratio and P/BV ratio we get:

[(352.50 x 1)+(307.60 x 2)+(283.00 x 1)]/(1+2+1)= 312.675, i.e. Rs.312.675 crores is the value.

ILLUSTRATION: 9

ABC Ltd. requires an initial investment of Rs.12 lakh for its new store for which Rs.4 lakh would come from borrowing at an interest rate of 8%. The interest is paid for 5 years and the entire principal with interest is repaid at the end of the sixth year. The interest expenses are tax deductible at a rate of 36%, but the principal payments are not. The cash flows to the firm are expected to be Rs.80,000 initially. These cash flows are expected to grow at a rate of 30% for the first 4 years and at 75% from the fifth year. Estimate the free cash flow to equity.

Solution:

Free cash flow to equity = (Net operating income - Interest) + Depreciation and amortization - Capital expenditure - Change in working capital - Principal repayments + Proceeds from new debt issues.

or

FCFE = FCFF + Borrowing - Interest (1 -t) - Principal repaid

YEAR	FCFF	BORROWING	INTEREST(1-T)	PRINCIPAL REPAID	FCFE
0	(12,00,000)	4,00,000			8,00,000
1	80,000		20,480		59,520
2	1,04,000		20,480		83,520
3	1,35,200		20,480		1,14,720
4	1,75,760		20,480		1,55,280
5	3,07,580		20,480		2,87,100
6	5,38,265		20,480	4,00,000	1,17,785

ILLUSTRATION: 10

Alpha India Ltd. is trying to buy Beta India Ltd. Beta India Ltd., is a small biotechnology firm that develops products that are licensed to major pharmaceutical firms. The development costs are expected to generate negative cash flows of Rs.10 lakh during the first year of the forecast period. Licensing fee is expected to generate positive cash flows of Rs.5, 10, 15 and 20 lakh during 2-5 years respectively. Due to the emergence of competitive products cash flows are expected to grow annually at a modest 5% after the fifth year. The discount rate for the first five years is estimated to be 15% and then drop to 8% beyond the fifth year.

Calculate the value of the firm.

Solution:

Year	Cash Flows	Discount rate @15%	Present value
1	(10)	1.15	(8.69)
2	5	1.323	3.779
3	10	1.521	6.575
4	15	1.749	8.576
5	20	2.011	9.945

Total sum of present value = 20.185

Terminal Valuet = t 1 stable Cash Flow r g + −

Cash Flowt+1 = Cash flowt (1 + g)

= 20(1+0.05) = 21 lakh

Terminal Value = 21/(0.08 – 0.05)

= Rs.700 lakh.

Present value of terminal value = 700/2.011 = 348.08

Value of the firm = Rs.20.185 + Rs.348.08 = Rs.368.265 lakh

ILLUSTRATION 11

From the given financial statement of ABC Ltd find the following free cash flows viz. Free Cash Flow to Firm (FCFF) and Free Cash Flow to Equity (FCFE).

Balance Sheet of ABC Ltd	(Rs. in Millions)	
	31.3.2015	31.3.2016
Asset:		
Current Assets		
Cash	210	248
Account Receivable	474	513
Inventory	520	564
Total Current Assets	1204	1325
Gross Fixed Assets	2501	2850
Accumulated Depreciation	(604)	(784)
Net Fixed Assets	1897	2066
Total Assets	**3101**	**3391**
Equity & Liabilities:		
Current Liabilities		
Accounts Payable	295	317
Notes Payable	300	310
Accrued Taxes and expenses	76	99
Total Current Liabilities	671	726
Long Term Debt	1010	1050
Share Capital	50	50

Additional paid in Capital	300	300
Retained Earnings	1070	1265
Total Shareholders' Equity	1420	1615
Total Liabilities	**3101**	**3391**

Statement of Income — ABC Ltd (Rs. Million) — 31.3.2016

Total revenues	2215
Operating Costs and Expenses	1430
EBITDA	785
Depreciation	180
EBIT	605
Interest Expense	130
PBT	475
Tax (@40%)	190
Net Income	**285**
Dividends	90
Transfer to Retained Earnings	195

Statement of Cash Flows — ABC Ltd (Rs. Million) — 31.3.2016

Operating Activities	
Net Income	285
Adjustments	
Depreciation	180
Income taxes Paid	(190)
Change in Working Capital	
Account Receivable	(39)
Inventories	(44)
Accounts Payable	22
Accrued taxes & expenses	23
Cash provided by Operating Activities	427
Investing Activities	
Purchases of fixed assets	349
Cash used for Investing Activities	349
Financing Activities	

Notes Payable	(10)
Long Term Debt	(40)
Dividends	90
Cash used for Financing Activities	40
Cash and Equivalents Increase	38
Cash - beginning of the year	210
Cash - end of the year	248
Additional disclosures	
Interest Paid	130

SOLUTION:

Free cash flow to the firm is given by the formula:

FCFF = NI + Non Cash Charges + Interest (1-T) - Net Investment - Net Change in Working Capital

FCFF = 285 + 180+ 130(1– 0.40) – 349*– (39 + 44 – 22 – 23)

FCFF = 285 + 180 + 78 – 349 – 38 = **Rs.156 million**

*Net Investment in 2016 = Change in Gross Fixed Assets = (2850 – 2501) = 349

Free cash flow to the Equity is given by the formula:

FCFE = FCFF - Interest (1 - Tax rate) + Net borrowing

FCFE = 156 – 130(1 – 0.40) + (10 + 40)

FCFE = 156 – 78 + 50 = Rs.128 million.

ILLUSTRATION 12

ABC Ltd has FCFF of Rs.170 Crores and FCFE of Rs.130 Crores. ABC Ltd's WACC is 13% and its cost of equity is 15%. FCFF is expected to grow forever at 7% and FCFE is expected to grow forever at 7.5%. ABC Ltd has debt outstanding at Rs.1500 Crores. Find the value of ABC Ltd using FCFF approach and FCFE approach.

Solution:

FCFF Approach: (discount rate = WACC)

The firm value is the present value of FCFF discounted at the weighted-average cost of capital (WACC):

= FCFFt /(k-g) = 170 x 1.07 / (0.13 - 0.07) = Rs.3031.67 Crores

The market value of equity is the value of the firm minus the value of debt:

Equity = 3031.67 - 1500 = Rs.1531.67 Crores

FCFE Approach: (discount rate = Cost of Equity)

Using the FCFE valuation approach, the present value of FCFE, discounted at Cost of equity

= FCFEt/(k-g) = 130 x 1.075/(0.15 - 0.075) = Rs.1863.33 Crores.

ILLUSTRATION 13

Given below is the Balance Sheet of Khan Ltd. as on 31.3.2016:

Equity and Liability	Rs. (in Lakh)	Assets	Rs. (in Lakh)
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
Equity Share Capital of Rs. 10 each	100	(i) Tangible Assets:	
(b) Reserve & Surplus		Land and Building	40
— General Reserve	40	– Plant and Machinery	80
(2) Current Liabilities:		Non-Current Investments	10
(a) Trade Payables		(2) Current Assets:	
— Sundry Creditors	30	(a) Inventories	20
		(b) Trade Receivables	
		-Sundry Debtors	15
		(c) Cash & Cash Equivalents	5
Total	**170**	**Total**	**170**

You are required to work out the value of the Company's, shares on the basis of Net Assets method and Profit-earning capacity (Capitalisation) method and arrive at the fair price of the shares, by considering the following information:

(i) Profit for the current year Rs.64 lakhs includes Rs.4 lakhs extraordinary income and Rs.1 lakh income from investments of surplus funds; such surplus funds are unlikely to recur.

(ii) In subsequent years, additional advertisement expenses of Rs.5 lakhs are expected to be incurred each year.

(iii) Market values of Land and Building & Plant and Machinery have been ascertained at Rs.96 lakhs and Rs.100 lakhs respectively. This will entail additional depreciation of Rs.6 lakhs each year.

(iv) Effective Income-tax rate is 30%.

(v) The capitalization rate applicable to similar business is 16%.

Solution:

Net Assets Method:

Assets	Rs. (in Lakh)
Land and Building	96
Plant and Machinery	100
Investments	10
Stocks	20

Debtors	15
Cash at Bank	5
Total Assets	246
Less: Creditors	30
Net Assets	**216**

Profit Earning Capacity Method:

	Rs. (in Lakh)
Profit before tax	64
Less: Extraordinary income	4
Less: Investment income not likely to recur	1
Less: Additional expenses for forthcoming years - Advertisement	5
Less: Depreciation	6
Expected Earnings Before Taxes	48
Less: Income taxes @30%	14.4
Future Maintainable Profits	33.6

Total Value of Business = Future Maintainable Profit 33.6 / Capitalization Factor 0.16 = **Rs. 210 lakhs**

Subtracting external liabilities we get Net Value of Business. Value of share would be Net Value of Business divided by number of shares = **(Rs.210 lakhs - Rs.30 lakhs) /10 lakhs = Rs.18.00.**

Fair Price of share	Rs.
Value as per Net Assets Method	21.6
Value as per Profit earning capacity (Capitalization) method	18.0

<u>THEREFORE, Fair Price = Average of the two = Rs.19.80 per Share</u>

ILLUSTRATION 14.

A company manufacturing, needle roller bearings, is financed by debt and equity to the extent of 3:7, with total debts of Rs.10.82 million. The company's debt is valued at 8%. The beta of the company's equity is known to be 1.5. The company generates a free cash flow Rs.2 million with the known growth projection of 5% to perpetuity. If it is known that the market risk premium is 6% and the risk free rate is 5%, what is the value of each equity share for the 1 million shareholders of the company? Assume that the company is in the 40% tax bracket.

Solution:

It is given that:

FCF1 = 2.00(1.05) = Rs.2.1 million; g = 5%;

β =1.5; RF = 5%; (RM – RF) = 6%; = RPM

Wd = 30%; T = 40%; Kd = 8%

Ke = RF + RPM(β) = 5% + 6%(1.5) = 14%,

WACC = Wd Kd (l-T) + We Ke

= 0.30(8%)(0.60) + 0.70(14%)

= 11.24%

Value of firm = FCF (1+ g) / WACC - g

2.1 / 0.1124 – 0.05 = Rs.33.65 Million.

Value of Equity Shares = Value of Firm – Value of debt

33.65 - 10.82 = Rs.22.83 million

Price = 22.83 million /1 million shares = **Rs.22.83 / share.**

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ILLUSTRATION 15.

If in the above problem, the following different situations are observed:

Free Cash Flows given for: Year 1: Rs.2.5 million; Year 2: Rs.2.9 million, Year 3: Rs.3.4 million; Year 4 onwards: Growth of 5%

Tax shields are available each year on interest of Rs.1.50 million for years 1 to 3. With all other information remaining the same, find the value per equity share?

Solution:

FCF1 = Rs.2.5 million, FCF2 = Rs.2.9 million and FCF3 = Rs.3.4 million;

g = 5%;

β = 1.5; RF = 5%; RPM = 6%;

Wd = 30%; T = 40%; Kd = 8%

WACC was calculated as 11.24%.

The terminal value after year 3 can be calculated as

= FCF3(1+g) / (WACC – g)

= 3.4(1.05)/(0.1124-0.05)

= Rs.57.21 million

Tax shields in years 1 through 3 are:

TS1 = TS2 = TS3 = Interest x T

= 1,500,000 x 0.40 = 6,00,000

Free Cash Flows for years 1 to 3 and terminal value for year 4-end: (FCF = FCF1+ TS1 and so on)

Year 1	Year 2	Year 3	Year 4-end
3.1 million	3.5 million	4.0 million	57.21 million

Since the interest tax shields have been taken into account, the cash flows would have to be discounted with WACC where we do not apply tax for debt parties,
i.e., K = Wd Kd + We Ke = 0.30(8%) + 0.70(14%) = 12.20%

The present value of the FCFs, the tax shields, and the terminal value gives us the value of the firm:

Value of Firm = Present Value of all inflow = Rs.48.88 Million.

Equity value = VFirm - Vdebt

= 48.88 million -10.82 million

= 38.06 million

or Rs. 38.06 per share since there are 1 million shares outstanding.

ILLUSTRATION 16.

The free cash flow of S Ltd is projected to grow at a compound annual average rate of 35% for the next 5 years. Growth is then expected to slow down to a normal 5% annual growth rate. The current year's cash flow of S Ltd is Rs.4 lakh. S Ltd's cost of capital during the high growth period is 18% and 12% beyond the fifth year, as growth stabilizes. Calculate the value of the S Ltd.

Solution:

Present Value of Cash Flows during the Forecast Period:

PV1-t = {[FCFE0 x (1 + gt)t]/(1 + WACC)t

= [(4 x 1.35)/1.18] + [{4 x (1.35)2}/(1.18)2] + [{4 x (1.35)3} / (1.18)3] + [{4 x (1.35)4} / (1.18)4] + [{4 x(1.35)5} / (1.18)5]

= 5.4 / 1.18 +7.29/(1.18)2 +9.84/(1.18)3 + 13.29/(1.18)4+17.93/(1.18)5

= 4.58 + 5.24 + 5.99 + 6.85 + 7.84

= Rs.30.50 lakh.

Calculation of Terminal Value:

Where Pn = FCFEn x(1 + g)/(ke -g)

= (17.93 x 1.05) / 0.12-0.05

= 18.83/0.07

= Rs.269 lakh

PV of Terminal Price = 269 / (1.18)5 = 117.58

P0, FCFE = PV1-5 + PVT

= 30.50 + 117.58 = **Rs.148.08 lakh.**

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ILLUSTRATION 17.

An unlisted company RS Ltd., manufacturing electrical equipments is currently in the expansion mode and is expected to be a good investment keeping in mind the expected sales and profits over the next 5 years. The projection statement of free cash flows is given below for the period 2009-2013. The shares are likely to be listed after an initial public offer (IPO) shortly.

(Rs. Crores)

Particulars	31.03.12	31.03.13	31.03.14	31.03.15	31.03.16
Income	99.58	121.48	151.91	189.76	231.40
Expenditure	87.63	106.30	132.16	164.14	199.00
Operating profit (PBDIT)	11.95	15.18	19.75	25.62	32.40
-Depreciation	3.23	9.29	9.63	9.63	9.31
-Interest	0.85	0.67	0.39	0.12	0.00
PBT	7.87	5.22	9.73	15.87	23.08
-Provisions for taxation	2.59	1.72	3.21	5.23	7.61
Net profit	5.28	3.50	6.52	10.64	15.47
Add: Depreciation	3.23	9.29	9.63	9.63	9.31
Less: capital spending	14.58	30.30	1.71	0.00	0.00
Less: Incremental working capital	17.09	22.59	12.59	12.00	12.00
Free cash flow to the firm	-23.16	-40.10	1.85	8.27	12.78

This is a company with similar risk characteristics that of RS Ltd. which is listed and whose average beta is 0.85. The risk free rate and the market risk premium are 7% and the company is funded with 93% equity and 7% debt, whose cost is 9.25%. A 5% growth is projected beyond 5 years till perpetuity. The firm falls in the 33% tax bracket. The total of 1.06 Crores shares would be outstanding. Find out the intrinsic value of share using Discounted Cash Flow Analysis.

Solution:

Calculation of Cost of Equity = Rf + β(Rm - Rf) = 7 + 0.85 x 7 = 12.95%

Cost of Debt = 9.25%

WACC = 0.93 x 0.1295 + 0.07 x 0.0925 x (1-0.33) = 12.48%

Discount rate = 12.48%

Calculation of Value of Firm:

[Rs. in Crores]

Year	Cash flows	Disc. Factor @ 12.48%	PV of Cash flows
2011-12	-23.16	0.889	-20.59
2012-13	-40.10	0.790	-31.68
2013-14	1.85	0.703	1.30
2014-15	8.27	0.625	5.17
2015-16	12.78	0.555	7.09
Terminal Value* (g = 5%)	179.40	0.555	99.57
Total PV			60.86
No. of shares outstanding in Crs			1.06
Fair Value of Share in Rs.			57.41

12.78 (1+ 0.05) / 12.48% - 5%

The intrinsic value of share is Rs.57 approximately.

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STUDY NOTE 6 VALUATION MODELS

Valuation of Business

ILLUSTRATION 18.

P Ltd is considering buying the business of Q Ltd the final accounts of which for the last 3 years were as follows:

Profit and Loss Accounts for the 3 years ended 31st Dec. (Figures in Rs.)

Particulars	2014	2015	2016
Sales	2,00,000	1,90,000	2,24,000
Material Consumed	1,00,000	95,000	1,12,000
Business Expenses	80,000	80,000	82,000
Depreciation	12,000	13,000	14,000
Net Profit	8,000	2,000	16,000

Balance Sheet as at 31st Dec. (Figures in Rs.)

Particulars	2013	2014	2015	2016
Fixed Assets (at Cost)	1,00,000	1,20,000	1,40,000	1,80,000
Less: Depreciation	70,000	82,000	95,000	1,09,000
	30,000	38,000	45,000	71,000
Stock in Trade	16,000	17,000	18,500	21,000
Sundry Debtors	21,000	24,000	26,000	28,000
Cash in hand and Bank	32,000	11,000	28,000	13,200
Prepaid Expenses	1,000	500	2,000	1,000
Total Assets	1,00,000	90,500	1,19,500	1,34,200
Equity Capital	50,000	50,000	70,000	70,000
Share premium	--	--	5,000	5,000
General Reserve	16,000	24,000	26,000	42,000
Debentures	20,000	--	--	--
Sundry Creditors	11,000	13,000	14,000	14,000
Accrued Expenses	3,000	3,500	4,500	3,200
Total Liabilities	1,00,000	90,500	1,19,500	1,34,200

P Ltd wishes the offer to be based upon trading cash flows rather than book profits. Trading Cash Flow means Cash received from Debtors less Cash Paid to Creditors and for Business Expenses excluding Depreciation, together with an allowance for average annual expenditure on Fixed Assets of Rs.15,000 per year.

The actual expenditure on Fixed Assets is to be ignored, as is any cash receipt or payment out on the issue or redemption of Shares or Debentures.

P Ltd wishes the Trading Cash Flow to be calculated for each of the years 2014, 2015 and 2016 and for these to be combined using weights of 25% for 2014, 35% for 2015 and 40% for 2016 to give an Average Annual Trading Cash Flow.

P Ltd considers that the Average Annual Cash Flow should show a return of 10% on its investment.

You are required to calculate:

(a) Trading Cash Flow for each of the years 2014, 2015 & 2016,

(b) Weighted Average Annual Trading Cash Flow, and

(c) Price which P Ltd should offer for the business.

Solution:

Particulars	2014	2015	2016
Net Profit as per Profit & Loss A/c	8,000	2,000	16,000
Add: Depreciation	12,000	13,000	14,000
Operating Cash Flows before Working Capital Changes	20,000	15,000	30,000
Adjustment for Working Capital Changes			
(a) Change in Stock	(1,000)	(1,500)	(2,500)
(b) Change in Debtors	(3,000)	(2,000)	(2,000)
(c) Prepaid Expenses	500	(1,500)	1,000
(d) Sundry Creditors	2,000	1,000	--
(e) Accrued Expenses	500	1,000	(1,300)
Cash Generated from Operations	19,000	12,000	25,200
Less: Allowance for Expenditure on Fixed Assets	(15,000)	(15,000)	(15,000)
Trading Cash Flow	4,000	(3,000)	10,200
Weights	25%	35%	40%
Weighted Trading Cash Flow	1,000	(1,050)	4,080

Weighted Average Cash Flow	4,030
Capitalization Rate	10%
Value of Business	40,300

ILLUSTRATION 19.

Shah Ltd had earned a PAT of Rs.48 Lakhs for the year just ended. It wants you to ascertain the value of its business, based on the following information.

(i) Tax Rate for the year just ended was 36%. Future Tax rate is estimated at 34%.

(ii) The Company's Equity Shares are quoted at Rs.120 at the Balance Sheet date. The Company had an Equity Capital of Rs.100 Lakhs, divided into Shares of Rs.50 each.

(iii) Profits for the year have been calculated after considering the following in the P & L Account:-

- Subsidy Rs.2 Lakhs received from Government towards fulfillment of certain social obligations.

  The Government has withdrawn this subsidy and hence, this amount will not be received in future.
- Interest Rs.8 Lakhs on Term Loan. The final instalment of this Term Loan was fully settled in the last year.
- Managerial Remuneration Rs.15 Lakhs. The Shareholders have approved an increase of Rs.6 Lakhs in the overall Managerial Remuneration, from the next year onwards.
- Loss on sale of Fixed Assets and Investments amounting to Rs.8 Lakhs. (Ignore Tax Effect thereon)

Solution:

1. Computation of Future Maintainable Profits

Particulars	Rs. Lakhs
Profit after Tax for the year just ended	48,00,000
Add: Tax Expense (Tax is 36%, So PAT = 64%, Hence, Tax = 48,00,000 × 36/64)	27,00,000
Profit before Tax for the year just ended	**75,00,000**
Add/ (Less): Adjustments in respect of Non-Recurring items	
Subsidy Income not received in future	(2,00,000)
Interest on Term Loan not payable in future, hence saved	8,00,000
Additional Managerial Remuneration	(6,00,000)
Loss on Sale of Fixed Assets and Investments (non-recurring)	8,00,000
Future Maintainable Profits before Tax	**83,00,000**
Less: Tax Expense at 34%	28,22,000
Future Maintainable Profits after Tax Equity Earnings	**54,78,000**

2. Computation of Capitalization Rate and Value of Business

Particulars	Rs. Lakhs
(a) Profit after Tax for the year just ended	Rs.48 Lakhs
(b) Number of Equity Shares (Rs.100 Lakhs ÷ Rs.50 per Share)	2 Lakhs
(c) Earnings Per Share (EPS) = PAT ÷ Number of Equity Shares	Rs.24
(d) Market Price per Share on Balance Sheet Date	Rs.120
(e) Price Earnings Ratio = MPS ÷ EPS	5
(f) Capitalization Rate = 1 ÷ PE Ratio	20%
(g) Value of Business = Future Maintainable Profits ÷ Capitalization Rate = Rs.**54.78 Lakhs ÷ 20%**	Rs.**273.90 Lakhs**

ILLUSTRATION 20.

Shiva Ltd. gives the following information-

- Profits After Tax for the period = Rs.100 Lakhs; Expected Compound Growth Rate = 8% p.a
- Cash Flows After Taxes for the period = Rs.125 Lakhs; Expected Compound Growth Rate = 7% p.a.
- Current Market Price per Equity Share = Rs.900; Equity Share Capital = Rs.1,00,00,000 into Shares of Rs.100 each.

Compute the value of Shiva Ltd by projecting its PAT /CFAT for an eight year period. Use 10% Discount Rate for your calculations. Also calculate the value of the business by capitalizing the current PAT/ CFAT.

Solution:

1. Discounted Value of Future PAT and CFAT (Rs. Lakhs)

Year	PVIF at 10%	PAT	Discounted PAT	CFAT	Discounted CFAT
1	0.9091	100.00 + 8% = 108.00	98.18	125.00 + 7% = 133.75	121.59
2	0.8264	108.00 + 8% = 116.64	96.39	133.75 + 7% = 143.11	118.27
3	0.7513	116.64 + 8% =125.97	94.64	143.11 + 7% = 153.13	115.04
4	0.6830	125.97 + 8% = 136.05	92.92	153.13 + 7% = 163.85	111.91
5	0.6209	136.05 + 8% = 146.93	91.23	163.85 + 7% = 175.32	108.86

6	0.5645	146.93 + 8% = 158.69	89.58	175.32 + 7% =187.59	105.90
7	0.5132	158.69 + 8% = 171.38	87.95	187.59 + 7% = 200.72	103.01
8	0.4665	171.38 + 8% = 185.09	86.34	200.72 + 7% = 214.78	100.19
Total	**Value of Business**	**737.23**	**884.77**		

2. Capitalization of current PAT /CFAT (Rs. Lakhs)

	Particulars	**PAT**	**CFAT**
(a)	PAT/CFAT for the period	Rs.100.00 Lakhs	Rs.125.00 Lakhs
(b)	Earnings per Share = PAT ÷ Number of Equity Shares	Rs.100 per share	Rs.100 per share
(c)	Market Price per share	Rs.900 per share	Rs.900 per share
(d)	P/E Ratio = MPS ÷ EPS	9	9
(e)	Capitalization Rate = 1÷ PE Ratio	11.11%	11.11%
(f)	Value of Business = PAT or CFAT ÷ Capitalization Rate	Rs.900.09 Lakhs	Rs.1,125.11 Lakhs

3. Summary of Value of Business under different methods

	Particulars	Rs. **Lakhs**
(a)	Discounted Value of future PAT of 8 years	Rs.737.23 Lakhs
(b)	Discounted Value of future CFAT of 8 years	Rs.884.77 Lakhs
(c)	Capitalization of current PAT at 11.11%	Rs.900.09 Lakhs
(d)	Capitalization of current CFAT at 11.11%	Rs.1,125.11 Lakhs
(e)	Simple Average of all of the above = (a+b+c+d) ÷4	Rs.911.80 Lakhs

ILLUSTRATION 21.

Kolkata Ltd and Mumbai Ltd have agreed that Kolkata Ltd will take over the business of Mumbai Ltd with effect from 31st December 2013. It is agreed that:

(i) 10,00,000 shareholders of Mumbai Ltd will receive Shares of Kolkata Ltd. The Swap ratio is determined on the basis of 26 week average market prices of Shares of both the Companies. Average Prices have been worked out at Rs.50 and Rs.25 for the shares of Kolkata Ltd and Mumbai Ltd respectively.

(ii) In addition to (1) above, the shareholders of Mumbai Ltd will be paid in cash based on the projected synergy that will arise on the absorption of the business of Mumbai Ltd by Kolkata Ltd. 50% of the projected benefits will be paid to the share holders of Mumbai Ltd.

The following projections have been agreed upon by the management of both the Companies.

Year	2014	2015	2016	2017	2018
Benefit (in Rs. Lakhs)	50	75	90	100	105

The benefit is estimated to grow at the rate of 2% from 2018 onwards. It has been further agreed that a discount rate of 20% should be used to calculate the cash that the holders of each share of Mumbai Ltd will receive.

- Calculate the cash that holder of each share of Mumbai Ltd will receive.
- Calculate the total purchase consideration.

(Discounting Rate 20%: 1 year-0.833, 2 year – 0.694, 3 year – 0.579, 4 year – 0.482, 5 year -0.402, 6 year - 0.335)

Solution:

1. Present Value of Synergy Benefits

Year	Computation	PV= Rs. Lakhs
2014	50 × 0.833	41.65
2015	75 × 0.694	52.05
2016	90 × 0.579	52.11
2017	100 × 0.482	48.20
2018	105 × 0.402	42.21
2019 onwards (Terminal value Note)	(105 × 102% ÷18%) × 0.402	239.19
Total		**475.41**

50% on the Synergy Benefits = 475.41 × 50% = Rs.237.705 Lakhs

Cash for every share held in Mumbai Ltd = 237.705 ÷ 10 = Rs.23.77

Note: For every increasing cash flow at constant growth rate i.e. Perpetual Cash Flows is as under –

2. Total Purchase Consideration for the business

(a) Equity share (25/50 × 10,00,000 × Rs.50)	Rs.250.00 Lakhs
(b) Cash = 50% of Synergy Benefits	Rs.237.70 Lakhs
Total	Rs.487.70 Lakhs

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	Units	Unit Cost (Rs.)	Total Cost (Rs.)
Inventory, January 1	100	8	800
Purchased June 1	60	9	540
Purchased October 1	80	10	800
Goods available for sale	240	8.917	2140
Goods sold during the year	150	?	?
Ending inventory	?	?	?

USING ABOVE TABLE YOU HAVE TO SOLVE ILLUSTRATION 1 AND 2

ILLUSTRATION 1.

In the above Example, 150 units were sold. If the merchant selected the 100 units with a unit cost of Rs.8 and 50 ofthe units having a unit cost of Rs.9, the cost of goods sold would be

ANSWER:

(100 × Rs.8) + (50 × Rs.9) = Rs.1, 250. If the 150 units with the highest cost were selected, the cost of goods sold would be(80 × Rs.10) + (60 × Rs.9) + (10 × Rs.8) = Rs.1, 420.

ILLUSTRATION 2.

Assuming the periodic inventory method, the 240 units available for sale have a total cost of Rs. 2, 140; hence, the average cost is Rs. 2,140 / 240 = Rs.8.917. The calculations cost of goods sold and ending inventory are as follows:

	Units	Units (Rs.)	Cost Total (Rs.)
Cost of Goods sold	150	8.917	1338
Ending Inventory	90	8.917	802
	240		2140

First-in, First-Out (FIFO)

The FIFO method assumes that the oldest goods, in terms of date of receipt and entry to stock are first issued to production or sold first and that the most recently purchased goods are in the ending inventory. In the illustration, for the 150 units sold, it is assumed that the 100 units in beginning inventory were sold first and that the other 50 units sold were from the purchase made on June 1.

	Units	Units Cost (Rs.)	Cost Total (Rs.)
Cost of Goods Sold:			
From beginning inventory	100	8	800
From purchase of June	50	9	450
Cost of Goods Sold	150		1250
Ending Inventory:			
From Purchase of June 1	10	9	90
From purchase of October 1	80	10	800
Ending Inventory	90		890

For the moment, it is sufficient to note that with FIFO (1) cost of goods sold is likely to approximate the physical flow of the goods because most companies sell their oldest merchandise first and (2) the ending inventory approximates the current cost of the goods, since it is costed at the amounts of most recent purchases.

Last-In, First Out

The LIFO method is the reverse of FIFO. Cost of goods issued to production or sold is based on the cost of the most recent purchases, and ending inventory is costed at the cost of the oldest units available.

	Units	Units Cost (Rs.)	Cost Total (Rs.)
Cost of Goods Sold:			
From purchase of October 1	80	10	800
From Purchase of June 1	60	9	540
From beginning inventory	10	8	80
Cost of Goods Sold	150		1420
Ending Inventory:			
From beginning inventory	90	8	720

LIFO (1) cost of goods sold does not reflect the usual physical flow of merchandise and

(2) the ending inventory may be costed at amounts prevailing several months or years ago, which in an era of repaid inflation are far below current costs.

(Note that LIFO is not permitted under international accounting standards.)

ILLUSTRATION 3.

ABC Stores is a departmental store, which sell goods on retail basis. It makes a gross profit of 20% on net sales. The following figures for the year-end are available:

Opening Stock	Rs. 50,000
Purchases	Rs. 3,60,000
Purchase Returns	Rs. 10,000
Freight Inwards	Rs. 10,000
Gross Sales	Rs. 4,50,000
Sales Returns	Rs. 11,250
Carriage Outwards	Rs. 5,000

Calculate the estimated cost of the inventory on the closing date.

Solution: **Calculation of Cost for closing stock**

Particulars	Rs.
Opening Stock	50,000
Purchases less returns (360000-10000)	3,50,000
Freight Inwards	10,000
	4,10,000
Less: net sales (450000-11250)	4,38,750
	(28,750)
Add: gross profits (438750x 20%)	87,750
Closing stock	59,000

ILLUSTRATION 4.

Oil Company is a bulk distributor of high octane petrol. A periodic inventory of petrol on hand is taken when the books are closed at the end of each month. The following summary of information is available for the month of June, 2016.

Sales Rs. 9,45,000
General Administrative cost Rs. 25,000
Opening stock 100000 litres @ Rs. 3per litre Rs. 3,00,000
Purchases (including freight):
June 1- 2,00,000 litres @ Rs. 2.85 per litre
June 30 - 1,00,000 litre @ Rs. 3.03 per litre
Closing stock on June 30 - 1,30,000 litres

Compute the following data by FIFO, Weighted average and LIFO methods of inventory costing on June 30.

Solution:

Statement showing value of closing stock or inventory on 30th June, 2016 under FIFO, weighted and LIFO methods of pricing of issues [quantity of closing stock (100000 + 30000) litres.]

Particulars	FIFO	Weighted Average	LIFO
(1) First-in-First out Method:*			
100000litres @ Rs.3.03 per litres	3,03,000		
30000 litres @ Rs.2.85 per litres	85,500		
(2) Weighted Average Method:**			
130000 litres @ Rs.2.346 per litres		3,04,980	
(3) Last-in First out Method:***			
100000 litres @ Rs.3.00 per litres			3,00,000
30000 litres @ Rs.2.85 per litres			85,500
Value of Closing Stock	3,88,500	3,04,980	3,85,500

* Under FIFO method old lots are exhausted and new lots are kept in hand on 30.6.2016.

** Under Weighted Average method, the Weighted Average rate is to be calculated or follows: (100000 Litres x Rs.3 + 200000 Litres x Rs.2.85 + 100000 Litres) / 500000 Litres = Rs.2.346 per Litre.

*** Under LIFO method, new lots are exhausted except purchased on 30.06.16 and old lots are kept in hand on 30.06.16

ILLUSTRATION 5.

Closing Stock Valuation of Budgeted Raw Material Purchases.

Quarter	1st	2nd	3rd	4th
Working Days	65	60	55	60
Production (units per working day)	100	110	120	105
Raw Material Purchase (% by weight of annual total)	30%	50%	20%	
Budgeted purchase price (? Per kg.)	1.00	1.05	1.125	

Quantity of raw material per unit of production: 2kg
Budgeted opening stock of raw material: 4000kg (cost Rs. 4000)
Budgeted closing stock of raw material: 2000kg
Issues are priced on FIFO basis.
Calculate the following budgeted figures:
Quarterly and annual purchases of raw material, by weight and value.

Closing quarterly stock by weighted and value.

Solution:

						Consumption
Quarter	**Day**		**Production per day**		**qty. of RM per unit of production**	**Kg.**
1st	65	x	100	x	2	13000
2nd	60	x	110	x	2	13200
3rd	55	x	120	x	2	13200
4th	60	x	105	x	2	12600
Total consumption for the year						52000

We know that:
Consumption = opening stock + purchases-closing stock
Purchases = consumption + closing stock-opening stock
= 52000 = 2000-4000 or, 50000Kg.

(a) Purchases:

Quarter	Kg.				Purchase Price	Value (Rs.)
1	50000	x	30%	i.e.	1.00	15000
	15000					
2	50000	x	50%	i.e.	1.05	26250
	25000					
3	50000	x	20%	i.e.	1.125	11250
	10000					
						52500

(b) Closing quarterly Stock by weighted and value:

1st Quarter	(FIFO method)	Quantity Kg.	Rate (Rs.)	Value (Rs.)
	Opening Stock	4000	1	4000
	Purchase	15000	1	15000
	total	19000		19000
less:	consumption	13000	1	13000
	closing stock	6000	1	6000
2nd quarter	opening stock	6000	1	6000
	purchase	25000	1.05	26250
	total	31000		32250
less:	consumption	13200		13560*
	closing stock	17800		18690
	*6000 @ Rs1.00 =	6000		
	7200 @ Rs1.05 =	7560		
	13200	13560		
3rd quarter	opening stock	17800	1.05	18690
	purchase	10000	1.125	11250
	total	27800		29940
less:	consumption	13200	1.05	13860
	closing stock	14600		16080
4th quarter	opening stock	14600		16080
	purchase	nil		nil
	total	14600		14600
less:	consumption	12600		13830*
	closing stock	2000		2250
	* 4600 (i.e 17800-13200) @ Rs.1.05	4830		
	8000 @ Rs. 1.125	9000		
	12600	13830		

ILLUSTRATION 6.

The XYZ Machineries Ltd. requests you to ascertain the amount at which the inventory should be included in the financial statement for the year 2015-16. The value of inventory as shown in the books is Rs.12, 50,000.

To determine the net realisable value of the inventory (on a test check basis), you had selected several items whose book value was Rs. 3, 50,000. You ascertain that except for items (a) to (b) mentioned below, the cost was in excess of the realisable value by Rs. 29,532.

The following items require special treatment.

(a) One machine (cost Rs. 1, 30,000) can now fetch Rs. 1, 15,000. It was priced at Rs. 70,000 and was written down to the same figure at the end of 2015-16.

(b) A pump (cost Rs. 50,000) was expected to realise Rs. 35,000. A special commission would have to be paid to the broker.

(c) 6 units of product No. 15,710 were in stock valued each at Rs. 5,520; the selling price was Rs. 4,500 per unit; selling expenses are 10% of the selling price.

Taking into consideration only the above mentioned items requiring special treatment, compute the value of their inventory as at 31st March, 2016 you would consider reasonable.

Solution:

Book value of selected items is given. From the given information, realisable value of remaining selected items will have to be found. Then the value of inventory (net realisable value) for all the items to be included in the financial statements of the company for the year 2015-16 is to be determined.

Working showing Realisable Value of Selected Items

Book value of selected items		Rs. 350000
Less: Book value of items (a) to (c)		
(a) One machine	Rs. 70000	
(b) One pump	Rs. 50000	
(c) 6 units of product No. 15,710@ Rs. 5,520	33120	153120
Remaining book value		196880

It is given in the question that except for the items (a) to (b) the cost was in excess of realisable value by Rs. 29,532. In order to find out the realisable value of remaining items, this amount should be deducted from the book value of selected items.

The realisable value of remaining selected items will be: Rs. 1,96,880 - Rs.29,532 = Rs. 1,67,348. Percentage of the cost in excess of realisable value to the book value of selected items = (29,532/1,96,880) x 100 = 15%

Working showing the Inventory Valuation (on Net Realisable Value Basis) (as on 31-03-2016)

	Rs.	Rs.
Value of all the items as shown in the books		1250000
Less: Book value of special items		350000
Book value of the remaining items		900000
Less: Cost of excess of realisable value by 15% i.e. (9,00,000 x 15%)		135000
		765000
Add: Realisable value of remaining selected items		167348
		932348
Add: Realisable value of selected items:		
One machine	Rs.115000	
One pump (Rs. 35,000 less 15% brokerage)	29750	
6 units of product No. 15,710 (6 x 4,500 less 10% selling expenses)	24300	169050
Value of all items of inventory (as on 31-3-16)		1101398

Raghav ACADEMY

STUDY NOTE 7 VALUATION OF BONDS & SHARES

ILLUSTRATION 7.
X Ltd. has the following portfolio of investment on 31st March 2016

Current investment	Cost	Market Value
Shares of A Ltd.	250	265
Units of UTI	160	160
Shares of C Ltd.	125	100
	535	525
Long term investment		
Shares of Y Ltd. (subsidiary)	200	210
Shares of Z Ltd.	150	130
Shares of W Ltd. (subsidiary)	80	10
	430	350

Compute the value of investment for balance sheet purpose assuming that the fall in value of investment Z Ltd. is temporary and that of W Ltd. is permanent.

Solution:

Current investment (at lower of cost or market value, individually)

	(Rs.In thousand)	
Shares of A Ltd.	250	
Units of UTI	160	
Shares of C Ltd.	100	510
Long term investments		
Shares of Y Ltd.	200	
Shares of Z Ltd	150	
Shares of W Ltd.	80	
430		
Less: Provision for permanent diminution	70	360
Total: (510 + 360)		**870**

Interest, dividend and rental receivables in connection with an investment are generally regarded as income, being the return on the investment. However, in some circumstances, such inflows represent a recovery of cost and do not from part of income. This happens when the inflows relate to a period prior to the date of acquisition of investment. Such inflows will be deducted from the cost of acquisition.

STUDY NOTE 7 VALUATION OF BONDS & SHARES

ILLUSTRATION 8.

Navaratna Ltd. furnishes the following particulars about their investment in shares of Samay Ltd. for the year 2015-16

Balance of shares held on 1st April 2015	Rs. 262000	(10000 shares of Rs. 10 each)
Purchased 2000 shares on 1st July 2016	Rs. 60000	
Sold 500 shares on 1st August 2015 @ Rs. 35 per share cum dividend	Rs.17500	
Navaratna Ltd. declared final dividend for 2014-15 on 1st September 2015. Received 1:5 bonus shares on 1st February, 2016.	20%	

Brokerage for each transaction is 2%. Find out cost of shares held by Navaratna Ltd. as on 31st March 2016.

Solution:

STATEMENT OF COST

Date	Particulars	Amount (Rs.)	Amount (Rs.)
1-4-15	Balance (10000 shares)		2,62,000
1-7-15	Purchased (2000 shares):		
	Cost (cum-div)	60,000	
	Add brokerage	1,200	
		61,200	
	Less: Dividend for 2014-15	4,000	
			57200
1-8-15	Sold (500 shares cum div)		
	Sale proceeds	17,500	
	Less: brokerage 2%	350	
		17,150	
	Less: Dividend for 2014-15	1,000	
	Cost of sales (500 x 319200/12,000)		(13300)
1-2-16	Bonus shares (1:5) i.e. (11,500 x 1/5)		Nil
	Cost of Investment		3,05,900

** Cost of investment a 305900

* Cost of sales is computed on average cost basis.

** Bonus shares are free and hence nothing is shown in amount column.

Treatment of dividend received:

Dividend received from Samay Ltd. during 2015-16 (11500 x Rs. 10) x 20%	23,000
Less: Dividend deducted from cost of investment	4,000
	19,000
Add: Dividend included in sales proceeds of 500 shares (received by the new buyer)	1,000
Dividend receved to be shown in Profit & Loss A/c	20,000
Profit on sale of investment:	
Sale proceeds of 500 shares (net of brokerage)	17,150
Less: Dividend for 2014-15 included above (to be considered as income)	1000
Less: cost of sales (on average cost basis)	13300
Profit on sales	2850

ILLUSTRATION 9.
If Modern Electronics is selling for Rs. 100 per share today and is expected to sell for Rs. 110 one year from now, what is the expected return if the dividend one year from now is forecasted to be Rs. 5.00?

Solution:
Expected Return = r = (5 + 110 - 100) / 100 = 0.15
The formula can be broken into two parts:
Dividend Yield + Capital Appreciation
Expected Return = r = $(Div_1 / P_0) + [(P_1 - P_0) / P_0]$
Here $P_1 - P_0$ represents capital appreciation

ILLUSTRATION 10.

Current forecasts are for XYZ Company to pay dividends of Rs.3, Rs.3.24, and Rs.3.50 over the next three years, respectively. At the end of three years you anticipate selling your stock at a market price of Rs.94.48. What is the price of the stock given a 12% expected return?
Solution:

PV $= \frac{3.00}{(1+0.12)^1} + \frac{3.24}{(1+0.12)^2} + \frac{3.50+94.48}{(1+0.12)^3}$

PV = Rs. 75.

If we forecast no growth, and plan to hold out stock indefinitely, we will then value the stock as PERPETUITY.

Perpetuity $= P_0 = (Div_1 / r)$
$= EPS_1 / r$ = [Assumes all earnings are paid to shareholders]

Constant Growth DDM - A version of the dividend growth model in which dividends grow at a constant rate (Gordon Growth Model).

STUDY NOTE 7 VALUATION OF BONDS & SHARES

SHARES

ILLUSTRATION 1.
Z Ltd. has an issued and paid-up capital of 50,000 shares of Rs.100 each. The company declared a dividend of Rs.12.50 lakhs during the last five years and expects to maintain the same level of dividends in the future. The control and ownership of the company is lying in the few hands of Directors and their family members. The average dividend yield for listed companies in the same line of business is 18%.
Calculate the value of 3,000 shares in the company.

Solution:

Dividend per share $= \frac{\text{Rs.}12,50,000}{50,000} = \text{Rs.}25$

Dividend yield = 18%

Value per share $= \frac{2.5}{0.18} = \text{Rs.}138.90$

Value of 3,000 shares = 3,000 shares x Rs.138.90 = Rs.4,16,700.

ILLUSTRATION 2.
The Directors of Kamdhenu Private Ltd are planning to sell the Company. For this purpose they want you to put a value on the equity share of the Company using the methods which a prospective purchaser might apply.
The following information should be considered in valuing the shares under each method, commenting briefly on each method adopted -

1. **Balance Sheet as on 31st March 2015**

Equity and Liability	Rs.	Assets	Rs.
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets: (Tangible):	
Equity Share Capital of Rs. 10 each	2,00,000	— Land and Building	5,00,000
(b) Reserve & Surplus		— Plant and Machinery	2,75,000
— Revenue Reserve	5,95,000	— Motor Vehicles	55,000
(2) Non-Current Liabilities:		(b) Other Non-Current Assets	
Long Term Borrowings		— Preliminary Expenses	2,000
— Secured Loan against Land & Building	1,50,000	(2) Current Assets:	
(3) Current Liabilities:		(a) Inventories	1,33,000
(a) Trade Payables - Sundry Creditors	1,35,000	(b) Trade Receivables	
(b) Short Term Provision		— Sundry Debtors	1,45,000
— Provision for Taxation	45,000	(c) Cash and Cash Equivalents	15,000
Total	**11,25,000**	**Total**	**11,25,000**

2. **Profit/ Dividend record:** The Profit record after tax and interest but before dividends over the last five years have been as follows:

Year	2011	2012	2013	2014	2015
Profit	Rs.80,000	Rs.75,000	Rs.95,000	Rs.80,000	Rs.85,000

The average dividend has been Rs. 30,000 (gross) for the last ten years.

3. The operating budget shows that estimated after tax profit for the next year will be Rs. 85,000 and thereafter it is estimated that this will increase by 5% p.a over the next four years.

4. In the light of recent developments in the field of financial reporting, the Company has had its Fixed Assets valued by an independent expert whose report discloses the following values - Land & Building – Rs. 6,10,000, Plant & Machinery- Rs. 2,88,000, Motor Vehicles – Rs. 1,02,000.

5. A study of three public companies in the same market as Kamdhenu Private Ltd shows that the average dividend yield and price earning ratio of these over last three years have been –

Year	**Abhilasha Ltd**		**Ninder Ltd**		**Sanju Ltd**	
	Dividend Yield %	**P/E Ratio**	**Dividend Yield %**	**P/E Ratio**	**Dividend Yield %**	**P/E Ratio**
2009	17.00	8.00	17.00	8.50	16.50	9.00
2010	17.00	8.00	15.00	9.00	17.00	10.00
2011	17.00	9.00	18.00	10.00	17.50	11.50
Average	17.00	8.33	16.70	9.17	17.00	10.17

6. One of the Directors has indicated that after tax cost of capital is now 17.5%. The estimated net cash flow of the Company after taking into consideration taxation and capital expenditure over next five years in order to achieve/ and as a result of, the five years profit plan, are as follows:

Year	2016	2017	2018	2019	2020
CF (Rs.)	1,00,000	1,20,000	1,40,000	10,000	1,50,000

Another Director is of the view that profitability be measured at 12.5% on Tangible Capital and 17.5% on Intangible Capital.

STUDY NOTE 7 VALUATION OF BONDS & SHARES

Solution:

1. Net Assets Method

Particulars	Rs.	Rs.
Land and Building (at revalued amount)		6,10,000
Plant and Machinery (at revalued amount)		2,88,000
Motor Vehicles (at revalued amount)		1,02,000
Stock in trade (at Balance Sheet Value)		1,33,000
Sundry Debtors (at Balance Sheet Value)		1,45,000
Cash at Bank (at Balance Sheet Value)		15,000
Total Assets		12,93,000
Less: Outside Liabilities		
Secured Loans	(1,50,000)	
Sundry creditors	(1,35,000)	
Provision for Taxation	(45,000)	3,30,000
Net Tangible Assets		9,63,000
Number or Equity Shares		20,000
Value per Equity Share (?9,63,000 - 20,000)		48.15

2. Dividend Yield Method

a. Actual Dividend Rate of the Company = Average Dividend - Paid Up Capital =	Rs.30,000 - Rs.2,00,000	15.00 %
b. Average Industry Dividend Rate = (17% +16.70% +17%) /3		16.90 %
c. Value per Equity Share = (Face Value x Actual Yield)/ Industry Dividend Rate =	(Rs.10 x 15.00%) /16.90%	8.88

3. PE Multiple Method (based on Projected Earnings)

Note: Industry Average PE Ratio = (8.33 + 9.17 +10.17)/3 = 9.22 times

Year	Profit after Tax	Weights*	Product
2016	Rs.85,000	5	4,25,000
2017	85,000 x 1.05 = Rs.89,250	4	3,57,000
2018	89,250 x 1.05 = Rs.93,713	3	2,81,139
2019	93,713 x 1.05 = Rs.98,399	2	1,96,798
2020	98,399 x 1.05 =	1	1,03,319

	Rs.1,03,319		
Total	**Rs.4,69,681**	**15**	**13,63,256**
a. Average Profits (Simple/ Weighted)	4,69,681 / 5 = Rs.93,936		13,63,256 /15 = Rs.90,884
b. Number of Equity Share	20,000 shares		20,000 shares
c. Projected Earnings per Share	Rs.4.70		Rs.4.54
d. Value per Share (on PE Multiple) = Co' EPS x Industry average PE Ratio	Rs.4.70 x 9.22 times = Rs.43.33		Rs.4.54 x 9.22 = Rs.41.86

Note:

- Also, PAT for the year ending on the B/s date i.e 2015 can be taken as a Future Earning Capacity i.e at Rs.85,000. Hence, EPS = Rs.4 .25 and Value per share = Rs.4.25 x 9.22 times = Rs.39.19.
- Higher weightage is give to the near future years than far further future years.

4. Projected Earnings Capitalization Method

Particulars	Simple Average	Weighted Average
a. Projected Earnings (PAT) of the Company	Rs.93,936	Rs.90,884
b. Normal Rate of Return of the Industry = 1 /PE Ratio	(1/9.22) = 10.85%	(1/9.22) = 10.85%
c. Capitalized Value of Projected Earnings (a/b)	Rs.8,65,770	Rs.8,37,641
d. Value per share = (c /20,000 Shares)	Rs.43.29	Rs.41.88

Note: The valuation under PE Multiple and Earnings Capitalization Method (at 10.85%) is effectively the same. The difference is due to rounding - off aspect in calculations.

5. Discounted Cash Flow Method

Year	PVF at 17.5%	Cash Flows	Present Value
2016	0.85	Rs.1,00,000	Rs.85,000
2017	0.72	Rs.1,20,000	Rs.86,400
2018	0.62	Rs.1,40,000	Rs.86,800
2019	0.52	Rs. 10,000	Rs.5,200
2020	0.45	Rs.1,50,000	Rs.67,500
2021 onwards (See Note below)	0.45	Rs.1,50,000 /10.85% = Rs.13,82,488	Rs.6,22,120
Present Value of Future Cash Flows till perpetuity			Rs.9,53,020
Value per Share [Rs.9,53,020 / 20,000 shares]			Rs.47.65

Note:

- Cash Flows of Year 2020 Rs.1,50,000 are assumed to continue till perpetuity. Hence, it is divided by the Industry Normal Rate of Return, to estimate the cash flows till perpetuity. These are discounted to the present value, to ascertain the total discounted cash flows.
- Cash Flows of year 2019 is not in tune with the other years. This may be because of Capital Expenditure proposed during the year. In the absence of information of Capital Expenditure, no adjustment has been made.

6. Summary of Value per Share

Method	Value per Share	Remarks
L Net Assets Method	Rs.48.15	Reports the Fair Values of assets available to Equity Shareholders. Provides basis for negotiating prices
2.Dividend - Yield Method	Rs.8.88	Suitable only for purchase of small lots and not for acquisition of controlling interest.
3. Earnings - Yield (PE Multiple)		
(a) On Simple Average	Rs.43.33	Recognizes market / industry expectations and the
(b) On Weighted Average	Rs.41.86	Company's future performance. However, weighted average
(c) On B/s Year Profits	Rs.39.19	Based calculations are more appropriate.
4. Earnings Capitalization Method		
(a) On Simple Average	Rs.43.29	Only a variant of the PE Multiple method. Weighted Average
(b) On Weighted Average	Rs.41.88	Based calculations are more appropriate.
5. Discounted Cash Flows	Rs.47.65	Most suited for acquisition of controlling interest.

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STUDY NOTE 7 VALUATION OF BONDS & SHARES

ILLUSTRATION 3.

The Balance Sheet of Shyam Traders Ltd as on 31.12.2014 is as follow –

Equity and Liability	Rs.	Assets	Rs.
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital (Rs. 100 each)		(a) Fixed Assets	
(i) 4,500 Equity Shares	4,50,000	(i) Tangible Assets:	
(ii) 1,500 6% Preference Shares	1,50,000	— Freehold Properties	3,75,000
(b) Reserve & Surplus		— Plant and Machinery	1,50,000
— P & L Account	7,50,000	(ii) Intangible Assets:	
(2) Non-Current Liabilities:		— Goodwill	1,50,000
Long Term Borrowings - 5% Debenture	3,00,000	(b) Non-Current Investments	
(3) Current Liabilities:		— Quoted (Return 10% on cost)	3,00,000
(a) Trade Payables - Sundry Creditors	2,39,250	(2) Current Assets:	
		(a) Inventories	2,70,000
		(b) Trade Receivables	
		— Sundry Debtors	2,99,250
		(c) Cash and Cash Equivalents	3,45,000
Total	**18,89,250**	**Total**	**18,89,250**

Profits for the three years 2012, 2013, 2014 after charging the debenture interest but before providing for Preference Dividend, were Rs.2,20,500, Rs.3,22,500 and Rs.2,40,000 respectively.
Preference Shares are payable on Liquidation.
The purchaser wants to acquire all the 4,500 Equity Shares.

The price for Equity Shares is to be based on the following assumptions –

(a) Normal return of 12% on Net Asset (at revised valuation) attributable to Equity Shares.
(b) Goodwill to be calculated at 4 times the adjusted average super profits of the 3 years referred above.
(c) Debentures will be redeemed at a discount of 25% prior to the sale of the business; and in order to provide fund for this purpose, investments will be sold out.
(d) Value of Freehold Property is agreed to be ascertained on the basis 8% return. The current rental value is Rs.50,400.
(e) A claim of Rs.8,250 was omitted to be provided in the year 2014.
(f) Market Value of Quoted Investments was Rs.3,75,000.
(g) Non-recurring profits are to be eliminated. 10% of the profits for 2013 referred to above arose from a transaction of non- recurring nature.

(h) A Provision of 5% on Sundry Debtors was made in 2014 is no longer required (the provision when made was taken into account for purpose of Income Tax at 50%)

Prepare a valuation for the Company's Shares (from the point of view of the purchaser) after taking into account the revised values and valuation of goodwill based on 4 years purchase of super profits based on the average profits of the three years.

Solution:

1. Computation of Future Maintainable Equity Earnings

Particulars	2012	2013	2014
Profit After Tax	2,20,500	3,22,500	2,40,000
Less: Non- recurring Expenditure (10% x 3,22,500)		(32,250)	
Claims unaccounted, now accounted			(8,250)
Add: Provision for Bad Debts not required (2,99,250 x 5/95)			15,750
Less: Tax Provision at 50% on the above (15,750 -8,250) x 50%			(3,750)
Adjusted Profits after Tax	2,20,500	2,90,250	2,43,750
Average Profits (2,20,500 +2,90,250+2,43,750)-3			2,51,500
Add: Interest on Debentures (No Longer Payable) (Rs. 3,00,000 x 5% x 50%) (after tax)			7,500
Less: Income from Investments (No Longer receivable) (Rs. 3,00,000 x 10% x 50%) (after tax)			(15,000)
Future Maintainable Profits before Preference Dividend			2,44,000
Less: Preference Dividend			(9,000)
Future Maintainable Equity Earnings			2,35,000

Note:

- Sundry Debtors as per B/s reflects the net balance after deducting 5% provision. Since Net Debtors of Rs.2,99,250 reflect 95% of the Total Debtors Amount, Provision = Rs.2,99,250 x 5/95 = Rs.15,750.
- Simple Average is taken due to fluctuating / oscillating trend of profits.

2. Computation of Capital Employed

Particulars	Rs.	Rs.
Freehold Property (Capitalization of Rental Value of Rs.50,400 at 8%)		6,30,000
Plant & Machinery		1,50,000
Stock		2,70,000
Sundry Debtors [Rs.2,99,250 -(100% - Provision at 5%)		3,15,000
Bank [Balance 345 + Investment Sale 375 - Debenture Redemption 225]		4,95,000
Total Assets		18,60,000
Less: Outside Liabilities (excluding Equity Shareholders' Funds)		
Sundry Creditors [Rs.2,39,250 + Unaccounted Claim of Rs.8,250]	2,47,500	

Preference Shareholders [Share Capital + Dividend Due]	1,59,000	
Additional Tax Liability due to unaccounted claim & provision w/back	3,750	(4,10,250)
Net Worth of Equity Share Holders on B/s date		14,49,750

Note:

- Since Normal Return is 12% on the Net Assets available to Equity Shares (given), Future Maintainable Equity Earnings should be compared with the Expected Equity Earnings. Hence, Net Worth of Equity Shareholders (i.e after deducting Preference Shareholders dues) is considered.
- Goodwill in the Balance Sheet should not be considered for computing net worth for Goodwill computation.
- Redemption value of debentures = face Value Rs.3,00,000 - 25% Discount = Rs.2,25,000

3. Computation of Super profits and Goodwill

Particulars	Rs.
Future Maintainable Equity Earnings	2,35,000
Less: Normal Earnings = Normal Return x Capital Employed =12% x 14,49,750	(1,73,970)
Super Profit i.e., Excess Earnings available for Equity Shareholders	61,030
Goodwill at 4 years purchase of Super Profits = Rs. 61,030 x 4 years	2,44,120

Note: Alternatively, Average Capital Employed can be considered as Proxy for Future Capital Employed to determine normal earnings.

4. Valuation of Shares

Particulars	Rs.
a. Net Worth attributable to Equity Holders (calculated above)	14,49,750
b. Goodwill	2,44,120
c. Total Net Assets of Equity Shareholders	16,93,870
d. Number of Equity Shares	4,500 shares
e. Value per Equity Share	Rs.376.42

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STUDY NOTE 7 VALUATION OF BONDS & SHARES

ILLUSTRATION 4.

The Balance Sheet of Govinda Ltd as at 31st March is given below-

Equity and Liability	Rs.	Assets	Rs.
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
(i) 5,000 Equity Shares of Rs.100 each	5,00,000	(i) Tangible Assets:	
(ii) 3,000 12% Preference Shares of Rs.100	3,00,000	— Land and Building	3,20,000
(b) Reserve & Surplus		— Plant and Machinery (9,40,000 - Acc Depn 4,80,000)	4,60,000
(i) General Reserve	3,00,000	(b) Non-Current Investments	
(ii) P&L Account (1,20,000 b/f +4,80,000 CY Profit - 2,40,000 Prov for Tax)	3,60,000	— 6% Govt. Securities (at cost)	1,60,000
(2) Current Liabilities:		(c) Other Non-Current Assets	
(a) Trade Payables - Sundry Creditors	2,10,000	— Preliminary Expenses	60,000
(b) Short Term Provision		(2) Current Assets:	
(i) Provision for Taxation	2,40,000	(a) Inventories	4,50,000
		(b) Trade Receivables	
		— Book Debts	3,80,000
		(c) Cash and Cash Equivalents	80,000
Total	**19,10,000**	**Total**	**19,10,000**

The face value of the Government Securities is Rs.2,00,000. The current Year profit reported in the Balance Sheet includes income from such Government Securities. Stock in Trade reported in Balance Sheet is taken at 90% of Market value.

The shares of the Company are not quoted on the Stock Exchange. A provision exists in the Articles of Association of the Company that in cases where any existing shareholder desires to transfer his holdings to another person, it should be done at a fair market value to be fixed by the Statutory Auditor of the Company.

One of the shareholders desiring to transfer his holdings to X, an outsider, refers the matter of determination of the fair market value of shares to you, as the Statutory Auditor.

Indicate how you will proceed to determine such a value, based on the following additional information:

1. The Company's prospects in the near future appear good.
2. Land value is understated by Rs.4,00,000. Buildings have suffered a further depreciation of Rs.2,00,000.

3. Market Value of Plant and Machinery is Rs.5,40,000.
4. Companies doing similar business as that of Govinda Ltd show a market return of 12% on Capital Employed.
5. Profits over the prior 3 years period have been increasing at the rate of Rs.50,000 per annum.
6. It has always been the Company's practice to value stock at market prices.

Solution:

1. Computation of Future Maintainable Profits

Particulars	Rs.
Profit as per Profit & Loss Account	4,80,000
Less: Investment Income (Rs.2,00,000 x 6%)	(12,000)
Net Adjusted Profit Before Tax	4,68,000
Less: Tax Provision at 50% (See Note)	(2,34,000)
Adjusted Profit after Tax	2,34,000

Note:

- Tax Rate = Tax Provision as per books -Profit as per books = Rs.2,40,000 - Rs.4,80,000 = 50%.
- It is assumed that 90% of Market Value is lower than cost of stock. Since the Company has been valuing its stock at market prices, it is assumed that no further adjustment is considered necessary in this case.

We are informed that the profits (assumed as PBT) of the last 3 years have been increasing at Rs.50,000 per annum.

Presuming the trend of Rs.50,000 increase in PBT to continue, profit after tax will increase by Rs.25,000 [Rs.50,000 - 50%], and the expected profit of the next three years and their average will be –

Future Year	Expected PAT				Weights	Weight x PAT
Year 1	2,34,000 2,59,000	+25,000	=		3	Rs.7,77,000
Year 2	2,59,000 2,84,000	+	25,000	=	2	Rs.5,68,000
Year 3	2,84,000 3,09,000	+25,000	=		1	Rs.3,09,000
Total					6	Rs.16,54,000
Weighted Average Profits = Rs.16,54,000 / 6						Rs.2,75,667
Less: Preference Dividend (Rs.3,00,000 x 12%)						(Rs.36,000)
Equity Earnings						Rs.2,39,667

2. Computation of Proxy Trading Capital Employed (based on Closing Capital Employed)

Particulars	Rs.	Rs.
Land & Buildings- Book Value	3,20,000	
Add: Increase in Value of Land	4,00,000	
Less: Decrease in Value of Building	(2,00,000)	5,20,000
Plant & Machinery		5,40,000
Book Debts		3,80,000
Stock in Trade (at Market Value) i.e. Rs.4,50,000 x 100/90		5,00,000
Cash and Bank Balances		80,000
Total Assets		20,20,000
Less: External Liabilities		
Trade Creditors	2,10,000	
Provision for Taxation	2,40,000	(4,50,000)
Less: Preference Capital		(3,00,000)
Capital Employed as at 31st March (year-end)		12,70,000

Note: Stock is taken at Realizable Value, i. e., Market Value. In the B/s, it has been taken at 90% only.

3. Computation of Goodwill

Particulars	Rs.
a. Capitalised Value of Future Maintainable Profits i.e Rs. 2,39,667 / 12%	19,97,225
b. Capital Employed on Balance Sheet Date	12,70,000
c. Excess attributed to Goodwill (a/b)	7,27,225

4. Computation of value per Share on Net Assets Basis

Particulars	Rs.
a. Capital Employed on Balance Sheet date	12,70,000
b. Goodwill as calculated above	7,27,225
c. Non- Trade Investments at Cost	2,00,000
d. Net Assets available to Equity Shareholders (a+b+c)	21,97,225
e. Number of Equity Shares	5,000 Shares
f. Value per Equity Share based on Net Assets (d /e)	Rs.439.45

Assuming Equity Shares are valued at Par if yielding 12% Return on Total Capital Employed, value per share is —

Particulars	Rs.
Future Maintainable Profit for Equity Shareholders (as computed above)	2,39,667
Add: Non- trade Income (after Tax) (2,00,000 x 6% x 50%)	6,000
Total Equity Earnings	2,45,667
Total Value Attributable to Equity Shareholders (computed above)	21,97,225
Actual Yield on Equity Capital Employed (245667 -2197225)	11.18%
Value per Share = Par Value x Actual Yield - Expected Yield = Rs. 100 x 11.18% /12%	Rs.93.17

6. Summary of Value per Share under different methods

Particulars	Rs.
a. Value per Share under Net Assets method	439.45
b. Value per Share under Yield method	93.17
c. Fair Value per Share = (Rs.439.45 + Rs.93.17)/2	266.31

ILLUSTRATION 5.

The Summarized Balance Sheet of Amway Private Ltd as on 31.03.2016 is as under-

Equity and Liability	Rs.	Assets	Rs.
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
(i) Equity Share of Rs. 10 each	5,00,000	(i) Tangible Assets:	
(ii) 8% Preference Shares of Rs.10 each fully paid up	2,00,000	— Leasehold Properties (1,60,000 - Depn 70,000)	90,000
(b) Reserve & Surplus		— Plant and Machinery (2,50,000 - Depn 25,000)	2,25,000
(i) General Reserve	1,00,000	(ii) Intangible Assets:	
(ii) P&L Account	2,20,250	— Goodwill	1,75,000
(2) Current Liabilities:		(b) Non-Current Investments	4,00,000
(a) Short Term Borrowings - Bank Loan	1,00,000	(2) Current Assets:	
(b) Trade Payables - Sundry Creditors	49,750	(a) Inventories	82,500
		(b) Trade Receivables	
		— Sundry Debtors	40,500
		(c) Cash and Cash Equivalents	1,57,000
Total	**11,70,000**	**Total**	**11,70,000**

A holder of 10,000 of the Equity Shares in the company has agreed to sell these shares at a value based on the above Balance Sheet, but subject to adjustment of the valuation of the following:

1. The leasehold property was acquired on 01.04.2006 and at the Balance Sheet date the lease has a further six years to run. The cost should be written off over the term of the lease by equal annual charges. To date Rs.7,000 per annum had been written off.
2. In 2013-14, goods costing Rs.6,000 were purchased and have been included since that date at cost in the Stock lists. The goods were valueless on the Balance Sheet date.
3. An expense Creditor Rs.3,750 of the current year has been omitted from being recorded in the books.
4. A General Reserve of 10% on total Debtors, after specific provision for Doubtful Debts, has been made for the First time in the current year accounts.

5. Goodwill is to be valued at three years' purchase of the average Profits, after the above adjustments, of three years 2013-14; 2014-15; and 2015-16, such profits being those available for dividend for Equity shareholders.
6. The profits of the company as shown by the accounts before appropriations and before providing for preference dividends were as follows - 2013-14 Rs.80,400; 2014-15 Rs.92,900; 2015-16 Rs.89,650.

You are required to compute the total consideration due to the Vending Shareholder.

Solution:

1. Future Maintainable Profits

Particulars	2013-14	2014-15	2015-16
Profits as given	80,400	92,900	89,650
Add: Lease Charges debited in P&L A/c	7,000	7,000	7,000
Less: Equal Lease Amortization (1,60,000 /16 Years)	(10,000)	(10,000)	(10,000)
Less: Obsolete and Valueless Closing Stock (assuming it lost value on B/S date)			(6,000)
Less: Unrecorded Expense			(3,750)
Add: General Reserve on Total Debtors (40,500 x 10% / 90%)			4,500
Adjusted Profits	77,400	89,900	81,400
Average Adjusted Operating Profits = (77,400 + 89,900 +81,400)/3			82,900
Less: Preference Dividends (8% of Rs.2,00,000)			(16,000)
Equity Earnings = Future Maintainable Earnings			66,900
Goodwill = 3 x Average Profit Rs.66,900			2,00,700

Notes:

1. In the absence of tax rates, tax effects are ignored on the above adjustments.
2. Loss in value of stock is assumed to have taken place during the last financial year.
3. General Reserve on Bad Debts has been reversed, assuming the same will not be provided in the future. Alternatively, if it is assumed that it will be continued in the future, the same may be added back to the Average Profits.

2. Capital Employed (based on Closing Balance Sheet)

Particulars		Rs.
Goodwill		2,00,700
Leasehold Property	(1,60,000 Less Amortization for 10 years 10,000 x 10)	60,000
Plant and Machinery	(at Balance Sheet value)	2,25,000
Investments at Cost	(Assuming to be Trade Investments)	4,00,000
Stocks at Cost	(82,500 - 6,000 Valueless stock)	76,500
Sundry Debtors	(40,500 + Reversal of Reserve 4,500)	45,000
Balance at Bank		1,57,000
Sundry Creditors	(49,750 + Expense Creditors 3,750)	(53,500)
Bank Loan		(1,00,000)
Preference Capital		(2,00,000)

Equity Capital Employed		8,10,700
No. of Equity Shares		50,000
Value per Share		Rs. 16.214

ILLUSTRATION 6.
Following are the information of two companies for the year ended 31st March, 2016:

Particulars	Company A	Company B
Equity Shares of Rs. 10 each	8,00,000	10,00,000
10% Pref. Shares of Rs. 10 each	6,00,000	4,00,000
Profit after tax	3,00,000	3,00,000

Assume the Market expectation is 18% and 80% of the Profits are distributed.
(i) What is the rate you would pay to the Equity Shares of each Company?
(a) If you are buying a small lot.
(b) If you are buying controlling interest shares.
(ii) If you plan to Invest only in preference shares which company's preference shares would you prefer?
(iii) Would your rates be different for buying small tot, if the company 'A' retains 30% and company 'B' 10% of the profits?
[Note: A control premium is an amount that a buyer is sometimes willing to pay over the current market price of a publicly traded company in order to acquire a controlling share in that company.]

Solution:
(I) (a) Buying a small lot of equity shares: If the purpose of valuation is to provide data base to aid a decision of buying a small (non-controlling) position of the equity of the companies, dividend capitalisation method is most appropriate. Under this method, value of equity share is given by:

$$\frac{\text{Dividend per share}}{\text{Market capitalisation rate}} \times 100$$

Company A : $\frac{2.4}{18} \times 100$ = Rs. 13.33

Company B: Rs. $\frac{2.08}{18} \times 100$ = Rs. 11.56

(b) Buying controlling Interest equity shares: If the purpose of valuation is to provide data base to aid a decision of buying controlling interest in the company, EPS capitalisation method is most appropriate. Under this method, value of equity is given by:

$$\frac{\text{Earning per share (EPS)}}{\text{Market capitalisation rate}} \times 100$$

Company A :Rs. $\frac{3}{18} \times 100$ = Rs. 16.67

Company B: Rs. $\frac{2.6}{18}$ x 100 = Rs. 14.44

(ii) Preference Dividend coverage ratios of both companies are to be compared to make such decision. Preference dividend coverage ratio is given by:

$\frac{\text{Profit after tax}}{\text{Preference Dividend}}$ x 100

Company A :Rs. $\frac{3,00,000}{60,000}$ = 5 times

Company B: Rs. $\frac{3,00,000}{40,000}$ = 7.5 times

If we are planning to invest only in preference shares, we would prefer shares of B Company as there is more coverage for preference dividend.
(iii) Yes, the rates will be different for buying a small lot of equity shares, if the company 'A' retains 30% and company 'B' 10% of profits.
The new rates will be calculated as follows:

Company A :Rs. $\frac{2.1}{18}$ x 100 = Rs. 11.67

Company B: Rs. $\frac{2.34}{18}$ x 100 = Rs. 13.09

Working Notes:

1. **Computation of earning per share and dividend per share (companies distribute 80% of profits)**

Particulars	Company A	Company B
Profit after tax	3,00,000	3,00,000
Less: Preference dividend	60,000	40,000
Earnings available to equity shareholders (A)	2,40,000	2,60,000
Number of Equity Shares (B)	80,000	1,00,000
Earning per share (A/B)	3.0	2.60
Retained earnings 20%	48,000	52,000
Dividend declared 80% (C)	1,92,000	2,08,000
Dividend per share (C/B)	2.40	2.08

2. **Computation of dividend per share (Company A retains 30% and Company B 10% of profits)**

Earnings available for Equity Shareholders	2,40,000	2,60,000
Number of Equity Shares	80,000	1,00,000
Retained Earnings	72,000	26,000
Dividend Distribution	1,68,000	2,34,000
Dividend per share	2.10	2.34

ILLUSTRATION 20.

The Balance Sheet of Ganguram Industries Ltd as at 31st December 2015 was as under –

Equity and Liability	Rs.	Assets	Rs.
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
(i) Equity Share of Rs. 10 each		(i) Tangible Assets:	
— Rs.10 paid up per share	3,00,000	— Building	2,00,000
— Rs.5 paid up per share	2,00,000	— Plant and Machinery	4,00,000
(ii) 9% Preference Shares Capital (Rs.100)	1,00,000	(2) Current Assets:	
(b) Reserve & Surplus	3,00,000	(a) Inventories	2,50,000
(2) Current Liabilities:		(b) Trade Receivables	
(a) Trade Payables - Sundry Creditors	2,00,000	— Sundry Debtors	2,10,000
		(c) Cash and Cash Equivalents	40,000
Total	**11,00,000**	**Total**	**11,00,000**

Profit and Dividend in the last several years were as under:

Year	Profit	Equity Dividend
2013	Rs.2,20,000	12%
2014	Rs.2,50,000	15%
2015	Rs.3,20,000	18%

Land and Buildings are worth Rs.4,00,000. Managerial remuneration is likely to go up by Rs.20,000 p.a. Income-Tax may be provided at 50%. Equity Shares of Companies in the same industry with a dividend rate of 10% are quoted at par. Ignore Goodwill value depreciation adjustment for revaluation and the need of transfer to General Reserve.

Find the most appropriate value of an Equity Share assuming that-

1. Controlling interest is transferred;
2. Only a few shares are to be transferred.

Solution:

1. Computation of Future Maintainable Profits

Year	PBT	Weights	Product (Rs.)
2013	Rs.2,20,000	1	2,20,000
2014	Rs.2,50,000	2	5,00,000
2015	Rs.3,20,000	3	9,60,000
Total		6	16,80,000
Weighted Average Profits (Rs.16,80,000 +6)			2,80,000
Less: Additional Managerial Remuneration payable			(20,000)
Net Adjusted Profits before Tax			2,60,000
Less: Tax Expense at 50%			(1,30,000)
Net Adjusted Profits after Tax, but before Preference Dividend			1,30,000
Less: Preference Dividend (Rs.1,00,000 x 9%)			(9,000)
Future Maintainable PAT available for Equity Shareholders			1,21,000

Notes:

- It is assumed that the Profits given in the Question are Profits before Tax.
- Since Profits show an increasing trend, weighted average is more appropriate. Hence, more weights are assigned to the profits of the most recent years.
- Instead of assigning weights, Linear Trend Equation may be formed and the future profits for some years (say 3-5 years) estimated on the basis of the equation, and average of such profits be taken for determining Profits available for Equity Shareholders.

2. Valuation of Shares under Earnings Capitalization Method

Particulars	Rs.
Future Maintainable Profits for Equity Shareholders	1,21,000
Capitalized Value of Equity (Maintainable Profit -Normal Return) i.e. 1,21,000 - 10%	12,10,000
Add: Notional Call on Party Paid Shares (Rs. 5 x 40,000 Shares)	2,00,000
Total Value of Equity	14,10,000
Total Number of Equity Shares	
a. Fully Paid Share = Rs.3,00,000 - Rs.10 = 30,000 Shares;	70,000 shares
b. Partly Paid Shares = Rs.2,00,000 - Rs.5 = 40,000 Shares	
Value per Fully Paid Share [Adjusted Equity Value -Total No. of Shares]	Rs.20.14
Value per Partly Paid Share [Rs.20.14 - Rs.5 unpaid]	Rs.15.14

STUDY NOTE 7 VALUATION OF BONDS & SHARES

Note:

1. Unpaid amount on partly paid-up shares is assumed to be called in the near future. In the absence of specific information, additional income on Notional Calls, is ignored.
2. Normal Rate Return is assumed to Post Tax Expectation.

3. Valuation of Shares under Net Asset Method

Particulars	Rs.
Buildings (Revalued Amount)	4,00,000
Plant & Machinery	4,00,000
Sundry Debtors	2,10,000
Stock in Trade	2,50,000
Cash and Bank	40,000
Total Assets	13,00,000
Less: External Liabilities - Sundry Creditors	2,00,000

Net Assets	11,00,000
Less: Preference Share Capital	1,00,000
Net Assets Attributable to Equity Shareholders	10,00,000
Add: Notional Call on Shares	2,00,000
Adjusted Net Assets Attributable to Equity Shareholders	12,00,000
Number of Equity Shares (Fully Paid + Partly Paid) as calculated above	70,000 Shares
Value per Fully Paid Share (Rs.12,00,000 -70,000)	Rs.17.14
Value per Partly Paid Share (Rs.17.14 - Notional Call of Rs.5)	Rs.12.14

4. Summary of value per Share for Controlling Acquisition

Particulars	Fully Paid Share	Partly Paid Share
a. Earnings Capitalization Method	Rs.20.14	Rs.15.14
b. Net Assets Method	Rs.17.14	Rs.12.14
c. Fair Value (Average of the above)	(20.14 + 17.14)-2 = Rs.18.64	(15.14 + 12.14) -2 = Rs.13.64

5. Computation of Value per Share for Small Lot Acquisition

Year	Dividend Rate	Weights	Product
2013	12%	1	12%
2014	15%	2	30%
2015	18%	3	54%
Total		**6**	**96%**
Weighted Average Dividend Rate (96% -6)			16%
Value per Share for Small Lot Acquisition = (Paid Up Value per Share x Company's Dividend Rate)-Market Dividend Rate			
For Fully Paid Up Share: (Rs.10x 16%)-10%			Rs.16.00
For Partly Paid Up Share: (Rs.5 x 16%)-10%			Rs.8.00

STUDY NOTE 7 VALUATION OF BONDS & SHARES

Note:

When small shareholders acquire shares based on dividend expectation, shares are to be valued only on basis of paid up value of shares since, generally, dividends are declared only on the paid up value of shares and not on the notional full value of shares. Here, merely reducing the value of a fully paid share by unpaid amount is not appropriate. Students should carefully observe the distinction in valuation principles between majority acquisition and small lot buying.

ILLUSTRATION 21.

The following is the Balance Sheet of N Ltd. as on 31st March, 2016:

Balance Sheet

Equity and Liability	Rs.	Assets	Rs.
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
(i) 4,00,000 Equity Share of Rs. 10 each	40,00,000	(i) Tangible Assets:	
(ii) 13.5% Redeemable Preference Shares of Rs.100 each fully paid up	20,00,000	— Building	24,00,000
(b) Reserve & Surplus		— Machinery	22,00,000
(i) General Reserve	16,00,000	— Furniture	10,00,000
(ii) P&L Account	3,20,000	— Vehicles	18,00,000
(2) Non-Current Liabilities:		(ii) Intangible Assets:	
Long Term Borrowings		— Goodwill	4,00,000
— Secured Loan against Fixed Assets	12,00,000	(b) Non-Current Investments	16,00,000
(3) Current Liabilities:		(c) Other Non-Current Assets	
(a) Trade Payables		— Preliminary Expenses	2,00,000
- Sundry Creditors	6,00,000	(2) Current Assets:	
— Bills Payable	31,00,000	(a) Inventories	11,00,000
		(b) Trade Receivables	
		— Sundry Debtors	18,00,000
		(c) Cash and Cash Equivalents	3,20,000
Total	1,28,20,000	Total	1,28,20,000

Further information:

(i) Return on capital employed is 20% in similar businesses.

(ii) Fixed assets are worth 30% more than book value. Stock is overvalued by Rs.1,00,000, Debtors are to be reduced by Rs.20,000. Trade investments, which constitute 10% of the total investments, are to be valued at 10% below cost.

(iii) Trade investments were purchased on 1.4.2015. 50% of non-Trade Investments were purchased on 1.4.2014 and the rest on 1.4.2013. Non-Trade Investments yielded 15% return on cost.

(iv) In 2013-2014 new machinery costing Rs.2,00,000 was purchased, but wrongly charged to revenue. This amount should be adjusted taking depreciation at 10% on reducing value method.

(v) In 2014-2015 furniture with a book value of Rs.1,00,000 was sold for Rs.60,000.

(vi) For calculating goodwill two years purchase of super profits based on simple average profits of last four years are to be considered. Profits of last four years are as under: 2012-2013 Rs.16,00,000, -2013-2014 Rs.18,00.000, 20142015 Rs.21,00,000, 2015-2016 Rs.22,00,000.

(vii) Additional depreciation provision at the rate of 10% on the additional value of Plant and Machinery alone may be considered for arriving at average profit.

Find out the intrinsic value of the equity share. Income-tax and Dividend tax are not to be considered.

Solution: **Calculation of intrinsic value of equity shares of N Ltd. 1.**

Calculation of Goodwill

(i) Capital employed

Fixed Assets	Rs.	Rs.
Building	24,00,000	
Machinery (Rs.22,00,000 + Rs.1,45,800)	23,45,800	
Furniture	10,00,000	
Vehicles	18,00,000	
	75,45,800	
Add: 30% increase	22,63,740	
	98,09,540	
Trade investments (Rs.16,00,000 x 10% x 90%)	1,44,000	
Debtors (Rs.18,00,000 - Rs.20,000)	17,80,000	
Stock (Rs.11,00,000 - Rs.1,00,000)	10,00,000	
Bank balance	3,20,000	1,30,53,540
Less: Outside liabilities		
Bank Loan	12,00,000	
Bills payable	6,00,000	
Creditors	31,00,000	49,00,000
Capital employed		81,53,540

(ii) Future maintainable profit Calculation of average profit

	2012-13 (Rs.)	2013-14 (Rs.)	2014-15 (Rs.)	2015-16 (Rs.)
Profit given	16,00,000	18,00,000	21,00,000	22,00,000
Add: Capital expenditure of machinery charged to revenue	--	2,00,000	--	--
Loss on sale of furniture	--	--	40,000	--
	16,00,000	20,00,000	21,40,000	22,00,000
Less: Depreciation on machinery		20,000	18,000	16,200
Income from non-trade investments		1,08,000	2,16,000	2,16,000
Reduction in value of stock				1,00,000
Bad debts Adjusted profit				20,000
Adjusted profit	16,00,000	18,72,000	19,06,000	18,47,800

Total adjusted profit for four years (2012-2013 to 2015-2016)	72,25,800
Average profit (Rs.72,25,800/4)	18,06,450
Less: Depreciation at 10% on additional value of machinery (22,00,000 + 1,45,800) x 30/100 i.e. Rs. 7,03,740	70,374
Adjusted average profit	17,36,076

(iii) Normal Profit

(20% on capital employed i.e. 20% on Rs. 81,53,540) = Rs.16,30,708

(iv) Super profit

Expected profit - normal profit (Rs.17,36,076 - Rs. 16,30,708) = Rs. 1,05,368

(v) Goodwill

2 years' purchase of super profit Rs. 1,05,368 x 2 = Rs. 2,10,736

2. Net assets available to equity shareholders

	Rs.	Rs.
Goodwill as calculated in 1(v) above		2,10,736
Sundry fixed assets		98,09,540
Trade and Non-trade investments		15,84,000
Debtors		17,80,000
Stock		10,00,000
Bank balance		3,20,000
		1,47,04,276
Less: Outside liabilities		
Bank loan	12,00,000	
Bills payable	6,00,000	
Creditors	31,00,000	49,00,000

Preference share capital		20,00,000
Net assets for equity shareholders		78,04,276

3. Valuation of equity shares

Value of equity share = $\frac{\text{Net assets available to equity shareholders}}{\text{Number of equity shares}} = \frac{\text{Rs.78,04,276}}{\text{Rs.4,00,000}}$ = Rs. 19.51

Note:

1. Depreciation on the overall increased value of assets (worth 30% more than book value) has not been considered. Depreciation on the additional value of only plant and machinery has been considered taking depreciation at 10% on reducing value method while calculating average adjusted profit.
2. Loss on sale of furniture has been taken as non-recurring or extraordinary item.
3. It has been assumed that preference dividend has been paid till date.

ILLUSTRATION 22.

The Capital Structure of M/s XYZ Ltd., on 31st March, 2016 was as follows:

	Rs.
Equity Capital (18,000 Shares of Rs.100 each)	18,00,000
12% Preference Capital 5,000 Shares of Rs.100 each	5,00,000
12% Secured Debentures	5,00,000
Reserves	5,00,000
Profit earned before Interest and Taxes during the year	7,20,000
Tax Rate	40%

Generally the return on equity shares of this type of Industry is 15%. Subject to:

(a) The profit after tax covers Fixed Interest and Fixed Dividends at least 4 times.
(b) The Debt Equity ratio is at least 2;
(c) Yield on shares is calculated at 60% of distributed profits and 10% of undistributed profits; The Company has been paying regularly an Equity dividend of 15%.

The risk premium for Dividends is generally assumed at 1%. Find out the value of Equity shares of the Company.

Solution:

Calculation of profit after tax (PAT)	Rs.	Rs.
Profit before interest & tax (PBIT)		7,20,000
Less: Debenture interest (Rs. 5,00,000 x 12/100)		60,000
Profit before tax (PBT)		6,60,000
Loss: Tax @ 40%		2,64,000

Profit after tax (PAT)		3,96,000
Less: Preference dividend	60,000	
Equity dividend	2,70,000	3,30,000
Retained earnings (undistributed profit)		66,000

Calculation of Interest and Fixed Dividend Coverage

$$= \frac{\text{PAT + Debenture interest}}{\text{Debenture interest + Preference dividend}} = \frac{\text{Rs.3,96,000 + 60,000}}{\text{Rs.60,000 + 60,000}} = \frac{\text{Rs.4,56,000}}{\text{Rs.1,20,000}} = 3.8 \text{ times}$$

Calculation of Debt Equity Ratio

Debt Equity Ratio $= \frac{\text{Debt (long term loans)}}{\text{Equity (shareholder's funds)}}$

$$= \frac{\text{Debentures}}{\text{Preference share capital + Equity share capital + Reserves}} = \frac{\text{Rs.5,00,000}}{\text{Rs.5,00,000 +18,00,000 + 5,00,000}}$$

Debt Equity Ratio $= \frac{\text{Rs.5,00,000}}{\text{Rs.28 00 000}} = 0.179$

The ratio is less than the prescribed ratio.

Calculation of Yield on Equity Shares

Yield on equity shares is calculated at 60% of distributed profits and 10% of undistributed profits:

60% of distributed profits (60% of Rs.2,70,000)	1,62,000
10% of undistributed profits (10% of Rs.66,000)	6,600
	1,68,600

Yield on shares $= \frac{\text{Yield on shares}}{\text{Equity share capital}} x\ 100$

$= \frac{\text{Rs.1,68,600}}{\text{Rs.18,00,000}}$ x 100 = 9.37%

Calculation of Expected Yield on Equity Shares

Normal return expected	15%
Add: Risk premium for low interest and fixed dividend coverage (3.8 < 4)	1%*
Risk for debt equity ratio not required	Nil **
	16%

Value of an Equity Share = $\frac{\text{Actual yield}}{\text{Expected yield}}$ x Paid up value of share

$$= \frac{9.37}{16}\ x\ 100 = Rs.58.56$$

* When interest and fixed dividend coverage is lower than the prescribed norm, the riskiness of equity investors is high. They should claim additional risk premium over and above the normal rate of return. Hence, the additional risk premium of 1% has been added.

** The debt equity ratio is lower than the prescribed ratio that means outside funds (Debts) are lower as compared to shareholders' funds. Therefore, the risk is less for equity shareholders. Therefore, no risk premium is required to be added in this case.

Raghav ACADEMY

ILLUSTRATION 1.

The risk-free rate	= 5.5%	
The market price of risk	= 7%	
The company's beta	= 1.2	
Cost of equity	= 5.5% + 7% (1.2)	= 13.9%

ILLUSTRATION 2.

Cost of debt 8%
Tax rate = 40%
Capital structure: Debt: 40% and Equity: 60%
Weighted average cost of capital = 13.9% (0.60) + 8%(1-0.40)(0.40) = 10.26%

ILLUSTRATION 3.

	Company A	Company B
Market price per share	Rs. 75	Rs. 15
No. of shares	1,00,000	60,000
Market Value of the company	Rs. 75,00,000	Rs. 9,00,000

Assume Company A intends to pay Rs. 12,00,000/- cash for Company B.
REQUIRED:

(1) Cost to the bidder company?
(2) Cost to the bidder company? if the share price includes a speculation element of Rs.2 per share.
(3) Worth of Target Company?

The share price in the market is expected to accurately reflect the true value of the company.
The cost to the bidder Company A = Payment - The market value of Company B
= RS.12 lakhs - RS.9 lakhs = RS.3 lakhs.

Company A is paying Rs. 3 lakhs for the identified benefits of the merger.
If the share price includes a speculation element of Rs. 2 per share:
The cost to Company A = Rs. 3,00,000 + (60,000 x Rs. 2) = Rs. 3,00,000 + Rs. 1,20,000 = Rs. 4,20,000/-
Worth of Company B = (Rs. 15 – Rs. 2) x 60,000 = Rs. 13 x 60,000 = Rs. 7,80,000/-
This can also be expressed as: Rs. 12,00,000 – Rs. 4,20,000 = Rs. 7,80,000

ILLUSTRATION 4.
Assume the current market value of the bidding company is Rs. 40 crores, and that of the target company is also Rs. 40 crores. Then, the sum of the values as independent companies is Rs. 80 crores. Suppose, as a combined entity, due to synergistic effects, the value increases to Rs. 100 crores. The amount of value created is Rs. 20 crores. How will the increase in value be shared or divided between the bidder and the target company?

SOLUTION:
Targets usually receive a premium. If the bidder pays the target a premium of less than Rs. 20 crores, it will share in the value increases. If the bidder pays Rs. 60 crores to the target, all gains will go the target company. The bidder achieves no value increase for itself. On the other hand, if the bidder pays Rs. 70 crores to the target, the value of bidder will down to Rs. 30 crores.

ILLUSTRATION 5.
Acquiring company is considering the acquisition of Target Company in a stock- for- stock transaction in which target Company would receive X90 for each share of its common stock. The Acquiring company does not expect any change in its price/ earnings ratio multiple after the merger and chooses to value the target company conservatively by assuming no earnings growth due to synergy.

CALCULATE:

(i) The purchase price premium
(ii) The exchange ratio
(iii) The number of new shares issued by the acquiring company.
(iv) Post-merger EPS of the combined firms
(v) Pre-merger EPS of the Acquiring company
(vi) Pre-merger P/E ratio
(vii) Post-merger share price
(viii) Post-merger equity ownership distribution.

The following additional information is available.

Particulars	Acquiring	Target
Earnings	Rs. 2,50,000	Rs. 72,500
Number of shares	1,10,000	20,000
Market Price per Share	Rs. 50	Rs. 60

Also, Comment on your results.

Solution:

(i) Purchase price premium = Offer price for Target company stock/Target company Market price per share = 90/60 = 1.5

(ii) Exchange ratio = Price per share offered for Target Company/Market Price per share for the acquiring company = 90/50 = 1.8
Acquiring company issues 1.8 shares of stock for each of Target Company's stock.

(iii) New shares issued by acquiring company = shares of Target Company x Exchange ratio = 20,000 x 1.8 = 36,000.

(iv) Post-merger EPS of the combined companies = Combined earning/ total number of share.
Combined earnings = (2,50,000 + 72,500) = Rs.3,22,500
Total shares outstanding of the new entity
= 1,10,000 + 36,000 = 1,46,000

= Rs.3,22,500 - 1,46,000 = Rs.2.209

(v) Pre-merger EPS of the acquiring company
= earnings / Number of shares
= 2,50,000 / 1,10,000 = Rs.2.273

(vi) Pre-merger P/E = Pre-merger market price per share / Pre-merger earnings per share
= 50/2.273 = 22.00

(vii) Post-merger share price = Post-merger EPS x Pre-merger P/E
= 2.209 x 22.00 = Rs.48.60 (as compared to Rs.50 Pre-merger)

(viii) Post-merger Equity Ownership Distribution
Target Company = Number of new shares / Total number of shares
= 36,000/ 1,46,000 = 0.2466 or 24.66%
Acquiring company = 100 - 24.66 = 75.34%

Comment - The acquisition results in a Rs. 1.40 reduction in the market price of the acquiring company due to a 0.064 decline in the EPS of the combined companies. Whether the acquisition is a poor decision depends upon what happens to the earnings would have in the absence of the acquisition, the acquisition may contribute to the market value of the acquiring company.

ILLUSTRATION 6.
R Ltd is intending to acquire S Ltd. (by merger) and the following information are available in respect of both the companies.

Particulars	R Ltd.	S Ltd.
Total current Earnings	Rs.2,50,000	Rs.90,000
No. of Outstanding Shares	50,000	30,000
Market price per share	Rs.21	Rs.14

(i) What is the present EPS of both the companies?
(ii) If the proposed merger takes place what would be the new earnings per share for R Ltd. (assuming the merger takes place by exchange of equity shares and the exchange ratio is based on the current market price)?
(iii) What should be the exchange ratio if S Ltd. wants to ensure the same earnings to members as before the merger took placer?

Solution:
(i) EPS = total earnings/ No. of equity shares
EPS_{RLTD} = 2,50,000/50,000 = Rs.5
EPS_{SLTD} = 90,000/30,000 = Rs.3

(ii) No. of shares S Ltd. shareholders will get in R Ltd. based on market prices of shares is as follows:
Exchange Ratio $= \frac{14}{21} = \frac{2}{3}$ i. e. for every 3 shares of S Ltd. 2 shares of R Ltd.

Total No. of shares of R Ltd. Issued = $\frac{14}{21}$ x 30,000 = 20,000 shares 21

Total number of shares of R Ltd. After merger = 50,000 + 20,000 = 70,000
Total earning of R Ltd after merger = 2,50,000 + 90,000 = 3,40,000 [Remember no synergy given]
The new EPS of R Ltd. After merger = $\frac{Rs.3,40,000}{70,000}$ = Rs. 4.86

(iii) Calculation of exchange ratio to ensure S Ltd to earn the same before the merger took place: Both acquiring and acquired firm can maintain their EPS only if the merger takes place based on respective EPS.
Exchange Ratio based on EPS = 3/5 = 0.6
Total shares of R Ltd. receivable by S Ltd. shareholders = 0.6 x 30,000 = 18,000
Total No. of shares of R LTD after merger = 50,000 + 18,000 = 68,000
EPS after merger = Total Earnings / Total no. of shares = [Rs.2,50,000 + Rs.90,000] / 68,000 = Rs.5.00
Total earnings after merger of S Ltd. = Rs.5 x 18,000 = Rs.90,000.

ILLUSTRATION 7.
A Ltd. is considering the acquisition of B Ltd. with stock. Relevant financial information is given below.

Particulars	A Ltd.	B Ltd.
Present earnings	Rs.7.5 lakhs	Rs.2.5 lakhs
Equity (No. of shares)	4.0 lakhs	2.0 lakhs
EPS	Rs. 1.875	Rs. 1.25
P/E ratio	10	5

Answer the following question:

(i) What is the market price of each company?
(ii) What is the market capitalization of each company?
(iii) If the P/E of A Ltd. changes to 7.5, what is the market price of A Ltd.?
(iv) Does market value of A Ltd. changer?
(v) What would be the exchange ratio based on Market Price? (Take revised Price of A Ltd.)

Solution:

(i) P/E = Market Price/ EPS. Therefore we have, Market price = P/E x EPS
A Ltd.'s Market Price = 10 x 1.875 = Rs.18.75
B Ltd.'s Market Price = 5 x1.25 = Rs.6.25

(ii) Market Capitalization (same as market value or in short referred as market Cap)
= Number of outstanding shares x market Price
A Ltd.'s Market cap = 4.0 lakhs x Rs.18.75 = Rs.75 Lakhs
B Ltd.'s market cap = 2.0 lakhs x Rs.6.25 = Rs.12.5 Lakhs

(iii) If the P/E of A ltd. changes to 7.5, then the market price is given by
= 7.5 x Rs.1.875 = Rs.14.0625

(iv) Yes. The market value decreases. i.e.
= A Ltd.'s market Value = 4.0 lakhs x Rs.14.0625 = Rs.56.25 Lakhs.

(v) General Formula for exchange ratio = $\frac{\text{MPS of Target Firm}}{\text{MPS of acquiring Firm}}$ = 6.25/14.0625 = 0.44

ILLUSTRATION 8.

A Ltd. is considering takeover of B Ltd. and C Ltd. The financial data for the three companies are as follows:

Particulars	A Ltd.	B Ltd.	C Ltd.
Equity Share Capital of Rs.10 each (Rs. crores)	450	180	90
Earnings (Rs. crores)	90	18	18
Market price of each share (Rs.)	60	37	46

Calculate:

(i) Price earnings ratios

(ii) Earnings per share of A Ltd. after the acquisition of B Ltd. and C Ltd. separately. Will you recommend the merger of either/both of the companies? Justify your answer.

Solution:

(i) Calculation of Price Earnings ratios

Particulars	A Ltd.	B Ltd.	C Ltd.
Earnings (Rs. crores)	90	18	18
No. of shares (crores)	45	18	9
EPS (Rs.)	2	1	2
Market price of each share (Rs.)	60	37	46
PE Ratio (MPS - EPS)	30	37	23

(ii) Calculation of EPS of A Ltd. after acquisition of B Ltd. and C Ltd.

Exchange ratio or rate = $\frac{\text{Buyer's P/E Ratio}}{\text{Seller's P/E Ratio}}$

Particulars	A Ltd.	B Ltd.	C Ltd.
Exchange ratio in A Ltd.	--	0.81	1.30
Value of shares (Rs. crores) (MPS x No. of Eq. Share)	2700	666	414
No. of A Ltd.'s share to be given (crores)	--	666/60	414/60
EPS (Rs.)	--	11.10	6.9
Total earings after acquisition (Rs. crores)	--	108	108
Total number of shares (crores)	--	56.1	51.9
EPS after acquisition (Rs.)	--	1.93	2.08

Analysis: After merger of C Ltd. with A Ltd's. EPS is higher than A Ltd. (Rs. 2.08). Hence merger with only C Ltd. is suggested to increase the value to the shareholders of A Ltd.

ILLUSTRATION 9.

XYZ Ltd. is considering merger with ABC Ltd. XYZ Ltd.'s shares are currently traded at Rs. 25. It has 2,00,000 shares outstanding and its profits after taxes (PAT) amount to Rs. 4,00,000. ABC Ltd. has 1,00,000 shares outstanding. Its current market price is Rs. 12.50 and its PAT are Rs. 1,00,000. The merger will be effected by means of a stock swap (exchange). ABC Ltd. has agreed to a plan under which XYZ Ltd. will offer the current market value of ABC Ltd.'s shares:

(i) What is the pre-merger earnings per share (EPS) and P/E ratios of both the companies?

(ii) If ABC Ltd.'s P/E ratio is 8, what is its current market price? What is the exchange ratio? What will XYZ Ltd.'s post-merger EPS be?

(iii) What must the exchange ratio be for XYZ Ltd.'s that pre and post-merger EPS to be the same?

Solution:

(i) Pre-merger EPS and P/E ratios of XYZ Ltd. and ABC Ltd.

Particulars	XYZ Ltd.	ABC Ltd.
Profits after taxes	Rs. 4,00,000	Rs. 1,00,000
Number of shares outstanding	2,00,000	1,00,000
EPS (Earnings after tax/No. of shares)	Rs. 2	Rs. 1
Market price per share	Rs. 25.00	Rs. 12.50
P/E Ratio (times) (MPS - EPS)	12.50	12.50

(ii) Current market price of ABC Ltd., if P/E ratio is 8 = Rs. 1 x 8 = Rs. 8

Exchange ratio = Rs. 25/8 = 3.125

Post merger EPS of XYZ Ltd. = $\frac{\text{Rs.}4,00,000 + \text{Rs.}1,00,000}{2,00,000 + (1,00,000 / 3.25)} = \frac{\text{Rs.}5,00,000}{2,32,000}$ = 2.16

(iii) Desired exchange ratio

Total number of shares in post-merged company = $\frac{\text{Post} - \text{merged earnings}}{\text{Pre} - \text{merger EPS of XYZ Ltd.}}$ = 5,00,000/2 = 2,50,000

Number of shares required to be issued = 2,50,000 - 200,000 = 50,000

Therefore, the exchange ratio is = 50,000/ 1,00,000 = 0.50

ILLUSTRATION 10.

Company X is contemplating the purchase of Company Y, Company X has 3,00,000 shares having a market price of Rs. 30 per share, while Company Y has 2,00,000 shares selling at Rs. 20 per share. The EPS are Rs. 4.00 and Rs. 2.25 for Company X and Y respectively. Managements of both companies are discussing two alternative proposals for exchange of shares as indicated below:

(a) in proportion to the relative earnings per share of two Companies.

(b) 0.5 share of Company X for one share of company Y (0.5 : 1).

You are required:

(i) To calculate the Earnings Per Share (EPS) after merger under two alternatives; and

(ii) To show the impact on EPS for the shareholders of two companies under both alternatives.

Solution:

Working Notes:

Computation of total earnings after merger

Particulars	Company X	Company Y	Total
Outstanding shares	3,00,000	2,00,000	
EPS (Rs.)	4	2.25	
Total earnings (Rs.)	12,00,000	4,50,000	16,50.000

(i) (a) Calculation of EPS when exchange ratio is in proportion to relative EPS of two companies

Company X	3,00,000
Company Y (2,00,000 x 2.25/4)	1,12,500
Total number of shares after merger	4,12,500

Company X

EPS before merger = Rs. 4

EPS after merger = Rs. 16,50,000/4,12,500 shares = Rs. 4

(i) (b) Calculate of EPS when share exchange ratio is 0.5:1

Total earnings after merger = Rs. 16,50,000

Total number of shares after merger = 3,00,000 + (2,00,000 x 0.5) = 4,00,000 shares

EPS after merger = Rs. 16,50,000 / 4,00,000 = Rs. 4.125

(ii) Impact of merger on EPS for shareholders of Company X and Company Y

(a) Marger took place on relative EPS of two companies; therefore both companies maintain their EPS and no impact on EPS of shareholders of both companies.

(b) Impact on Shareholders of Company X

	(Rs.)
EPS before merger	4.000
EPS after merger	4.125
Increase in EPS	0.125

Impact on shareholders of Company Y

	(Rs.)
EPS before merger	2.25
Equivalent EPS after merger (4.125 x 0.5)	2.0625
Decrease in EPS	0.1875

ILLUSTRATION 11.

The following information is provided in relation to the acquiring firm Mark limited and the target Mask Limited

Particulars	Firm Mark Limited	Firm Mask Limited
Earnings after tax (Rs.)	200 lacs	40 lacs
Number of shares outstanding	20 lacs	10 lacs
P/E ratio	10	5

Required:

(i) What is the swap ratio in terms of current market prices?

(ii) What is the EPS of Mark Limited after acquisition?

(iii) What is the expected market price per share of Mark Limited after acquisition assuming that P/E ratio of Mark limited remains unchanged?

(iv) Determine the market value of the merged firm.

(v) Calculate gain/loss for shareholders of the two independent companies after acquisition.

Solution:

(i) Calculation of Swap ratio:

Particulars	Firm Mark Limited	Firm Mask Limited
Earnings after tax (Rs.)	200 lacs	40 lacs
Number of shares outstanding	20 lacs	10 lacs
P/E ratio	10	5
EPS	200/20 =10	= 40/10 = 4
Market Price = (P/E x EPS)	Rs. 100	Rs. 20

Therefore swap ratio in terms of market prices

= MPS of target firm/ MPS of acquiring firm

= 20/100 = 0.20

(ii) We have general formula given by:

$$EPS_{AB} = \frac{(E_A + E_B)}{[S_A + S_B(ER_A)]}$$

Therefore, EPS of Mark Limited after acquisition = $\frac{200+40}{20+10\ x\ 0.2} = \frac{240}{22}$ = Rs. 10.91

(iii) Expected market price per share of Mark Limited with the same P/E of 10 will be

= EPS x P/E = Rs. 10.91 x 10 = Rs. 109.10

(iv) Market Value of the merged firm

= Total number of outstanding shares x market price

= (20 + 2) lacs x Rs. 109.10 = Rs. 2400.2 lacs

(v) Gain / Loss accruing to the shareholders of both companies

Particulars	Total	Mark	Mask
Number of shares after acquisition	22 lacs	20 lacs	2 lacs
Market price after acquisition	Rs. 109.10	Rs. 109.10	Rs. 109.10
Total Market value after acquisition	Rs. 2400.2 lacs	Rs. 2182 lacs	Rs. 218.2 lacs
Existing Market Value	Rs. 2200 lacs	Rs. 2000 lacs	Rs. 200 lacs
Gain to shareholders	Rs. 200.2 lacs	Rs. 182	Rs. 18.2 lacs

ILLUSTRATION 12.

ABC Ltd. run and managed by an efficient team that insists on reinvesting 60% of its earnings in projects that provide an ROE (return of equity) of 10%, despite the fact that the firm's capitalization rate (K) is 15%. The firm's current year's earning is Rs. 10 per share.

At what price the stock of ABC Ltd. sell? What is the present value of growth opportunities? Why would such a firm be a takeover target?

Solution:

Dividend growth rate G = ROE x b

Where, b = 1 - payout ratio

.-. G = 10% x 0.60 = 6%

4

Stock price of ABC Ltd. = $\frac{10 \text{ x } 0.4}{0.15-0.06} = \frac{4}{0.09}$ = Rs. 44.44

Present value of growth opportunities (PVGO)

= market price per share - No growth value per share

= Rs. 44.44 - (Rs. 10/0.15)

= Rs. 44.44 – Rs. 66.66

= Rs. (-22.22) i.e. negative PVGO

Reasons for takeover target - Negative PVGO implies that the net present value of the firm's projects is negative; the rate of return on those assets is less than the opportunity cost of capital. Such a firm would be subject to takeover target because **another firm could buy** the firm for the market price of Rs. 44.44 per share and increase the value of the firm by changing its investment policy. For example, if the new management simply paid out all earning as dividend, the value of the firm would increase up to its no growth value of Rs. 66.66.

ILLUSTRATION 13.

XY Ltd., a retail florist, is for sale at an asking price of Rs. 62,00,000. You have been contacted for a potential buyer who has asked you to give him opinion as to whether the asking price is reasonable. The potential buyer has only limited information about XY Ltd. And potential buyer does not know that annual gross sales of XY Ltd. is about Rs. 82,00,000 and that last year's tax return reported an annual profit of Rs. 8,40,000 before tax. You have collected the following information from the financial details of several retail florists that were up for sale in the past:

Table 1

Particulars	Price-to-sale(P/S) ratio	Price-to-earnings (P/E) ratio
Number of firms	38.0	33.0
Mean ratio	0.55	3.29
Coefficient of Variation	0.65	1.52
Maximum ratio	2.35	6.29

Table 2 Top 10 players (in descending P/S order)

Firm	1	2	3	4	5	6	7	8	9	10
(P/S) ratio	2.35	1.76	1.32	1.17	1.09	1.01	0.96	0.85	0.72	0.68
(P/E) Multiple	5.65	6.29	5.31	4.60	3.95	3.25	3.10	2.96	2.90	2.75

Offer your opinion on the reasonableness of the asking price.

Solution:

Average P/S ratio of Industry = 0.55 Coefficient of variation of P/S ratio = 0.65

Average P/E ratio of Industry = 3.29 Coefficient of variation of P/E ratio = 1.52

The coefficient of variation of P/S ratio is much lower than the coefficient of variation of P/E ratio.

From this we can infer that there is a wider dispersion in case of P/E ratio than in case of P/S ratio.

Therefore, while defining the market, it is preferable to take P/S as guiding factor.

Asking price of XY Ltd. Rs. 62,00,000

Annual sales of XY Ltd. Rs. 82,00,000

Asking P/S ratio of XY Ltd. = 62,00,000/82,00,000 = 0.76

P/S ratio of XY Ltd. 0.76 is much higher than industry average 0.55, it is far below than the maximum P/S ratio of 2.35. The ratio of XY Ltd. is lying between 8th and 9th highest of the top ten players of the industry.

In other words, XY Ltd. would need to be among the 22%* (8.5/38 x 100) most desirable florist business to justify the asking price of Rs. 62,00,000 with annual gross sales of Rs. 82,00,000. If the sales are likely to hold in the coming years, the price may be (0.85 + 0.72)/2 x Rs. 82 Lakhs = Rs. 64.37 Lakhs.

Provided the buyer believes that XY Ltd. is a superior retail florist (among the top quartile), and the future sales are not likely to fall, the asking price of Rs. 62 lakhs appears to be reasonable. However, the buyer should make sure that the florist's accounts reflect a true and fair view of the business before he arrives at a final decision.

Note: 22% = (Average of 8th and 9th year - No. of Firms) x 100

i.e. $\{(\frac{8+9}{2})+38\} \times 100 = \frac{8.5}{38} x\ 100$ = 22% Approx.

ILLUSTRATION 14.

Following are the financial statement for A Ltd. and B Ltd. for the current financial year. Both the firm operate in the same industry:

Balance Sheet

	(Rs.)	
Particulars	**A Ltd.**	**B. Ltd.**
Total Current assets	14,00,000	10,00,000
Total Fixed assets (net)	10,00,000	5,00,000
	24,00,000	15,00,000
Equity capital (of Rs. 100 each)	10,00,000	8,00,000
Retained earnings	2,00,000	
14% Long-term debt	5,00,000	3,00,000
Total Current liabilities	7,00,000	4,00,000
	24,00,000	15,00,000

Income-Statements

	(Rs.)	
Particulars	**A Ltd.**	**B. Ltd.**
Net sales	34,50,000	17,00,000
Cost of goods sold	27,60,000	13,60,000
Gross profit	6,90,000	3,40,000
Operating expenses	2,00,000	1,00,000
Interest	70,000	42,000
Earnings before taxes	4,20,000	1,98,000
Taxes (50%)	2,10,000	99,000
Earnings after taxes (EAT)	2,10,000	99,000

Additional Information

Number of equity shares	10,000,	8,000
Dividend payment ratio (D/P)	40%,	60%
Market price per share (MPS)	Rs. 400,	Rs. 150

Assume that the two firms are in the process of negotiating a merger through an exchange of equity shares. You have been asked to assist in establishing equitable exchange terms, and are required to -

(i) Decompose the share prices of both the companies into EPS and P/E components, and also segregate their EPS figures into return on equity (ROE) and book value/intrinsic value per share (BVPS) components.

(ii) Estimate future EPS growth rates for each firm.

(iii) Based on expected operating synergies, A Ltd. estimates that the intrinsic value of B's equity share would be Rs. 200 per share on its acquisition. You are required to develop a range of justifiable equity share exchange ratios that can be offered by A Ltd. to B Ltd.'s shareholders. Based on your analysis in parts (i) and (ii) would you expect the negotiated terms to be closer to the upper, or the lower exchange ratio limits? Why?

(iv) Calculate the post-merger EPS based on an exchange ratio of 0.4:1 being offered by A Ltd. Indicate the immediate EPS accretion or dilution, if any, that will occur for each group of shareholders.

(v) Based on a 0.4:1 exchange ratio and assuming that A's pre-merger P/E ratio will continue after the merger, estimates the post-merger market price. Show the resulting accretion or dilution in pre-merger market prices.

Worker price per share (MPS) = EPS x P/E ratio or P/E Ratio = MPS / EPS.

Solution:

(i) Determination of EPS, P/E ratio, ROE and BVPC of A Ltd. and B Ltd.

Particulars		A Ltd.	B Ltd.
Profits After Tax	(PAT)	Rs. 2,10,000	Rs. 99,000
No. of Shares	(N)	10,000	8,000
EPS	(PAT/N)	Rs. 21.00	Rs. 12.375
Market price share	(MPS)	Rs. 400	Rs. 150
P/E ratio	(MPS/EPS)	19.05	12.12
Equity funds	(EF)	12,00,000	8,00,000
BVPS	(EF/N)	Rs. 120	Rs. 100
ROE	(PAT/EF) x 100	17.5%	12.375%

(ii) Estimates of Growth rates in EPS for each Firm

Retention ratio	(1-D/P ratio)	0.6	0.4
Growth rate	(ROE x Retention ratio)	10.5%	4.95%

(iii) Justifiable equity share exchange ratio

(a) Market Price based $\frac{MPS_B}{MPS_A} = \frac{Rs.150}{Rs.400}$ = 0.375 : 1 (lower limit)

(b) Intrinsic value based = $\frac{Rs.200}{Rs.400}$ = 0.5 : 1 (upper limit)

Since A Ltd. has a higher EPS, ROE, P/E ratio, and even higher EPS growth expectations, the negotiated terms would be expected to be closer to the lower limit, based on the existing share prices.

(iv) Calculation of Post-merger EPS and other effects

Particulars	A Ltd.	B Ltd.	Combined
PAT (i) (Rs.)	2,10,000	99,000	3,09,000
Shares outstanding (ii)	10,000	8,000	13,200*
EPS (i) / (ii) (Rs.)	21.00	12.375	23.41
EPS Accretion (Dilution) (Rs.)	2.41	3.015**	--

Note:

* Shares outstanding (combined) = 10,000 shares + (0.40 x 8,000) = 13,200 Shares

** EPS claim per old share = Rs. 23.41 x 0.40 = Rs. 9.36

EPS dilution of B Ltd. = Rs. 12.375 – Rs. 9.36 = Rs. 3.015

(v) Estimate of Post-merger Market Price and other effects

Particulars	A Ltd.	B Ltd.	Combined
EPS (i) (Rs.)	21.00	12.375	23.41
P/E Ratio (ii)	19.05	12.12	19.05
MPS (i) x (ii) (Rs.)	400	150	446.00
MPS Accretion (Dilution) (Rs.)	46	28.40***	---

Note: *

MPS claim per old share	(Rs. 446 x 0.4)	178.40
Less : MPS per old share		150.00
MPS accretion of B Ltd.		28.40

ILLUSTRATION 15.

Illustrate two main methods of financing an acquisition referred to in Accounting Standard - 14 (AS-14)

Solution:

Accounting for Amalgamations

The provisions of Accounting Standard (AS-14) on Accounting for Amalgamations issued by the Institute of Chartered accountants of India need to be referred to in this context.

The two main methods of financing an acquisition are cash and share exchange:

Method I - Cash: This method is generally considered suitable for relatively small acquisitions. It has two advantages:

(i) The buyer retains total control as the shareholders in the selling company are completely bought out, and

(ii) the value of the bid is known and the process is simple.

Let us consider 2 Companies A & B whose figures are stated below:

Particulars	Company A	Company B
Market price per share	Rs.75	Rs.15
No. of shares	100,000	60,000
Market Value of the company	Rs.75,00,000	Rs.900,000

Assume Company A intends to pay Rs.12,00,000 cash for Company B. If the share price does not anticipate a merger:

The share price in the market is expected to accurately reflect the true value of the company.

The cost to the bidder Company A = Payment - The market value of Company B

= Rs. 1 2 lakhs - Rs.9 lakhs = Rs.3 lakhs.

Company A is paying Rs.3 lakhs for the identified benefits of the merger. If the share price includes a speculation element of Rs.2 per share:

The cost to Company A = Rs.3,00,000 + (60,000 x Rs.2)
= Rs.3,00,000 + Rs.1,20,000
= Rs.4,20,000

Worth of Company B = (Rs.15 - Rs.2) x 60,000
= Rs.13 x 60,000
= Rs.7,80,000

This can also be expressed as: Rs.12,00,000 - Rs.4,20,000 = Rs.7,80,000

Method II - Share exchange: The method of payment in large transactions is predominantly stock for stock. The advantage of this method is that the acquirer does not part with cash and does not increase the financial risk by raising new debt. The disadvantage is that the acquirer's shareholders will have to share future prosperity with those of the acquired company.

Suppose Company A wished to offer shares in Company A to the shareholders of Company B instead of cash/ Amount to be paid to shareholders of Company B = Rs.12,00,000 Market price of shares of Company A = Rs.75

No. of shares to be offered = Rs.12,00,000 / Rs.75 = 16,000

Now, shareholders of Company B will own part of Company A, and will benefit from any future gains of the merged enterprise.

Their share in the merged enterprise = 16,000 / (1,00,000 + 16,000) = 13.8%

Further, now suppose that the benefits of the merger has been identified by Company A to have a present value of Rs. 4,00,000,

The value of the merged entity = Rs.75,00,000 + (Rs.9,00,000 + Rs.4,00,000) = Rs.88,00,000 True cost of merger to the shareholders of Company A:

Particulars	Company A	Company B
Proportion of ownership in merged enterprise	86.2%	13.8%
Market Value: Total = Rs.88,00,000	Rs.75,85,600	Rs. 12,14,400
No. of shares currently in issue	100,000	60,000
Market price per share	Rs.75.86	Rs.20.24

The above gives the value of shares in the company before the merger is completed, based on estimates of what the company will be worth after the merger.

The valuation of each company also recognizes the split of the expected benefits which will accrue to the combined entity once the merger has taken place.

The true cost can be calculated as given below:

Particulars	Rs.
60,000 shares in Company B @ Rs. 20.24	12,14,400
Less : Current market value	9,00,000
Benefits being paid to shareholders of Company B	3,14,400

ILLUSTRATION 16.

Fat Ltd. wants to acquire Lean Ltd., the balance sheet of Lean Ltd. as on 31.03.2016 is as follows:

Liabilities	Rs.	Assets	Rs.
(1) Shareholders Fund:		(1) Non-current Assets:	
(a) Share Capital		(a) Fixed Assets	
(i) 60,000 Equity Shares of Rs.10 each	6,00,000	(i) Tangible Assets:	
(b) Reserve & Surplus		— Plant and Equipment	11,00,000
(i) Retained Earnings	2,00,000	(2) Current Assets:	
(2) Non-Current Liabilities:		(a) Inventories	1,70,000
Long Term Borrowings - 12% Debenture	2,00,000	(b) Trade Receivables	
(3) Current Liabilities:		— Sundry Debtors	30,000
(a) Trade Payables - Sundry Creditors	3,20,000	(c) Cash and Cash Equivalents	20,000
Total	**13,20,000**	**Total**	**13,20,000**

Additional information:

(i) Shareholders of Lean Ltd. will get one share in Fat Ltd. for every two shares. External liabilities are expected to be settled at Rs. 3,00,000. Shares of Fat Ltd. would be issued at its current price of Rs. 15 per share. Debenture holders will get 13% convertible debentures in the purchasing companies for the same amount. Debtors and inventories are expected to release Rs. 1,80,000.

(ii) Fat Ltd. has decided to operate the business of Lean Ltd. as a separate division. The division is likely to give cash flow (after tax) to the extent of Rs. 3,00,000 per year for 6 years. Fat Ltd. has planned that after 6 year this division would be damaged and disposed off for Rs. 1,00,000.

(iii) Company's cost of capital is 14%

Make a report to the managing director advising him about the financial feasibility of the acquisition.
Note: Present value of Rs. 1 for six years @ 14% interest : 0.8772, 0.7695, 0.6750, 0.5921 and 0.4556.

Solution:

Cost of Acquisition	Rs.
Equity share ($\frac{60,000}{2}$ x $Rs. 15$)	4,50,000
13% convertible debenture	2,00,000
Cash (Payment for external liabilities - Realisation of Cash from Debtors and inventories - Cash of Lean Ltd.) i.e., (Rs. 3,00,000 - - 1,80,000 - 20,000)	1,00,000
Total Consideration	7,50,000

Calculation of NPV:

Year	Cost inflow	PV factor @ 14%	Prevent value
1	3,00,000	0.8772	2,63,160
2	3,00,000	0.7695	2,30,850
3	3,00,000	0.6750	2,02,500
4	3,00,000	0.5921	1,77,630
5	3,00,000	0.5194	1,55,820
6	3,00,000 + 1,00,000	0.4556	1,82,240
	Total PV of cash inflow		12,12,200
	Less : Cost of acquisition		7,50,000
	NPV		4,62,200

Since the NPV is positive it is suggested to acquire Lean Ltd. to maximize the value of shareholders of both the companies.

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ILLUSTRATION 17.

Firm A is studying the possible acquisition of firm B by way of merger. The following data are available:

Firm	After tax earnings	No. of Eq. sh.	Market price per share
A	Rs. 10,00,000	2,00,000	Rs. 75
B	Rs. 3,00,000	50,000	Rs. 60

(i) If the merger goes through by exchange of equity shares and the exchange ratio is set according to the current market price, what is the new earnings per share of firm A.

(ii) Firm B wants to be sure that their earnings per share is not diminished by the merger. What exchange ratio is relevant to achieve the objective?

Solution:

(i) Exchange ratio = 75 : 60

No. of shares to be issued by A Ltd. $= \frac{60 \ x \ 50,000}{75}$ 40,000 shares.

- Total number of shares = 2,00,000 + 40,000 = 2,40,000 shares
- Total after tax earnings = Rs. (10,00,000 + 3,00,000) = Rs. 13,00,000
- Earnings per share $= \frac{\text{Rs.}13,00,000}{2,40,000}$ = Rs. 5.42

(ii) Calculations of exchange ratio which would not diminish the EPS of B Ltd.:

Current EPS of

A Ltd. $= \frac{10,00,000}{2,00,000}$ = Rs. 5

B Ltd. $= \frac{3,00,000}{50,000}$ = Rs. 6

Exchange ratio $= \frac{6}{5}$ = 1.20 : 1 5

No. of shares to be issued by A Ltd. to B Ltd.

= 50,000 x $\frac{6}{5}$ shares = 60,000 shares

Total number of shares of A Ltd. after acquisition = 2,00,000 + 60,000 = 2,60,000 shares

EPS (after merger) = $\frac{\text{Rs.}(10,00,000 + 3,00,000)}{2,60,000 \text{ shares}}$ = Rs. 5

Total earnings in A Ltd. available to new shareholders of B Ltd. = 60,000 x 5 = Rs. 3,00,000

ILLUSTRATION 18.

The following information is provided relating to the acquiring company X Ltd. and the target company Y Ltd.

	X Ltd.	Y Ltd.
No. of shares (F.V. Rs. 10 each)	10.00 lakhs	7.5 lakhs
Market capitalization	500.00 lakhs	750.00 lakhs
P/E ratio (times)	10	5
Reserve and surplus	300.00 lakhs	165.00 lakhs
Promoter's holding (No. of shares)	4.75 lakhs	5.00 lakhs

Board of directors of both the companies have decided to give a fair deal to the shareholders and accordingly for swap ratio the weights are decided as 40%, 25% and 35% respectively for Earnings, Book value and Market price of share of each company:

(i) Calculate the swap ratio and also calculate Promoters holding percentage after acquisition.
(ii) What is the EPS of X Ltd. after acquisition of Y Ltd?
(iii) What is the expected market price per share and market capitalization of X Ltd. after acquisition, assuming P/E ratio of firm X Ltd. remains unchanged.
(iv) Calculate free float market capitalization of the merged fair.

Solution:

Calculation of swap ratio

	X Ltd.	Y Ltd.
Market capitalization	500 lakh	750 lakhs
No. of shares	10 lakhs	7.5 lakhs
Market price per share	Rs. 50	Rs. 100
P/E ratio	10	5
EPS (MPS - P/E Ratio)	Rs. 5	Rs. 20
Profit (No. of shares x EPS)	Rs. 50 lakhs	Rs. 150 lakhs
Share Capital	Rs. 100 lakhs	Rs. 75 lakhs
Reserve and surplus	Rs. 300 lakhs	Rs. 165 lakhs
Total (Share Capital + Reserve and Surplus)	Rs. 400 lakhs	Rs. 240 lakhs
Book value per share (Total - No. of shares)	Rs. 40	Rs. 32

(i) Calculation of swap ratio

EPS	5 : 20 i.e., 1 : 4 i.e., 4 x 40%	= 1.6
Book value	40 : 30 i.e., 1 : 0.8 i.e., 0.8 x 25%	= 0.2
Market price	50 : 100 i.e., 1 : 2 i.e., 2 x 35%	= 0.7
Total		**= 2.5**

Swap ratio is for every one share of Y Ltd. to issue 2.5 shares of X Ltd.
Hence total no. of shares to be issued = 7.5 lakhs x 2.5 = 18.75 lakh shares.
Promoters holding = 4.75 lakh shares + (5 x 2.5) lakh shares = 17.25 lakh shares

So parameters holding percentage $= \frac{17.25}{28.75} \times 100 = 60\%$

Total no. of shares = 10 lakhs + 18.75 lakhs = 28.75 lakhs

(ii) EPS $= \frac{\text{Total profit}}{\text{No.of shares}} = \frac{50 \text{ lakhs} + 150 \text{ lakh}}{28.75 \text{ lakh}}$ = Rs. 6.956

(iii) Expected market price = EPS x p/E = 6.956 x 10 = Rs. 69.56
Market capitalization = Rs. 69.56 x 28.75 lakh shares = Rs. 1999.85 lakh
(iv) Free float of market capitalization = Rs. 69.56 x (28.75 x 40%) = Rs. 799.94 lakh

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