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 2

Q.1 What is meant by market equilibrium? Also, discuss in detail the relationship between market equilibrium and time.

Answer:

Market Equilibrium

Market equilibrium occurs at the price where **quantity demanded equals quantity supplied**. At that price, there is no tendency to change – the market clears.

Mathematically: $Q_d(P) = Q_s(P)$.

Disequilibrium:

- Excess demand (shortage): $Q_d > Q_s$ → price rises.
- Excess supply (surplus): $Q_s > Q_d$ → price falls.

Relationship between Market Equilibrium and Time (Marshall's Period Analysis)

Alfred Marshall introduced **time elements** because adjustment speed affects equilibrium. He distinguished four periods:

1. ***Market (Very Short Run) Period***

- Supply is perfectly **inelastic** (fixed stock, perishable goods like fish, vegetables).
- Price determined solely by demand.
- **Example:** Daily fish market. Supply is whatever is caught; price adjusts to clear the stock.
- Diagram: Vertical supply curve, demand curve shifts determine price.

2. ***Short Run Period***

- Some factors are fixed (plant, equipment), but variable inputs can be changed.
- Supply is **somewhat elastic** (but not fully flexible).

- Firms can increase output by adding labour and raw materials, but capacity is limited.
- Equilibrium price is higher than long-run price if demand increases, because short-run supply is less elastic.

3. ***Long Run Period***

- All factors are variable – firms can enter/exit, expand plant size.
- Supply is **more elastic** than in short run.
- In competitive markets, long-run equilibrium occurs where price = minimum average total cost (normal profit).
- Entry of new firms eliminates excess profits.

4. ***Secular (Very Long Run) Period***

- Technology, population, capital stock, and even natural resources can change.
- Supply curve can shift over time due to innovation, resource discovery.
- Equilibrium evolves gradually.

Summary table:

Time Period	Supply Elasticity	Key Feature	Equilibrium Adjustment
Market (VSR)	Perfectly inelastic	Fixed stock, perishable	Price clears existing stock
Short run	Low elasticity	Fixed capacity	Price > long-run price (if demand ↑)
Long run	High elasticity	Free entry/exit	Price = min ATC (zero economic profit)
Secular	Variable	Technology, population change	Shifting equilibrium over time

Conclusion: The concept of equilibrium is not static; it depends crucially on the time allowed for adjustment. Marshall's period analysis shows that the same market mechanism leads to different equilibrium prices and quantities in different time frames.

Q.2 Explain the three forms of equilibrium of a firm under monopoly with the help of diagrams in the short run.

Answer:

A monopoly is a single firm facing the **market demand curve** (downward sloping). In the short run, the monopolist has fixed plant size and maximises profit where **MR = MC**. The three forms refer to **profit outcomes**: supernormal profit, normal profit, or loss (but continuing production if revenue covers variable cost).

Assumptions

- Single seller, no close substitutes.
- Barriers to entry exist (but short run, no entry anyway).
- Demand curve downward sloping → MR < Price.
- Short run: at least one fixed factor.

General profit maximization condition

$$MR = MC$$

$$\text{Profit} = (P - ATC) \times Q$$

Three forms of equilibrium

1. Supernormal profit (positive economic profit)

- **Condition:** At equilibrium output Q^*, $P > ATC$.
- **Diagram description:**
  - Draw downward sloping demand (D = AR) and MR below it.
  - Draw U-shaped MC and ATC.
  - MR = MC determines Q^*. From Q^* go up to demand curve to get P^*.
  - At Q^*, ATC is below P^*.
  - Profit rectangle = $(P^* - ATC) \times Q^*$.
- **Interpretation:** Monopolist earns above-normal profit even in short run; in long run, barriers prevent entry so profit persists.

2. Normal profit (zero economic profit)

- **Condition:** $P = ATC$ at equilibrium Q^* (where MR = MC).
- **Diagram:** The demand curve touches the ATC curve at the profit-maximising quantity. Price equals average total cost, so no excess profit or loss.
- **Interpretation:** Monopolist covers all costs, including opportunity cost of capital. May occur if demand is weak or costs are high.

3. Loss (but continue producing in short run)

- **Condition:** $AVC < P < ATC$ at Q^* (MR = MC). Price is above AVC but below ATC.
- **Diagram:** Demand curve lies below ATC but above AVC at Q^*. The loss = $(ATC - P) \times Q^*$. Because $P > AVC$, the firm covers variable costs plus some fixed costs, so it is better to produce than shut down (shutdown point is P = minimum AVC).
- **Interpretation:** Monopolist may incur losses in short run due to high fixed costs or low demand, but will continue as long as variable costs are covered. In long run, it will exit if losses persist.

Shutdown rule: If $P < \min AVC$, produce zero output (shut down).

Diagrams (describe for drawing)

All three diagrams share the same axes (Quantity on X; Price, Cost, Revenue on Y). Draw:

- D = AR (downward sloping)
- MR (downward sloping, twice as steep as AR)
- MC (U-shaped)
- ATC (U-shaped)
- AVC (optional, for loss case)

Diagram for supernormal profit: Mark Q^* at MR=MC; P^* on D above ATC; shaded profit rectangle.

Diagram for normal profit: P^* touches ATC at Q^*.

Diagram for loss: P^* between AVC and ATC; shaded loss rectangle.

Q.3 Define land and discuss its importance and characteristics. Also, write a note on the mobility of land.

Answer:

Definition of Land

In economics, **land** includes all natural resources that are used in production. It is not just the surface of the earth but also:

- Minerals, oil, gas
- Forests, water resources
- Climate, wind, solar energy
- Space (for satellites, etc.)

Classical definition (Ricardo): Land is "the original and indestructible powers of the soil."

Importance of Land

1. **Primary factor of production** – without land, no production.
2. **Source of raw materials** (agriculture, mining, forestry).
3. **Provides space** for factories, offices, housing, transport.
4. **Basis for food production** – essential for human survival.
5. **Environmental services** – climate regulation, water cycle, biodiversity.
6. **Store of value** – land ownership is a form of wealth.
7. **Collateral for loans** – used in credit markets.

Characteristics of Land

Characteristic	Explanation
Free gift of nature	Land is not produced by human effort; it exists naturally.
Fixed supply (geographically)	Total quantity of land is fixed (though reclamation can marginally increase usable land).
No cost of production	Land has no supply price; its price is demand-determined (Ricardian rent).

Characteristic	Explanation
Imperishable (indestructible)	Land cannot be destroyed (though its fertility can be degraded).
Immobile (geographically)	Physical location cannot be changed (but ownership can change).
Varying fertility / productivity	Different plots have different productive capacities.
Subject to diminishing returns	Intensive cultivation beyond a point yields lower extra output.
Multiple uses	Can be used for agriculture, industry, housing, recreation, etc.

Mobility of Land

Geographical (spatial) mobility: Zero / negligible

- Land cannot be moved from one place to another.
- However, **land use** can change (e.g., farmland converted to urban use).

Occupational mobility: High

- The same piece of land can be switched between different uses (agriculture → factory → housing).
- Mobility of land **use** depends on legal restrictions, soil quality, location, etc.

Transfer mobility (ownership): High

- Ownership of land can be transferred through sale, lease, inheritance.
- Financial markets allow land to be bought and sold easily (title deeds, registration).

Note on international mobility: Land itself cannot move across countries, but **land rights** can be owned by foreign entities (foreign direct investment in real estate).

Conclusion: Land is a unique factor due to its natural origin and fixed supply. While physically immobile, its use and ownership are mobile. This immobility gives rise to economic rent and location value.

Q.4 What are the laws of return? Also, explain the law of increasing returns to scale with the help of a table and diagram.

Answer:

Laws of Return

The laws of return describe the input-output relationship in production. They are divided into:

1. **Short-run laws (Law of Variable Proportions / Diminishing Returns)** – at least one factor fixed.
   - Increasing returns (stage I)
   - Diminishing returns (stage II)
   - Negative returns (stage III)
2. **Long-run laws (Returns to Scale)** – all factors variable.
   - **Increasing returns to scale (IRS)** – output increases more than proportionately.
   - **Constant returns to scale (CRS)** – output increases proportionately.
   - **Decreasing returns to scale (DRS)** – output increases less than proportionately.

Law of Increasing Returns to Scale (IRS)

Definition: When all inputs are increased by a given proportion, output increases by a **greater proportion**. For example, doubling all inputs more than doubles output.

Causes of IRS:

- **Economies of scale** (specialisation, indivisibilities, dimensional economies like doubling pipeline radius increases flow fourfold).
- **Better management** and division of labour.
- **Technical economies** (use of large, efficient machines).
- **Financial economies** (lower interest rates for large firms).
- **Marketing economies** (bulk buying, advertising spread).

Explanation with a Table

Assume a production function $Q=f(L,K)$. We increase both L and K by the same factor.

Combination	Labour (L)	Capital (K)	% increase in inputs	Output (Q)	% increase in output	Returns to scale
A	1	1	–	10	–	–
B	2	2	100%	25	150%	Increasing
C	4	4	100% (from B)	70	180%	Increasing
D	8	8	100%	210	200%	Increasing

Note: The percentage increase in output exceeds the percentage increase in inputs in each step.

Diagram (Isoquant map)

Draw:

- X-axis: Labour (L); Y-axis: Capital (K).
- Draw isoquants Q=10, Q=25, Q=70, Q=210.
- Draw a ray from origin (representing proportional input increases).
- The distance between successive isoquants along the ray **decreases** for IRS (meaning less additional inputs are needed to get a given output increase – actually careful: For IRS, moving from Q=10 to Q=25 requires a certain input increase. For a constant returns firm, doubling inputs would give Q=20, but here with same input increase (2L,2K) we get Q=25 > 20. So isoquants become closer together along the ray? Let's clarify: If returns are increasing, to increase output by a given percentage, you need a less-than-proportional increase in inputs. So the isoquants get **closer** together as output rises. That is, the distance between Q=10 and Q=25 is smaller than the distance between Q=5 and Q=10.)

Alternatively, draw total product curve (in long run, all factors variable) with output on Y and a composite input (e.g., capital-labour bundle) on X. IRS shows a convex (bowed upward) curve – slope increases as input increases.

Numerical example (Cobb-Douglas with IRS):

$Q = L^{0.6}K^{0.6}$ → sum of exponents = 1.2 > 1 → IRS.

If L and K double: $Q' = (2L)^{0.6}(2K)^{0.6} = 2^{1.2}L^{0.6}K^{0.6} = 2^{1.2}Q \approx 2.297Q$ (more than double).

Q.5 What is a function? Discuss types of functional relationships. Also, write a note on the graphical representation of functions.

Answer:

Definition of a Function

A function is a mathematical relationship between two or more variables such that for each value of the independent variable(s), there is **exactly one** value of the dependent variable.

$$Y = f(X_1, X_2, \ldots, X_n)$$

- **Dependent variable (Y)** – its value is determined by the function.
- **Independent variable(s) (X_i)** – causal factors.

Example in economics:
Demand function: $Q_d = f(P, Y, P_s, T, \ldots)$

Types of Functional Relationships

1. Based on number of independent variables

- **Univariate function:** $Y = f(X)$ e.g., $C = a + bY$ (consumption depends on income).
- **Multivariate function:** $Y = f(X_1, X_2, \ldots, X_n)$ e.g., production function $Q = f(L, K)$.

2. Based on form of relationship

Type	General form	Example	Economic application
Linear	$Y = a + bX$	$Q_d = 100 - 2P$	Simple demand/ supply
Quadratic	$Y = a + bX + cX^2$	TC = 100 + 10Q + 2Q²	Short-run cost
Cubic	$Y = a + bX + cX^2 + dX^3$	Typical cost function	Long-run cost
Power (Cobb-Douglas)	$Y = AX_1^{\alpha}X_2^{\beta}$	$Q = AL^{\alpha}K^{\beta}$	Production, utility
Exponential	$Y = ae^{bX}$	Growth models	Population, compound interest
Logarithmic	$Y = a + b\ln X$	Utility of wealth	Diminishing marginal utility
Inverse	$Y = a/X$	Price elasticity	Rectangular hyperbola demand

3. Based on direction

- **Direct (positive) relationship:** X ↑ → Y ↑ (e.g., consumption & income).
- **Inverse (negative) relationship:** X ↑ → Y ↓ (e.g., price & quantity demanded).

Graphical Representation of Functions

A function is represented by a **curve** (or line) on a coordinate system.

Rules:

- Independent variable(s) on X-axis; dependent on Y-axis (for 2D).
- For multivariate functions, we use **iso-curves** (indifference curves, isoquants) holding other variables constant (ceteris paribus).

Examples of graphs:

1. **Linear function** $Y = a + bX$: straight line.
   - If $b > 0$: upward sloping.
   - If $b < 0$: downward sloping.
   - Intercept = a, slope = b.
2. **Quadratic (U-shaped or inverted U)**: e.g., AVC curve – minimum point.
3. **Cubic (S-shaped)**: e.g., total product curve (stage I, II, III).
4. **Power function** (log-log): becomes linear if both axes are logarithmic.
5. **Isoquant** (two independent variables): contour lines showing constant output.

Important points:

- Slope of a function at a point = derivative (marginal concept).
- Area under curve = integral (total concept).
- Ceteris paribus: when graphing a bivariate relation, we assume all other variables constant. Shifts of the curve occur when those other variables change.

Conclusion: Functions are the language of economic modelling. Choosing the right functional form (linear vs non-linear) depends on the underlying behaviour being described. Graphical representation makes abstract relationships intuitive, especially for analysing marginal changes and equilibrium.