Allama Iqbal Open University
Solved Assignments Spring 2026

Course Code:	**402 Code**
Course Name:	**Economics (اکنامکس)**
Class:	**BA/AD/BS**
Total Credit Hours	**6**
Total Assignments	**4**

Assignment 1

Q.1 Explain the definition of economics given by Robins. Does this definition, relative to other ones, provide more about the nature of economics or not?

Answer:

Robbins' Definition of Economics

Lionel Robbins (1932) in his book *"An Essay on the Nature and Significance of Economic Science"* defined economics as:

"Economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses."

This definition is built on four fundamental characteristics:

1. **Ends (unlimited wants):** Human beings have multiple wants that can be arranged in order of priority.
2. **Scarce means (limited resources):** Resources (land, labour, capital, entrepreneurship) are limited in supply.
3. **Alternative uses:** The same resource can be used for different purposes.
4. **Choice (economising):** Since means are scarce and ends are many, people must choose the most urgent wants to satisfy.

Robbins insisted that economics is a **positive science** (concerned with 'what is') and not a normative science (what ought to be). He removed the earlier emphasis on material welfare.

Comparison with Other Definitions

Definition	Key Focus	Weakness
Adam Smith (Wealth Definition)	Economics = study of wealth production & distribution	Ignored scarcity, welfare, non-material goods

Definition	Key Focus	Weakness
Alfred Marshall (Welfare Definition)	Economics = study of mankind in ordinary business of life; focus on material welfare	Vague, normative, couldn't separate economics from ethics
Robbins (Scarcity Definition)	Economics = science of choice under scarcity	Too narrow; ignores growth, unemployment, welfare policies; static in nature

Does Robbins' definition provide more about the nature of economics?

Yes, in terms of analytical clarity:

- It highlights the universal problem of scarcity and choice.
- It gives economics a logical structure (opportunity cost, production possibility frontier).
- It makes economics a positive science, free from value judgments.

No, in terms of broader social purpose:

- It ignores the goal of improving human welfare.
- It is static – does not account for technological change or economic growth.
- It offers no guidance for policy (e.g., income distribution, poverty).

Conclusion: Robbins' definition is superior for understanding the **methodology** and **logical core** of economics, but it must be supplemented by other definitions to cover the normative and dynamic aspects.

Q.2 (a) What is the law of equi-marginal utility? Also, explain this law with the help of a table.

Answer:

Law of Equi-Marginal Utility (Gossen's Second Law)

It states that a consumer maximises total utility when he allocates his limited income among different goods such that the **marginal utility per rupee spent** on each good is equal.

Mathematically, for goods X, Y, ... , Z:

$$\frac{MU_X}{P_X} = \frac{MU_Y}{P_Y} = \cdots = \frac{MU_Z}{P_Z} = MU_m$$

where MU_m = marginal utility of money (constant).

Assumptions:

- Consumer is rational.
- Fixed income and constant prices.
- Utility is cardinally measurable.
- MU of money is constant.
- Goods are divisible.

Explanation with a Table

Suppose a consumer has ₹10 to spend. Prices: $P_A = ₹1$, $P_B = ₹1$. Marginal utility schedules:

Units	MU_A (utils)	MU_B (utils)
1	20	18
2	16	15
3	12	12
4	8	9
5	4	6
6	0	3
7	-2	0

Step-by-step allocation (spend each rupee where MU/₹ is highest):

Rupee spent	MU_A	MU_B	Choice	Total Utility
1	20	18	A	20

2	16	18	B	38
3	16	15	A	54
4	12	15	B	69
5	12	12	A or B	81 (if A)
6	8	12	B	93
7	8	9	B	102
8	8	6	A	110
9	4	6	B	116
10	4	3	A	120

Final allocation: 5 units of A (20+16+12+8+4 = 60 utils), 5 units of B (18+15+12+12+6 = 60 utils). Total utility = 120 utils.

Equilibrium check: At last units, $MU_A = 4$, $MU_B = 6$. Because prices are equal, the per-rupee MUs are 4 and 6 – not exactly equal due to indivisibility. With continuous divisibility they would equalise.

Q.2 (b) Can the substitution effect be positive? Explain with the help of a diagram.

Answer:

Substitution Effect

The substitution effect is the change in quantity demanded of a good due to a change in its relative price, holding real income (utility) constant. It always moves **opposite** to the price change: when price falls, quantity demanded rises; when price rises, quantity demanded falls. Hence it is **always negative** (or zero) – i.e., price and quantity move in opposite directions.

Can it be positive? No.

In standard consumer theory, the substitution effect **cannot be positive** because:

- It operates along the same indifference curve (constant utility).
- The indifference curve is convex to the origin, implying a diminishing marginal rate of substitution.

- The compensated (Hicksian) demand curve is always downward sloping, so price and quantity change in opposite directions.

Giffen goods show a positive total price effect (price up, quantity up), but that happens because the **negative income effect** outweighs the negative substitution effect. The substitution effect itself remains negative.

Diagrammatic Explanation

(Draw in your answer book)

- **X-axis:** Quantity of good X
- **Y-axis:** All other goods (Y)
- **Initial budget line** AB, tangent to indifference curve IC_1 at point E_1 → consumer buys OX_1 of X.
- **Price of X falls** → new budget line AB′ (flatter), tangent to higher IC_2 at E_2 → buys OX_2 of X.
- **Total change** = $OX_2 - OX_1$.

To isolate substitution effect:

- Draw a hypothetical budget line A′B′′ **parallel to AB′** but tangent to original IC_1 at E_3.
- Movement from E_1 to E_3 along IC_1 = substitution effect. Because the relative price of X fell, the consumer buys more X ($OX_3 - OX_1 > 0$).

Sign convention:

- Price fall → quantity increase = negative relationship. So substitution effect is **negative** in the sense of the price-quantity relationship.
- If price rose, the movement along IC_1 would reduce quantity – again negative.

Thus the substitution effect **cannot be positive** (it never reinforces a price increase by increasing demand). It is always ≤ 0.

Q.3 (a) What is meant by elasticity of demand and supply? Write down the formulas of point and arc-elasticity.

Answer:

Elasticity of Demand

It measures the responsiveness of quantity demanded to a change in a determinant (price, income, etc.).

Price elasticity of demand (Ed):

$$E_d = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in price}} = \frac{\Delta Q/Q}{\Delta P/P} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

Other elasticities:

- Income elasticity: $E_y = \frac{\Delta Q}{\Delta Y} \times \frac{Y}{Q}$
- Cross elasticity: $E_{xy} = \frac{\Delta Q_x}{\Delta P_y} \times \frac{P_y}{Q_x}$

Elasticity of Supply

Price elasticity of supply (Es):

$$E_s = \frac{\%\text{ change in quantity supplied}}{\%\text{ change in price}} = \frac{\Delta Q_s}{\Delta P} \times \frac{P}{Q_s}$$

Point Elasticity

Measures elasticity at a single point on the curve.
For demand: $E_d = \frac{dQ}{dP} \times \frac{P}{Q}$ (using derivative).

Geometric method (linear curve):
On a linear demand curve, at any point M:
$E_d = \frac{\text{lower segment}}{\text{upper segment}} = \frac{MB}{MA}$ (where M divides the curve into two segments).

For supply: $E_s = \frac{dQ_s}{dP} \times \frac{P}{Q_s}$.

Geometric method:

- If supply curve passes through origin → $E_s = 1$
- If it meets price axis before origin → $E_s > 1$
- If it meets quantity axis before origin → $E_s < 1$

Arc Elasticity

Measures elasticity over a finite range between two points. **Midpoint formula** (avoids dependence on start/end point):

$$E_d^{arc} = \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2} \div \frac{P_2 - P_1}{(P_1 + P_2)/2} = \frac{Q_2 - Q_1}{Q_2 + Q_1} \times \frac{P_2 + P_1}{P_2 - P_1}$$

Same formula for arc elasticity of supply.

Q.3 (b) Given the supply and demand equations: Estimate (i) Equilibrium price and quantity (ii) Elasticities of demand and supply at the equilibrium position.

Note: The assignment question does **not** provide specific equations. In a real exam, numbers would be given. For demonstration, I assume the following equations:

$$\begin{aligned} \text{Demand:} \quad & Q_d = 100 - 2P \\ \text{Supply:} \quad & Q_s = -20 + 4P \end{aligned}$$

(i) Equilibrium price and quantity

At equilibrium: $Q_d = Q_s$

$$100 - 2P = -20 + 4P$$

$$100 + 20 = 4P + 2P$$

$$120 = 6P$$

$$P^* = 20$$

Substitute into demand:

$$Q^* = 100 - 2(20) = 100 - 40 = 60$$

Answer: Equilibrium price = ₹20, equilibrium quantity = 60 units.

(ii) Elasticities at equilibrium

Point elasticity of demand:

$$E_d = \frac{dQ_d}{dP} \times \frac{P}{Q}$$

$$\frac{dQ_d}{dP} = -2$$

$$E_d = (-2) \times \frac{20}{60} = -2 \times \frac{1}{3} = -\frac{2}{3} \approx -0.67$$

Interpretation: Demand is inelastic ($|E_d| < 1$).

Point elasticity of supply:

$$E_s = \frac{dQ_s}{dP} \times \frac{P}{Q}$$

$$\frac{dQ_s}{dP} = 4$$

$$E_s = 4 \times \frac{20}{60} = 4 \times \frac{1}{3} = \frac{4}{3} \approx 1.33$$

Supply is elastic.

If your assignment provides different equations, substitute them into the same procedure. For example, if demand is $Q_d = a - bP$ and supply $Q_s = -c + dP$, then:

- Equilibrium: solve $a - bP = -c + dP \Rightarrow P^* = \frac{a+c}{b+d}$, $Q^* = a - bP^*$
- $E_d = -b \times \frac{P^*}{Q^*}$, $E_s = d \times \frac{P^*}{Q^*}$

Q.4 What is meant by fixed and variable cost? Differentiate among fixed, variable and total cost with the help of a table and diagram.

Answer:

Definitions

- **Fixed cost (FC)**: Costs that do not change with the level of output in the short run (e.g., rent, insurance, salaries of permanent staff). FC > 0 even when output = 0.
- **Variable cost (VC)**: Costs that vary directly with output (e.g., raw materials, wages of production workers). VC = 0 when output = 0.
- **Total cost (TC)**: Sum of fixed and variable costs: $TC = TFC + TVC$.

Table: Cost behaviour (example with TFC = ₹500)

Output (Q)	TFC (₹)	TVC (₹)	TC (₹)	AFC (₹)	AVC (₹)	ATC (₹)	MC (₹)
0	500	0	500	–	–	–	–
1	500	100	600	500	100	600	100
2	500	180	680	250	90	340	80
3	500	240	740	166.67	80	246.67	60
4	500	320	820	125	80	205	80
5	500	420	920	100	84	184	100
6	500	540	1040	83.33	90	173.33	120
7	500	700	1200	71.43	100	171.43	160
8	500	900	1400	62.50	112.5	175	200

Observations:

- TFC constant.
- TVC increases: first at decreasing rate (increasing returns), then at increasing rate (diminishing returns).
- TC = TFC + TVC, same shape as TVC but shifted upward.
- AFC continuously falls.
- AVC and ATC are U-shaped; MC cuts them at their minimum points.

Diagrams (describe for drawing)

Diagram 1: Total cost curves

- X-axis: Output (Q); Y-axis: Cost (₹)

- **TFC**: horizontal line at ₹500.
- **TVC**: starts at origin, rises slowly at first (concave), then steeply (convex).
- **TC**: parallel to TVC, starts at ₹500.

Diagram 2: Average & marginal cost curves

- X-axis: Output; Y-axis: Cost per unit (₹)
- **AFC**: downward sloping rectangular hyperbola.
- **AVC**: U-shaped.
- **ATC**: U-shaped, above AVC by AFC.
- **MC**: U-shaped, intersects AVC and ATC at their minima.

Differentiation table

Feature	Fixed Cost	Variable Cost	Total Cost
Change with output	Constant	Changes proportionally or non-linearly	Increases with output
At zero output	Positive (> 0)	Zero	Equal to fixed cost
Shape of total curve	Horizontal line	Inverse S-shape (first concave, then convex)	Same as TVC but shifted up by TFC
Per-unit behaviour	AFC falls continuously	AVC is U-shaped	ATC is U-shaped
Controllability (short run)	Fixed contract, not easily changed	Controllable by changing production	Partially controllable
Long run	Becomes variable	Still variable	All costs variable

Q.5 Write a note on the following:

(a) Adam Smith's definition of economics

Adam Smith (1776) – *"An Inquiry into the Nature and Causes of the Wealth of Nations"* – defined economics as the **science of wealth**. He focused on:

- **Production of wealth** (division of labour, capital accumulation, free markets).
- **Causes of wealth** (self-interest, competition, "invisible hand").
- **Laissez-faire** policy.

Criticism:

- Materialistic – ignored non-material welfare.
- No mention of scarcity or choice.
- Assumed full employment – ignores economic fluctuations.
- Neglected distribution and poverty.

Legacy: Established economics as a separate discipline; laid foundation for classical school.

(b) Demand curve in the case of a normal good

A **normal good** is one for which demand increases when income rises (positive income elasticity).

Demand curve shape: Downward sloping (law of demand).

- **Substitution effect** (price ↓ → quantity ↑) and **income effect** (price ↓ → real income ↑ → quantity ↑) both work in the same direction.
- Therefore the demand curve is smoothly downward sloping.

Diagram: X-axis = Quantity, Y-axis = Price; curve D slopes down.

- Shift factors: increase in income → D shifts right; decrease → shifts left.

Comparison:

- Inferior good: negative income effect (demand curve still downward sloping but flatter?). Actually, inferior good's demand curve is still downward sloping because substitution effect dominates except for Giffen goods.
- Giffen good: upward sloping demand curve (rare).

(c) Is the income effect always positive?

No. The income effect can be positive, negative, or zero.

- **Positive income effect** (normal goods): Real income ↑ → quantity demanded ↑.
- **Negative income effect** (inferior goods): Real income ↑ → quantity demanded ↓.
- **Zero income effect** (neutral goods): Quantity demanded does not change with income (e.g., salt for a typical consumer).

Example (negative income effect):
Low-quality rice (inferior good). When consumer's income rises, he buys less low-quality rice and more premium rice. For a price fall of low-quality rice:

- Substitution effect → increase quantity.
- Income effect (real income ↑) → decrease quantity (negative).
  If income effect is strong enough (Giffen case), total effect could be positive (price down, quantity down) → upward sloping demand.

  Thus income effect is **not always positive**; it depends on the nature of the good.

(d) Production and total cost

Production = transformation of inputs (land, labour, capital, entrepreneurship) into output.
Production function: $Q = f(L, K)$.

Total cost = minimum money cost to produce a given output, given input prices:
$TC = wL + rK$ (where w = wage, r = rental rate).

Relationship:

- From production function we derive the **total cost curve**.
- Shape of TC reflects **returns to scale** (or law of variable proportions in short run).

Short-run (labour variable, capital fixed):

$$MC = \frac{\Delta TC}{\Delta Q} = \frac{w}{\mathrm{MP}_L}$$

- When MP_L rises → MC falls.
- When MP_L falls → MC rises.

Long-run (all factors variable):

- Increasing returns to scale → TC increases less than proportionally → LRAC falling.
- Constant returns → TC proportional → LRAC constant.
- Decreasing returns → TC more than proportional → LRAC rising.

Conclusion: Production and total cost are two sides of the same coin; minimising cost for a given output is the dual problem of maximising output for a given cost.