INSTITUTE OF AERONAUTICAL ENGINEERING

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Regulation: UG20

COMPUTER SCIENCE AND ENGINEERING (AI & ML)

BUISSNESS ECONOMICS AND FINANCIAL ANALYSIS

AAT-II

Assignment

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Course: **CSE (AI&ML) – B**
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1. Differentiate about the Qualitative and quantitative techniques of Demand Forecasting

A. Here is a clear differentiation between **Qualitative** and **Quantitative** techniques of **Demand Forecasting**:

Qualitative Techniques vs Quantitative Techniques of Demand Forecasting

Basis of Comparison	Qualitative Techniques	Quantitative Techniques
Definition	Based on expert opinions, intuition, and subjective judgment.	Based on historical data, mathematical models, and statistics.
Data Requirement	Requires little to no past data.	Requires reliable and sufficient historical data.
Approach	Descriptive and judgmental.	Analytical and data-driven.
Use Case	Useful when launching new products or entering new markets.	Suitable for existing products with available past data.
Examples	Delphi method, Expert opinion, Market research, Sales force composite.	Time series analysis, Regression analysis, Moving averages, Exponential smoothing.
Accuracy	Less accurate due to subjective nature.	Generally more accurate due to statistical basis.
Time Horizon	Mostly used for long-term forecasting.	More suited for short- to medium-term forecasting.
Cost	Can be relatively inexpensive.	May require software and tools, thus more expensive.
Flexibility	More flexible and adaptable to sudden changes.	Less flexible; depends on data trends and consistency.
Human Involvement	High – relies heavily on human judgment.	Low – relies on automated calculations and models.

Conclusion:

- **Qualitative methods** are ideal when data is scarce or when launching innovative products.
- **Quantitative methods** are more reliable when sufficient historical data is available and patterns can be identified.

Both methods can be **combined (hybrid approach)** to improve forecasting accuracy, especially in dynamic market environments.

2. Describe the concept of shift in demand curve? Enumerate three possible reasons for such shift?

A. Concept of Shift in Demand Curve

A **shift in the demand curve** refers to a change in the **quantity demanded of a good or service at every price level**, caused by **factors other than the price of the good itself**.

- When **demand increases**, the **demand curve shifts to the right**.
- When **demand decreases**, the **demand curve shifts to the left**.

This shift represents a change in consumer behavior or market conditions that affects overall demand, irrespective of the product's price.

Three Possible Reasons for a Shift in the Demand Curve

1. Change in Consumer Income

- **Normal Goods**: When income increases, demand for normal goods rises, shifting the demand curve to the **right**.
- **Inferior Goods**: When income increases, demand for inferior goods falls, shifting the demand curve to the **left**.

2. Change in Tastes and Preferences

- A favorable change in consumer preferences (e.g., due to advertising or trends) leads to an increase in demand, shifting the curve to the **right**.
- A loss of interest in the product shifts the curve to the **left**.

3. Change in Prices of Related Goods

- **Substitutes**: If the price of a substitute rises, demand for the product increases (rightward shift).
- **Complements**: If the price of a complementary good rises, demand for the product decreases (leftward shift).

Conclusion

A shift in the demand curve indicates a fundamental change in market conditions beyond just the price of the product. Understanding the factors that cause such shifts helps businesses and policymakers make better economic decisions.

3. Consider the following data of a company: Sales = Rs. 40,000; Fixed cost = Rs. 7500; Variable cost = Rs. 17,500; Find the following: (a) Contribution (b) Profit (c) BEP (d) M.S.

A. To solve this problem, let's use the following formulas:

Given Data:

- **Sales (S)** = Rs. 40,000
- **Fixed Cost (FC)** = Rs. 7,500
- **Variable Cost (VC)** = Rs. 17,500

(a) Contribution = Sales – Variable Cost

Contribution=40,000−17,500=Rs. 22,500\text{Contribution} = 40,000 - 17,500 = \text{Rs. 22,500}

(b) Profit = Contribution – Fixed Cost
Profit=22,500−7,500=Rs. 15,000\text{Profit} = 22,500 - 7,500 = \text{Rs. 15,000}

(c) Break-Even Point (BEP) = Fixed Cost ÷ P/V Ratio
First, calculate the **P/V Ratio**:
P/V Ratio=ContributionSales×100=22,50040,000×100=56.25%\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{22,500}{40,000} \times 100 = 56.25\%
Now,
BEP (in Rs.)=7,5000.5625=Rs. 13,333.33 (approx)\text{BEP (in Rs.)} = \frac{7,500}{0.5625} = \text{Rs. 13,333.33 (approx)}

(d) Margin of Safety (M.S.) = Actual Sales – BEP Sales
M.S.=40,000−13,333.33=Rs. 26,666.67 (approx)\text{M.S.} = 40,000 - 13,333.33 = \text{Rs. 26,666.67 (approx)}

Final Answers:

- **(a) Contribution** = Rs. 22,500
- **(b) Profit** = Rs. 15,000
- **(c) BEP** = Rs. 13,333.33
- **(d) Margin of Safety** = Rs. 26,666.67

4. Outline the significance of Break-Even Analysis. State the assumptions and limitations of Break Even Analysis.

A. Significance of Break-Even Analysis
Break-Even Analysis is a financial tool used to determine the point at which a company's total revenue equals its total cost, resulting in **no profit or loss**. This point is known as the **Break-Even Point (BEP)**.
Key Significance:

1. **Profit Planning:**
   - Helps in determining the level of sales needed to cover costs and start generating profit.
2. **Cost Control:**
   - Encourages careful monitoring and management of fixed and variable costs.
3. **Pricing Decisions:**
   - Assists in setting appropriate selling prices to ensure profitability.
4. **Investment Decision-Making:**
   - Supports evaluating the feasibility and risk of new projects or products.
5. **Financial Forecasting:**
   - Aids in estimating future revenues, costs, and profits.
6. **Operational Efficiency:**
   - Helps assess the impact of production volume on cost and profitability.

Assumptions of Break-Even Analysis

1. **Costs are Classified Accurately:**
   - Costs are distinctly divided into **fixed** and **variable** components.
2. **Constant Selling Price:**
   - Selling price per unit does not change with the volume of sales.
3. **Constant Variable Cost Per Unit:**
   - Variable cost per unit remains unchanged regardless of production level.
4. **Production Equals Sales:**
   - All units produced are sold; no inventory buildup or shortage.
5. **Single Product or Constant Product Mix:**
   - The analysis is for a single product or a fixed product mix in the case of multiple products.
6. **Linear Relationship:**
   - Both revenue and cost behave linearly with respect to volume.

Limitations of Break-Even Analysis

1. **Oversimplified Assumptions:**
   - Real-world scenarios involve changing costs and prices, which the model does not capture.
2. **Ignores Market Conditions:**
   - Does not consider demand fluctuations or competition.
3. **Single Time Frame:**
   - Typically used for short-term decisions; not suitable for long-term strategic planning.
4. **Fixed Costs May Not Remain Constant:**
   - Fixed costs can increase beyond certain production capacities.
5. **Does Not Consider Capital Employed:**
   - Ignores return on investment or capital efficiency.
6. **Inapplicable for Multi-Product Firms (Directly):**
   - Needs adaptation when used for companies with diverse product lines.

Conclusion

Break-even analysis is a **valuable decision-making tool** in financial and operational planning. However, managers should be aware of its assumptions and limitations, and use it alongside other tools and realistic market analysis for better results.

5. Demonstrate how the price is determined under conditions of perfect competition. Illustrate this with the help of diagrams.

A. Price Determination under Perfect Competition

Under **perfect competition**, the price of a good is determined by the **interaction of market demand and supply**. No single buyer or seller has the power to influence the price, as there are many buyers and sellers dealing in **homogeneous products**.

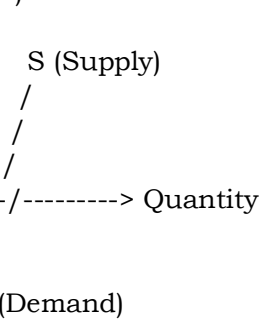
Key Features of Perfect Competition:

- **Large number of buyers and sellers**
- **Homogeneous products**
- **Free entry and exit**
- **Perfect knowledge**
- **No price control by individual firms**

How Price is Determined:
In the perfectly competitive market:

- **Price is determined at the point where market demand equals market supply**.
- Each individual firm is a **price taker**, not a price maker.
- The **industry** sets the price, and the firm accepts it.

Diagrammatic Representation
1. Industry Equilibrium (Market Demand and Supply Curve)
In the **industry diagram**, price is determined by the **intersection of the demand and supply curves**.



- The equilibrium price is where **demand (D)** equals **supply (S)**.
- At this point, **market clears**—no surplus or shortage.

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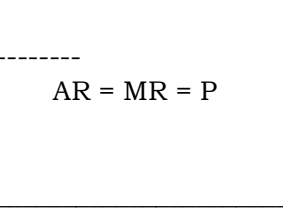
2. Firm Equilibrium (Firm as Price Taker)
In a perfectly competitive market, each firm takes the price determined by the industry as **given**. For the firm:

- **AR (Average Revenue) = MR (Marginal Revenue) = Price**
- The firm's **demand curve** is a **horizontal line** at the market price.



- The firm adjusts its **output** to the point where **Marginal Cost (MC) = Marginal Revenue (MR)** to maximize profit.

Equilibrium Condition for the Firm:

- **MR = MC** and **MC must cut MR from below**.

Conclusion:
In perfect competition, **market forces of demand and supply** determine the price. The individual firm **accepts this price** and adjusts its output accordingly. The firm's equilibrium is reached when its **MC = MR**, ensuring maximum profit or minimum loss in the short run, and only **normal profit in the long run**.

6. Illustrate the features of the following (a) public company (b) Government Company (c) Private Company.

A. Here is a clear illustration of the **features of Public Company, Government Company, and Private Company**:

(a) Public Company

A **Public Company** is a company that is registered under the Companies Act and can invite the public to subscribe to its shares or debentures.

Key Features:

1. **Minimum Members:** Requires at least **7 members** to start.
2. **Maximum Members:** No limit on the maximum number of shareholders.
3. **Share Transferability:** Shares are **freely transferable**.
4. **Minimum Directors:** Must have at least **3 directors**.
5. **Raising Capital:** Can **invite the public** to subscribe to shares and debentures.
6. **Name Suffix:** Must end with the word **"Limited"**.
7. **Regulatory Compliance:** Subject to more **stringent rules and disclosures** under law.
8. **Stock Exchange Listing:** May be listed on stock exchanges (e.g., NSE, BSE).

(b) Government Company

A **Government Company** is a company in which **at least 51% of the paid-up share capital** is held by the **Central or State Government**, or both.

Key Features:

1. **Government Ownership:** Majority ownership (≥51%) by government.
2. **Legal Entity:** Operates as a **separate legal entity** under the Companies Act.
3. **Management:** Managed by a **board of directors**, often appointed by the government.
4. **Autonomy:** Operates with a **commercial motive** but under government oversight.
5. **Accounts Audit:** Subject to audit by the **Comptroller and Auditor General (CAG)** of India.
6. **Examples:** Bharat Heavy Electricals Ltd. (BHEL), ONGC, SAIL.

(c) Private Company

A **Private Company** is a company that **restricts the right to transfer shares** and **does not invite the public** to subscribe to its securities.

Key Features:

1. **Minimum Members:** Requires a **minimum of 2 members**.
2. **Maximum Members:** Maximum of **200 members**.
3. **Share Transferability: Restricted** transfer of shares.
4. **Raising Capital: Cannot invite public** to invest in shares/debentures.
5. **Minimum Directors:** At least **2 directors** required.
6. **Name Suffix:** Must end with **"Private Limited"**.
7. **Compliance: Lesser compliance burden** compared to public companies.
8. **Ownership:** Often closely held by **family, friends, or small group of investors**.

Comparison Summary Table:

Feature	Public Company	Government Company	Private Company
Minimum Members	7	2	2
Maximum Members	No Limit	No Limit	200
Share Transferability	Freely transferable	Subject to government rules	Restricted
Public Subscription	Allowed	May or may not	Not allowed
Ownership	Public/Private investors	Government (≥51%)	Private individuals/groups
Compliance Level	High	Moderate to High	Comparatively low

These distinctions help in choosing the right form of company structure based on **objectives, ownership, and capital needs**.

7. Define Capital Budgeting. Illustrate the significance and limitations of Capital Budgeting.

A. Definition of Capital Budgeting

Capital Budgeting is the process of planning, evaluating, and selecting long-term investment projects or expenditures such as purchasing machinery, building infrastructure, or launching new products. It involves deciding whether the future benefits from a project are worth the initial and ongoing investment costs.
It is also known as **Investment Appraisal**.

Significance of Capital Budgeting

1. **Long-Term Impact on Business:**
   - Capital budgeting decisions affect a company's future growth, profitability, and strategic direction.
2. **Efficient Resource Allocation:**
   - Helps ensure that capital is invested in the most profitable and value-adding projects.
3. **Risk Management:**
   - Assists in evaluating the risks involved in various projects and selecting the one with an optimal risk-return balance.
4. **Wealth Maximization:**
   - Focuses on maximizing shareholder value by selecting projects that yield the highest returns.
5. **Helps in Cost Control:**
   - Provides a systematic approach to planning and controlling large expenditures.
6. **Facilitates Strategic Planning:**
   - Supports the company in achieving its long-term objectives through structured investment planning.

Limitations of Capital Budgeting

1. **Estimation Uncertainty:**
   - Involves forecasting future cash flows and returns, which are prone to inaccuracies.
2. **Time-Consuming Process:**
   - Requires thorough financial analysis, feasibility studies, and management approval, which can be lengthy.
3. **Ignores Qualitative Factors:**
   - May not account for non-financial aspects like employee satisfaction, social impact, or brand value.
4. **High Initial Cost:**

- Capital projects often require large amounts of funding, increasing financial risk if estimates are wrong.

5. **Changes in External Environment:**
   - Economic shifts, inflation, changes in technology, or government policies can affect project viability after implementation.
6. **Difficulties in Measuring Intangible Benefits:**
   - Certain benefits like improved customer satisfaction or goodwill are hard to quantify.

Conclusion

Capital budgeting is a critical financial management tool that helps in making sound investment decisions for long-term business success. While it offers many strategic benefits, it also involves challenges and limitations that must be carefully considered through detailed analysis and judgment.

8. Classify NPV & IRR and describe the two methods of evaluating capital budgeting proposals.

A. Classification of NPV & IRR

Both **NPV (Net Present Value)** and **IRR (Internal Rate of Return)** are classified under the category of **Discounted Cash Flow (DCF) methods** of evaluating capital budgeting proposals.

These methods consider the **time value of money**, making them more accurate for long-term investment decisions compared to non-discounted techniques like Payback Period or Accounting Rate of Return.

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1. Net Present Value (NPV)

Definition:

NPV is the **difference between the present value of cash inflows and the present value of cash outflows** over a period of time, discounted at a specified rate (usually the cost of capital).

Formula:

NPV=∑Rt(1+r)t−C0\text{NPV} = \sum \frac{R_t}{(1 + r)^t} - C_0

Where:

- RtR_t = Net cash inflow at time tt
- rr = Discount rate (cost of capital)
- C0C_0 = Initial investment
- tt = Time period

Decision Rule:

- If **NPV > 0** → Accept the project (Profitable)
- If **NPV < 0** → Reject the project (Not Profitable)
- If **NPV = 0** → Indifferent

Advantages:

- Considers time value of money

- Reflects absolute value creation
- Aligns with shareholder wealth maximization

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2. Internal Rate of Return (IRR)

Definition:

IRR is the **discount rate** at which the **NPV of all cash flows becomes zero**. It represents the break-even rate of return on an investment.

Formula:

0=∑Rt(1+IRR)t−C0\text{0} = \sum \frac{R_t}{(1 + IRR)^t} - C_0

(It's usually computed using trial-and-error or financial calculators/software.)

Decision Rule:

- If **IRR > Required Rate of Return (hurdle rate)** → Accept the project
- If **IRR < Required Rate of Return** → Reject the project
- If **IRR = Required Rate of Return** → Indifferent

Advantages:

- Considers time value of money
- Provides a percentage return, which is easily interpretable
- Useful for comparing profitability of different projects

Comparison Summary:

Criteria	**NPV**	**IRR**
Nature	Absolute value (Rs.)	Percentage return (%)
Decision Basis	Value creation	Rate of return vs. hurdle rate
Time Value Considered	Yes	Yes
Complexity	Relatively straightforward	Involves trial-and-error/iteration
Multiple IRRs Issue	No	Yes, possible in non-conventional cash flows

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Conclusion

Both **NPV and IRR** are essential tools in capital budgeting.

- **NPV** is more reliable when comparing mutually exclusive projects or differing cash flow patterns.
- **IRR** is preferred for understanding the return in percentage terms.

In practice, both are often used together to validate investment decisions.

9. Distinguish the differences between payback period and post pay back period? How is it useful in capital budgeting?

A. Difference Between Payback Period and Post-Payback Period

Basis of Comparison	Payback Period	Post-Payback Period
Definition	The time required to recover the initial investment from cash inflows.	The period **after** the payback period during which the project continues to generate profits.
Focus	Focuses on **recouping the initial investment**.	Focuses on **profits earned beyond recovery**.
Measurement	Measured in **years/months** it takes to recover cost.	Not directly measured; considered for assessing **long-term returns**.
Time Value of Money	Usually **ignored** (unless modified).	Also ignored in basic analysis.
Decision Criteria	Shorter payback period is preferred.	Evaluates if profits **continue and grow** after break-even.
Use in Capital Budgeting	Helps in determining **liquidity and risk**.	Assesses **profitability beyond breakeven** and **project viability**.
Limitation	Ignores returns **after** payback period.	Not a separate metric; used for **additional insight** after recovery.

Usefulness in Capital Budgeting

Payback Period:

- **Simple and easy to understand.**
- Useful for **preliminary screening** of projects.
- Helps assess **liquidity risk** by showing how quickly capital is recovered.
- Particularly useful for **short-term and risk-sensitive** investments.

Post-Payback Period:

- Helps assess the **true profitability** and **long-term viability** of the project.
- Provides insight into **how much value** a project generates **after breakeven**.
- Encourages decision-makers to **look beyond recovery** and consider **total returns**.

Conclusion:

While the **payback period** is crucial for understanding how quickly an investment can be recovered, the **post-payback period** is equally important for evaluating the **sustainability and overall profitability** of a project. Together, they provide a more comprehensive view of a project's financial desirability in capital budgeting decisions.

10. Prepare Journal Entries from the following in the books of Mr. Praveen and write ledger accounts of same. 2009, Dec 1st Business stated with cash Rs.50,000, Stock Rs.30,000, Furniture Rs. 10,000 and Machinery Rs. 20,000. Dec 2nd Telephone charges paid in cash Rs.5,000 Dec 3rd Transport charges paid by cheque Rs.3,000 Dec 4th Advertisements charges paid to Naga Raju Rs. 4,000 Dec 5th Dividend received from Ashok company Pvt. Ltd. Rs.2,000 Dec 6th Furniture purchased for personal use Rs.5,000 Dec 7th Rent paid to Landlord Ramana for Rs.8,000

A.

Journal Entries in the Books of Mr. Praveen – December 2009

Date	Particulars	L.F.	Debit (Rs.)	Credit (Rs.)
Dec 1	Cash A/c Dr.		50,000	
	Stock A/c Dr.		30,000	
	Furniture A/c Dr.		10,000	

Date	Particulars	L.F.	Debit (Rs.)	Credit (Rs.)
	Machinery A/c Dr.		20,000	
	To Capital A/c			1,10,000
	(Being business started with assets)			
Dec 2	Telephone Charges A/c Dr.		5,000	
	To Cash A/c			5,000
	(Being telephone charges paid in cash)			
Dec 3	Transport Charges A/c Dr.		3,000	
	To Bank A/c			3,000
	(Being transport charges paid by cheque)			
Dec 4	Advertisement Charges A/c Dr.		4,000	
	To Naga Raju A/c			4,000
	(Being advertisement charges due to Naga Raju)			
Dec 5	Cash A/c Dr.		2,000	
	To Dividend Received A/c			2,000
	(Being dividend received from Ashok Co. Pvt. Ltd.)			
Dec 6	Drawings A/c Dr.		5,000	
	To Furniture A/c			5,000
	(Being furniture purchased for personal use)			
Dec 7	Rent A/c Dr.		8,000	
	To Cash A/c			8,000
	(Being rent paid to landlord Ramana)			

Ledger Accounts

1. Capital Account

Date	Particulars	Amount (Rs.)
Dec 1	By Cash A/c, Stock A/c, Furniture A/c, Machinery A/c	1,10,000

2. Cash Account

Date	Particulars	Amount (Rs.)	Date	Particulars	Amount (Rs.)
Dec 1	To Capital A/c	50,000	Dec 2	By Telephone Charges A/c	5,000
Dec 5	To Dividend Received A/c	2,000	Dec 7	By Rent A/c	8,000
				By Balance c/d	39,000

3. Stock Account

Date	Particulars	Amount (Rs.)
Dec 1	To Capital A/c	30,000

4. Furniture Account

Date	Particulars	Amount (Rs.)	Date	Particulars	Amount (Rs.)
Dec 1	To Capital A/c	10,000	Dec 6	By Drawings A/c	5,000

Date	Particulars	Amount (Rs.)	Date	Particulars	Amount (Rs.)
				By Balance c/d	5,000

5. Machinery Account

Date	Particulars	Amount (Rs.)
Dec 1	To Capital A/c	20,000

6. Telephone Charges Account

Date	Particulars	Amount (Rs.)
Dec 2	To Cash A/c	5,000

7. Transport Charges Account

Date	Particulars	Amount (Rs.)
Dec 3	To Bank A/c	3,000

8. Bank Account

Date	Particulars	Amount (Rs.)
Dec 3	By Transport Charges A/c	3,000

9. Advertisement Charges Account

Date	Particulars	Amount (Rs.)
Dec 4	To Naga Raju A/c	4,000

10. Naga Raju Account

Date	Particulars	Amount (Rs.)
Dec 4	By Advertisement Charges A/c	4,000

11. Dividend Received Account

Date	Particulars	Amount (Rs.)
Dec 5	By Cash A/c	2,000

12. Drawings Account

Date	Particulars	Amount (Rs.)
Dec 6	To Furniture A/c	5,000

13. Rent Account

Date	Particulars	Amount (Rs.)
Dec 7	To Cash A/c	8,000