TOPIC 1.2

Types of Cost, Revenue and Profit, Short-run and Long-run Production

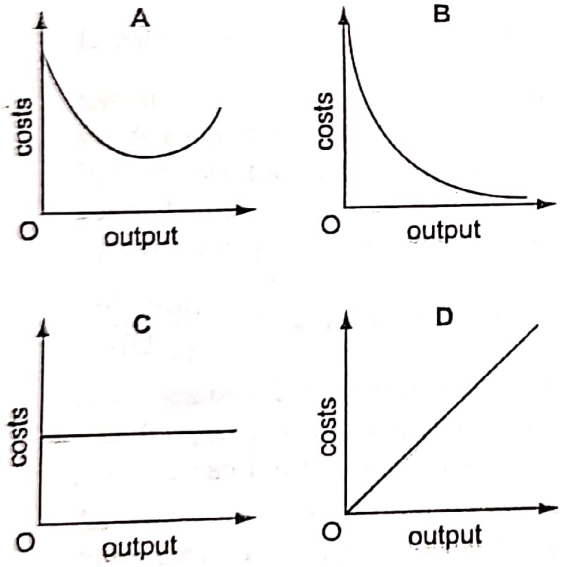
MCQ Section

1. What is the name for the relationship between a firm's output and the quantities of factor inputs that it employs?

   A a long-run production function
   B a long-run average cost function
   C productive efficiency
   D returns to scale

   [J08/P3/Q6]

2. Which diagram shows a firm's total fixed cost curve?



   [J08/P3/Q7]

3. What explains why both large and small firms are often found within the same industry?

   A There are significant barriers to the entry of new firms into the industry.
   B Firms that assemble the final product buy component parts from other specialist firms.
   C Production is subject to diseconomies of scale.
   D All firms in the industry produce identical products.

   [J08/P3/Q8]

4. Which statement explains why labour is subject to the law of diminishing returns in the short run?

   A As additional workers are hired, total output decreases.
   B As employment increases, the capital-labour ratio falls.
   C As employment increases, wage rates will have to be increased.
   D As output increases, eventually diseconomies of scale will occur.

   [N08/P3/Q4]

5. When a firm increases all its inputs by 300 %, its output increases by 200 %.

   What does this illustrate?

   A the law of diminishing returns
   B increasing returns to scale
   C diseconomies of scale
   D the law of variable proportions

   [N08/P3/Q7]

6. The table shows the production of a firm.

production (tonnes)	total cost ($)
0	20
1	30
2	35
3	40
4	45
5	50

HELPS to MCQ

1. **A** Production function shows how output will be affected by changes in the quantity of one or more of the inputs.

2. **C** Total fixed cost is independent of the level of output.

3. **B** Small firms exist because they supply parts of the products produced by large firms at low cost.

4. **B** In the short run, as more workers are applied to a fixed amount of capital the ratio with which the two inputs are combined decreases and gives way to diminishing returns. Option **A** is incorrect because total may be rising but at a decreasing rate. Option **C** does not necessarily happen and **D** suggests long run.

5. **C** All inputs increase in the long run. Hence, options **A** and **D** are incorrect as both suggest short run. The percentages given in the statement suggest decreasing returns to scale (diseconomies of scale) where a given percnetage increase in inputs results in a smaller % increase in output. Although option **B** indicates long run but is incorrect in the given situation.

What is the average variable cost of producing 5 tonnes of output?

A $4.00 B $5.00
C $6.00 D $10.00

[N08/P3/Q8]

7. An economist calculates that a firm has incurred the following costs over the course of a year.

	$(000)
wages and salaries	150
opportunity cost of owner's time	40
materials	80
rent	30
marketing fees	20
interest on bank loans	25
interest forgone on finance provided by owner	15

By how much does total cost as defined by an economist exceed the total cost as defined by an accountant?

A $15 000 B $40 000
C $55 000 D $85 000

[J09/P3/Q5]

8. A manufacturing firm has one plant of optimum size.

The firm builds a second plant identical to its first plant. The firm then finds that its long-run average cost has risen.

What could account for the change in its long-run average cost?

A diminishing returns
B external diseconomies of scale
C managerial diseconomies of scale
D technical diseconomies of scale

[J09/P3/Q6]

9. Which statement describes a situation in which a rise in input of factor X, all other factors being constant, results in no change in a firm's output?

A There are diminishing returns to factor X.
B Returns to scale are constant.
C There are diseconomies of scale.
D The marginal product of X is zero.

[N09/P3/Q3]

10. The table shows the inputs of the two factors of production, capital and labour, needed to produce varying levels of output.

output	capital	labour
100	5	10
200	8	16
300	14	28
400	20	40
500	26	52

Over which output range do increasing returns to scale occur?

A 100 to 200 B 200 to 300
C 300 to 400 D 400 to 500

[N09/P3/Q8]

HELPS to MCQ

6. **C** Total cost = fixed cost + variable cost. Fixed cost is located at zero output.

Fixed costs = 20, hence 50 − 20 = 30.

$AVC = \frac{VC}{Q}$ i.e. $6 = \frac{30}{5}$

7. **C** Accountants do not recognize implicit cost.

	Economist's cost $(000)	Accountant's cost $(000)
wages and salaries (explicit cost)	150	150
opportunity cost of owner's time (implicit cost)	40	–
materials (explicit cost)	80	80
rent (explicit)	30	30
marketing fees (explicit cost)	20	20
interest on bank loans (explicit)	25	25
interest forgone on finance provided by owner (implicit cost)	15	–
	360	305

8. **C** Increase in the number of plants might make it difficult to co-ordinate planning, marketing, production and so on, causing the firm's LRAC to rise. Option A suggests short run production function whereas option B indicates rising per unit cost due to the growth of industry. Option D relates to the change in technology.

9. **D** No change in TP indicates that MP = 0. Diminishing returns suggests that TP increases at a decreasing rate i.e. MP decreases, hence option A is incorrect. Options B and C suggest long run and the situation given in the question indicates short run.

11. The schedule shows the short-run marginal cost of producing good X.

units of X	1	2	3	4	5
marginal cost ($)	40	30	30	60	120

Given that the total fixed cost is $20, what level of output minimises average total cost?

A 2 units **B** 3 units
C 4 units **D** 5 units

[J10/P3/Q6]

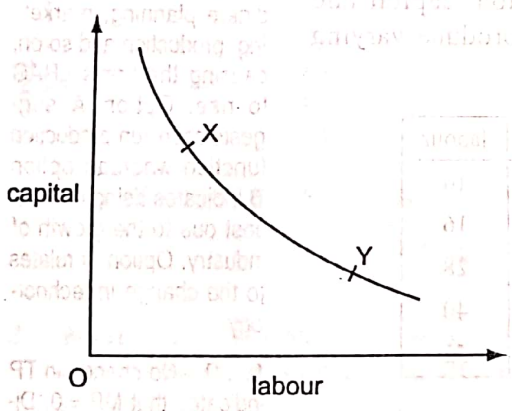
12. Which is an example of an external diseconomy?

A difficulties in co-ordinating activities in a large organisation
B difficulties in motivating workers in a large organisation
C higher transport costs as a firm's market expands
D increased traffic congestion as industries expand

[J10/P3/Q7]

13. In the diagram, the curve shows the various combinations of labour and capital that can be employed to produce a given level of output.

A firm chooses the combination of labour and capital shown by point X on the curve.

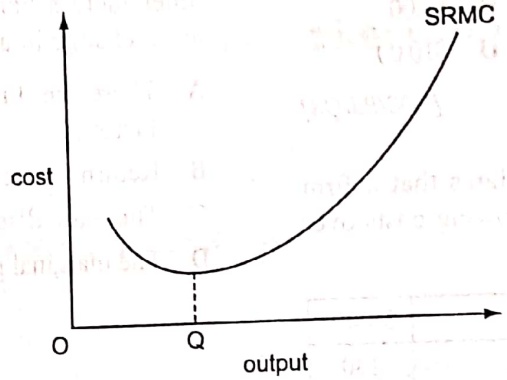


What could explain why the firm later chooses the combination of labour and capital shown by point Y?

A an increase in capital productivity
B an increase in interest rates
C an increase in labour productivity
D an increase in wage rates

[N10/P3/Q5]

14. The diagram shows a firm's short-run marginal cost curve.

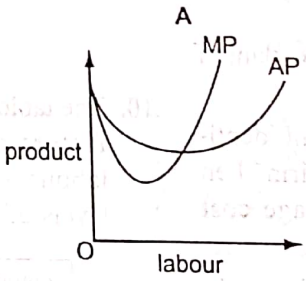


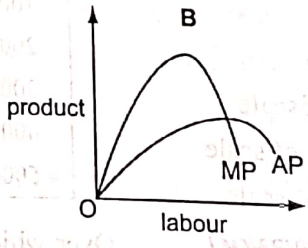
What explains why the curve is upward sloping at output levels above OQ?

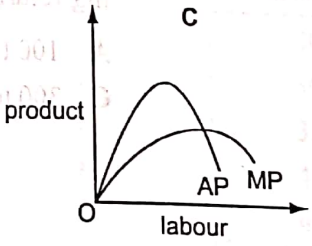
A diseconomies of scale
B inelasticity of supply
C rising fixed costs
D the law of variable proportions

[N10/P3/Q8]

15. Which diagram correctly shows the relationship between the average product (AP) and the marginal product (MP) of labour given that the quantities of other factor inputs remain constant?







HELPS to MCQ

10. A

% change in inputs	% change in output
60	100
75	50
42.8	33
30	25

Increasing returns to scale is when % change in inputs is smaller than % change in output.

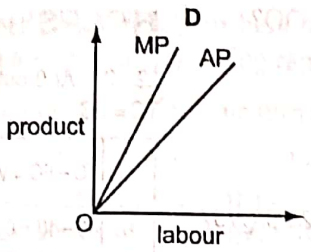
11. B

Unit of x	MC	TC	ATC
0	-	20	-
1	40	60	60
2	30	90	45
3	30	120	40
4	60	180	45
5	120	300	60

12. D An external diseconomy is the direct consequence of growth of industry. Options **A, B & C** refer to internal diseconomies.

13. B Interest rate is the price of capital. Thus a rise in interest rate would encourage firms to substitute capital with labour.

14. D Law of variable proportions (diminishing returns) suggests that a fall in returns (MP) to the variable factor causes SRMC to rise. Dis-economies of scale are related to LRMC hence **A** is incorrect. Elasticity of supply determines slope of SRMC while change in fixed cost does not affect SRMC.



[J11/P3/Q4]

16. What is the name for the relationship between a firm's output and the quantities of factor inputs that it employs?

A a long-run average cost function
B a long-run production function
C productive efficiency
D returns to scale

[J11/P3/Q5]

17. The table shows the levels of output of a good which can be produced with different combinations of labour and capital.

capital (number of machines)	labour (number of workers)	output (units)
2	6	100
2	7	106
2	8	108
4	12	200

Which characteristic of the production function for this good does the table show?

A a fixed ratio between capital and labour inputs
B constant returns to scale
C increasing marginal productivity of labour
D technical economies of scale

[N11/P3/Q7]

18. The short-run total costs (SRTC) of a firm are given by the formula

$SRTC = \$(10000 + 5X^2)$ where X is the level of output.

What are the firm's average fixed costs?

A \$10000 **B** $\frac{\$(10000+5X^2)}{X}$

C $\frac{\$10000}{X}$ **D** $\frac{\$10000}{5X^2}$

[N11/P3/Q8]

19. What would be most likely to constrain a firm's ability to grow?

A the increased difficulty faced by the firm in marketing its product
B the increased risks arising from product diversification
C the increasing costs of distributing goods from a given location
D the increased difficulties faced by the management in coordinating production

[N11/P3/Q9]

20. A firm experiences diseconomies of scale over its entire range of output.

What is the shape of its long-run average cost curve?

A It is horizontal.
B It is 'U' shaped.
C It slopes downwards.
D It slopes upwards.

[J12/P3/Q5]

21. Which is a financial economy of scale?

A lower costs in raising capital
B lower costs of marketing
C lower risk due to diversification
D lower variable costs of production

[J12/P3/Q6]

22. The table shows a firm's total costs of production.

production (tonnes)	total cost (\$)
0	40
1	60
2	70
3	80
4	90
5	100

What is the average variable cost of producing 5 tonnes of output?

A \$8.00 **B** \$10.00
C \$12.00 **D** \$20.00

[J12/P3/Q7]

HELPS to MCQ

15. B The typical relationship between the two curves can be summarized as;

- When AP curve rises MP curve remains above AP.
- The two curves intersect at the highest point of the AP.
- When AP curve falls MP curve remains below AP.

16. B A long run production function reflects the relationship between a firm's output and quantities of factor inputs that it employs.

17. B A firm is subject to constant returns to scale if both its inputs and output change with the same proportion. In the table increase in inputs = 100%. Note that number of machines rises from 2 to 4 while number of workers increases from 6 to 12. Increase in output = 100% i.e. 100 to 200.

18. C In a total cost function the constant value represents FC and AFC = FC/Q.

19. D Managerial diseconomies result in a higher per unit cost, therefore, constrains a firm's ability to grow.

20. D Diseconomies of scale cause LRAC curve to slope upward.

21. A Financial economy refers to a large firm being able to raise capital at lower costs.

23. An economist calculates that a firm has incurred the following costs over the course of a year.

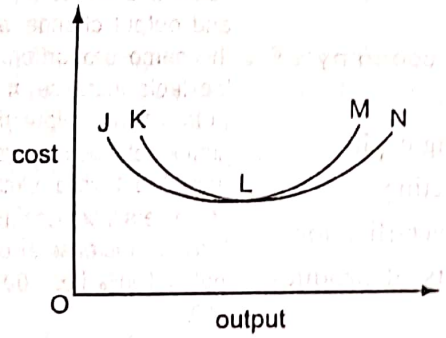
	$(000)
wages and salaries	150
opportunity cost of owner's time	35
materials	80
rent	30
marketing fees	20
interest on bank loans	25
interest forgone on finance provided by owner	10

By how much does total cost as defined by an economist exceed the total cost as defined by an accountant?

A $75 000 **B** $45 000
C $35 000 **D** $10 000

[J12/P3/Q8]

24. The diagram shows a firm's short-run and long-run average cost curves.

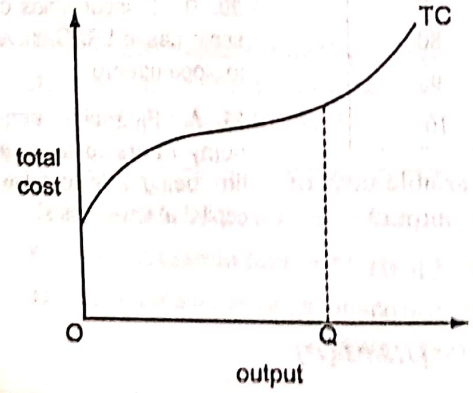


Which curve is the firm's long-run average cost curve?

A JLN **B** JLM
C KLM **D** KLN

[J12/P3/Q9]

25. The diagram shows a firm's short-run total cost curve (TC).



What is minimised at output OQ?

A average fixed cost
B average total cost
C average variable cost
D marginal cost

[J12/P3/Q13]

26. An economist calculates that an owner-managed firm has incurred the following costs over the course of a year.

	$(000)
wages of two employees	150
fee paid to wife for secretarial services	20
opportunity cost of owner's time	30
materials	80
rent	30
marketing fees	20
interest on bank loans	25
interest forgone on finance provided by owner	15

By how much does total cost as defined by an economist exceed the total cost as defined by an accountant?

A $15 000 **B** $30 000
C $45 000 **D** $65 000

[N12/P3/Q8]

27. A manufacturing firm has one plant of optimum size.

The firm builds a second plant identical to its first plant. The firm then finds that its long-run average cost has risen.

What could account for the change in its long-run average cost?

A diminishing returns
B external diseconomies of scale
C managerial diseconomies of scale
D technical diseconomies of scale

[N12/P3/Q9]

HELPS to MCQ

22. C At 0 output TC = FC

units	TC − FC = VC	AVC = VC/Q
0	40 − 40 = 0	-
1	60 − 40 = 20	20
2	70 − 40 = 30	15
3	80 − 40 = 40	13.3
4	90 − 40 = 50	12.5
5	100 − 40 = 60	12

23. B Accountants do not recognize implicit costs while economists recognize both implicit and explicit costs. In the table both the opportunity cost of owner's time and interest forgone on finances provided by owners are implicit costs and the rest are explicit costs.

24. A The graph depicts standard relationship between LRAC curve and LRMC curve. LRM curve remains below LRAC curve when LRAC curve decreases and remains higher when LRAC curve rises.

25. C At output OQ the slope from the origin on VC curve is the lowest i.e. lowest AVC.

26. C Accountants do not recognize implicit costs while economists recognize both explicit and implicit costs.

	accountants' costs	economists' cost
wages	150	150
fee paid to wife	20	20
cost of owner's time	-	30
materials	80	80
rent	30	30
marketing fee	20	20
interest on loan	25	25
interest forgone	-	15
	325	370

28. What is most likely to be associated with a firm that is growing rapidly?

A a high rate of labour turnover
B a low level of net investment
C a low percentage of profits paid as dividends to shareholders
D attainment of the necessary conditions for allocative efficiency

[N12/P3/Q10]

29. An economist calculates that a firm has incurred the following costs over the course of the year.

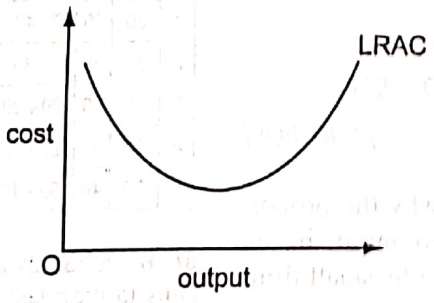
	$(000)
wages and salaries	150
opportunity cost of owner's time	40
materials	80
rent of buildings	30
marketing fees	20
interest on bank loans	25
interest forgone on finance provided by owner	15
depreciation of equipment	20

By how much would the economist's calculation of the total cost incurred by the firm exceed an accountant's calculation of the firm's total cost?

A $15 000 **B** $40 000
C $55 000 **D** $75 000

[J13/P3/Q7]

30. The diagram shows the long-run average cost curve of a firm which faces constant factor prices.



Which economic concepts in the table explain the shape of the LRAC curve?

	economies and diseconomies of scale	the law of diminishing returns	the law of variable proportions
A	✓	✓	✗
B	✓	✗	✗
C	✗	✓	✓
D	✗	✗	✓

[J13/P3/Q8]

31. Which feature of an economy would be most favourable for the survival of small firms?

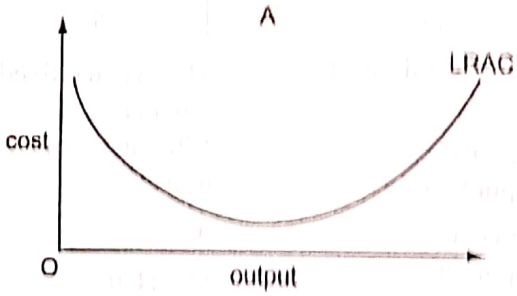
A capital intensive production
B economies of scale in production
C the presence of a stock exchange
D the widespread availability of bank lending

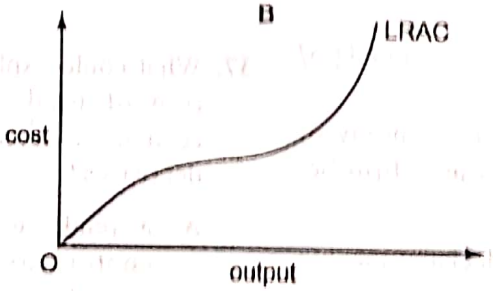
[J13/P3/Q9]

32. The table shows a firm's long-run total cost schedule.

output of goods per month	total cost (US$)
100	100
200	120
300	150
400	200

Which graph shows the shape of the firm's long-run average cost curve?





HELPS to MCQ

27. C Diminishing returns operates in the short run thus A is incorrect. External economies result from the growth of the industry, hence B is incorrect. Option D is irrelevant.

28. C Firms pay lower dividends because they need more finances in order to spend on their rapid growth.

29. C Accountants would not include opportunity cost of owner's time and interest forgone on finance provided by owners for these are implicit costs. However, economist would include them in their calculation of costs.

30. B Diminishing returns or variable proportions apply in the short run. LRAC depicts economies and diseconomies scale.

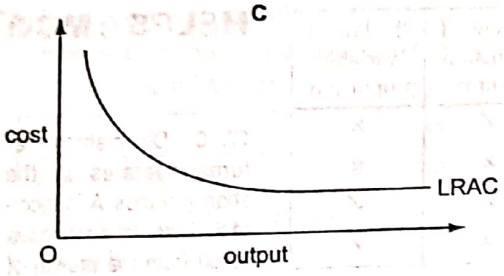
31. D Lack of finance is the major hindrance in survival of small firms. Options A, B & C favour large firms.

32. C

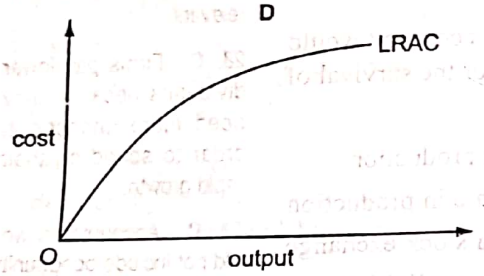
output	$\frac{TC}{Q} = AC$
100	$\frac{100}{100} = 1$
200	$\frac{120}{200} = 0.6$
300	$\frac{150}{300} = 0.5$
400	$\frac{200}{400} = 0.5$

LRAC first decreases and then becomes stable.

C

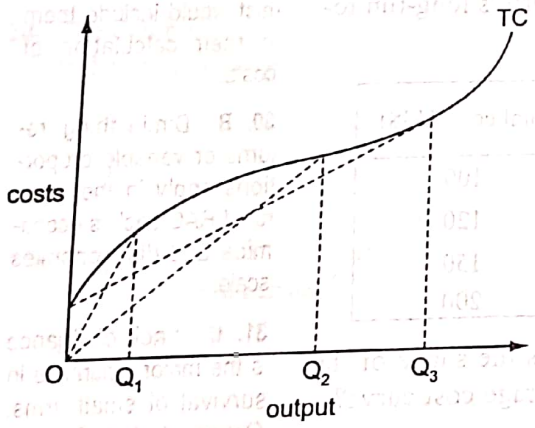


D



[N13/P3/Q7]

33. In the diagram, TC is a firm's short-run total cost curve.



Which statement is correct?

A Average total cost is minimised at output OQ_2.

B Average variable cost is minimised at output OQ_1.

C Average variable cost is minimised at output OQ_3.

D Marginal cost is minimised at output OQ_1.

[N13/P3/Q8]

34. What is an internal diseconomy of scale that often arises as a firm becomes larger?

A a more complex decision-making process

B an increase in the cost of raising finance for investment

C an increase in traffic congestion

D upward pressure on wages in the local labour market

[N13/P3/Q9]

35. The table gives information about a firm's costs over a given range of output in the short run and in the long run.

output (thousand)	21	22	23	24	25
short-run average cost ($)	20	19	18	17	16
long-run average cost ($)	12	13	14	15	16

Which conclusions can be drawn about the characteristics of production over this output range in the short run and in the long run?

	short run	long run
A	decreasing returns to scale	diminishing returns
B	economies of scale	diminishing returns
C	increasing returns	decreasing returns to scale
D	increasing returns	economies of scale

[J14/P3/Q7]

36. The table shows a firm's marginal costs.

output	marginal cost ($)
1	40
2	30
3	20
4	30
5	40

The average fixed cost of producing 5 units is $6.
What is the total cost of producing 5 units?

A $46 **B** $70

C $190 **D** $230

[J14/P3/Q9]

37. What could explain why the proportion of total employment in an economy accounted for by small firms decreases?

A a trend towards the use of sub-contractors to produce specialised components

B growing technical economies of scale in manufacturing

HELPS to MCQ

33. C At zero output TC = FC and VC = 0. Hence the origin point of VC is where TC curve intersects Y-axis. The slope of TC curve at Q_3 is the lowest from the origin point of VC, therefore AVC at Q_3 is the lowest.

34. A Complex decision-making process refers to managerial diseconomy. All other options are examples of external diseconomies.

35. C Decreasing SRAC suggests increasing returns while increasing LRAC indicates decreasing returns to scale. Options A & B are incorrect because long run is subject to returns to scale while diminishing returns operates in the short run.

36. C AFC × Q = TFC

Q	TFC	MC	TC
0	30	-	30+0=30
1	30	40	30+40=70
2	30	30	70+30=100
3	30	20	100+20=120
4	30	30	120+30=150
5	30	40	150+40=190

37. B EOS allow the firms to grow large and become cost effective thus account for existence of large firms. All other options account for the existence of small firms.

C growth of the service sector and a decline in manufacturing

D the opening up of specialist markets as real incomes rise

[J14/P3/Q10]

38. The table below shows the relationship between total output and total costs of a firm given constant factor prices and fixed factor proportions.

output	costs ($)
100	100
200	160
300	180
400	320
500	500

It follows that, over this range of output, the firm experiences

A decreasing returns for output between 100 and 300 and increasing returns for output larger than 300.

B increasing returns for output between 100 and 300 and decreasing returns for output larger than 300.

C decreasing returns throughout.

D increasing returns throughout.

[N14/P3/Q8]

39. In 2009, the United Kingdom's largest grocery supermarket, Tesco plc, created Tesco Bank offering a range of financial services to customers.

This is an example of

A external growth and horizontal merger.

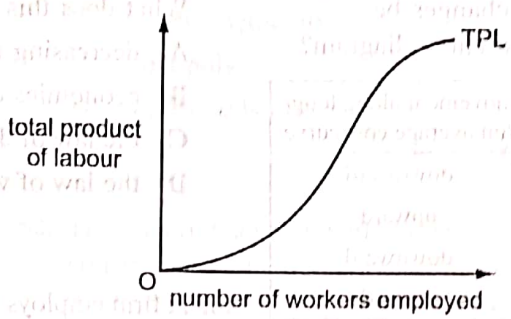
B external growth and vertical merger.

C internal growth and diversification.

D internal growth and market concentration.

[N14/P3/Q9]

40. The diagram shows the total product of labour (TPL) curve for a firm whose only variable factor input is labour.



What explains the shape of the curve?

A diminishing marginal disutility of work

B increasing marginal disutility of work

C technical diseconomies of scale

D the law of variable proportions

[J15/P3/Q4]

41. What relationship does a firm's long-run production function describe?

A the firm's output and the quantities of factor inputs employed

B the firm's long-run average cost of production and the level of output

C the firm's long-run average cost of production and the quantities of factor inputs employed

D the prices of factor inputs and the quantities of factor inputs employed

[J15/P3/Q7]

42. The table shows a firm's total and marginal costs.

output	total cost ($)	marginal cost ($)
1	340	40
2	375	35
3	400	25
4	435	35
5	475	40

What is the average fixed cost of producing 6 units?

A $50 **B** $60

C $180 **D** $300

[J15/P3/Q8]

HELPS to MCQ

38. B

Per unit cost $= \frac{TC}{\text{output}}$ ($)	
$\frac{100}{100} = 1$	increasing returns
$\frac{160}{200} = 0.8$	
$\frac{180}{300} = 0.6$	decreasing returns
$\frac{320}{400} = 0.8$	
$\frac{500}{500} = 1$	

39. C Creating a bank suggests internal growth while entering into another industry indicates diversification.

40. D Since only labour is the variable factor, therefore, the graph represents short run and hence suggests diminishing returns (variable proportions). Options **A** and **B** are irrelevant while **C** implies long-run.

41. A A production function describes relationship between inputs and output.

42. A At zero output TC = FC. In order to calculate TC at zero output we subtract MC from the TC at an output level one and then $\frac{FC}{Q} = AFC$.

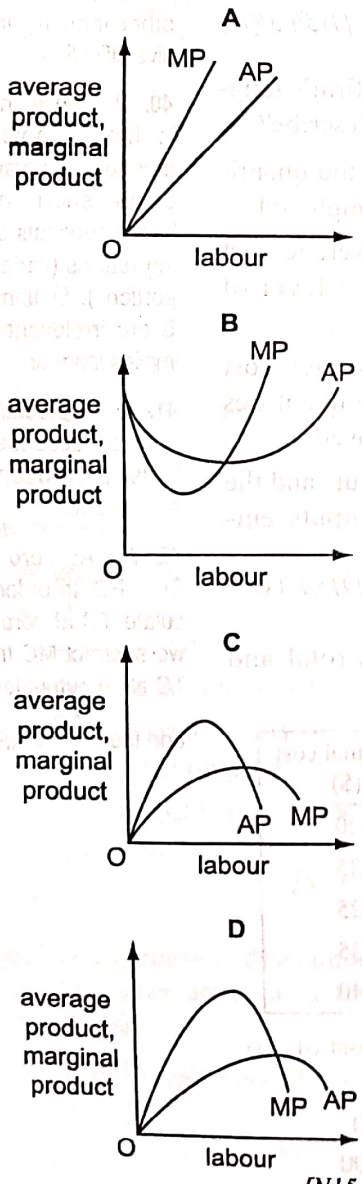
43. A firm experiences external diseconomies of scale and decreasing returns to scale.

How would these changes be illustrated on a cost curve diagram?

	shift in long-run average cost curve	movement along long-run average cost curve
A	downward	downward
B	downward	upward
C	upward	downward
D	upward	upward

[J15/P3/Q9]

44. Which diagram correctly shows the relationship between the average product (AP) and the marginal product (MP) of labour, given that the quantities of other factor inputs remain constant?



[N15/P3/Q5]

45. A fourfold increase in all of a firm's inputs results in a threefold increase in its output.

What does this illustrate?

A decreasing returns to scale

B economies of scale

C the law of diminishing returns

D the law of variable proportions

[N15/P3/Q8]

46. A firm employs two factors of production. The table shows the marginal products of these factors and their respective costs at the current level of output.

	land	labour
marginal product (units)	1	5
marginal cost per unit of factor ($)	4	3

Which adjustment in factor use would be most likely to bring the firm nearer to the least-cost combination of inputs for its current output level?

	land	labour
A	less	less
B	less	more
C	more	less
D	more	more

[N15/P3/Q9]

47. Which is a risk-bearing economy of scale?

A greater bargaining power in purchasing from suppliers

B greater diversification of the product range

C lower costs in raising capital

D lower distribution costs by increasing market share

[J16/P3/Q10]

48. Which assumption is made in calculating a firm's short-run production function?

A All factors of production are fixed.

B All factors of production are variable.

HELPS to MCQ

43. D External diseconomies shift LRAC curve upward while decreasing returns to scale makes LRAC curve to slope upward as scale of output increases.

44. D Typical shapes of AP & MP.

45. A All inputs can change only in the long run, therefore options C & D are ruled out. Since the proportionate change in inputs is more than the proportionate change in output therefore B is ruled out.

46. B Least-cost-combination implies that

$$\frac{MP_{land}}{P_{land}} = \frac{MP_{labour}}{P_{labour}}$$

$$\frac{1}{4} < \frac{5}{3}$$

Currently, the ratios are not equal. So in order to equate them more labour should be employed so that MP_{labour} falls and therefore reduces the value of its fraction. Similarly less land increases MP_{land} and therefore increases the value of its fraction. We need to do these adjustments until the values of these two fractions are equal.

47. B Diversification will spread the risk on higher number of products

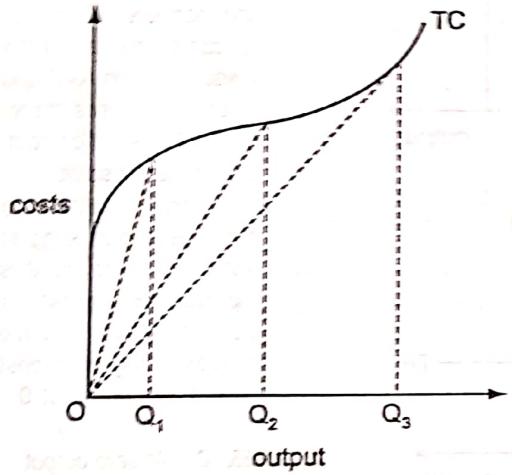
48. C According to the theory technology varies only in the very long run.

C The state of technology is fixed.

D The state of technology is variable.

[N16/P3/Q8]

49. In the diagram, TC is a firm's short-run total cost curve.



Which statement is correct?

A Average total cost is minimised at output OQ_2.

B Average variable cost is minimised at output OQ_1.

C Average variable cost is minimised at output OQ_3.

D Marginal cost is minimised at output OQ_2.

[N16/P3/Q9]

50. The table shows the total cost of a firm.

output	total cost ($)
0	40
1	55
2	60
3	65
4	80

What is the average variable cost of producing 4 units of output?

A $10 B $15

C $20 D $40

[N16/P3/Q10]

51. Which is not a source of market failure?

A imperfect information

B income inequality

C monopoly

D non-excludability

[N16/P3/Q14]

52. The government wants to regulate the consumption of a demerit good in order to increase society's net welfare.

In which situation will society's net welfare increase?

A The fall in the marginal social benefit is greater than the fall in the marginal social cost.

B The fall in the marginal social cost is greater than the fall in the marginal social benefit.

C The fall in the total social benefit is greater than the fall in the total social cost.

D The fall in the total social cost is greater than the fall in the total social benefit.

[N16/P3/Q15]

53. In 2015, a large mining company said it would reduce the number of staff by 6000 and sell its less profitable mines in an attempt to become more efficient.

If it is successful, what is most likely to happen to its costs?

	total fixed cost	total variable cost	average cost
A	fall	fall	fall
B	fall	fall	no change
C	fall	no change	fall
D	no change	fall	fall

[N17/P3/Q2]

HELPS to MCQ

49. D MC as measured by the slope between two successive points on TC curve is the lowest at Q_2. ATC refers to the slope of each point on a TC curve from origin therefore A is incorrect. AVC refers to the slope of each point on a TVC curve from origin.

50. A At zero output TC = FC. In this case FC = 40 and TC − FC = VC.

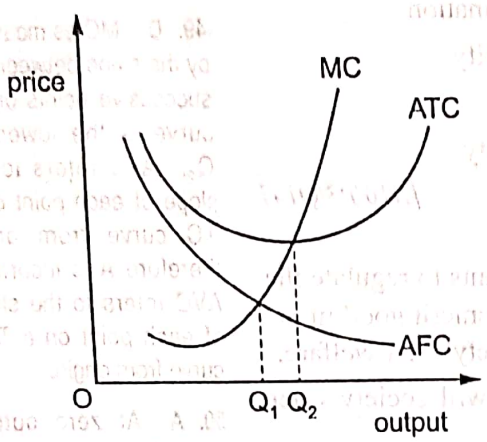
Then $\frac{VC}{Q} = AVC$

51. B It refers to equity therefore not related to efficiency or market failure.

52. D Demerit goods are associated with higher SC therefore greater fall in SC will improve net welfare.

53. A Selling mines would lower total fixed cost while lowering the number of workers would reduce variable cost. These two would eventually lower AC.

54. The diagram shows the cost curves for a firm.



What does the firm experience as it increases output from Q_1 to Q_2?

A decreased average variable cost

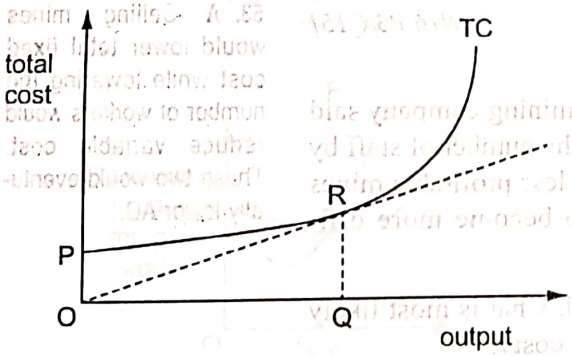
B diminishing returns

C economies of scale

D increased profit

[N17/P3/Q5]

55. In the diagram the curve TC shows the relationship between a firm's total costs and its level of output.



At output OQ average fixed costs are

A equal to $\frac{OP}{QR}$.

B equal to $\frac{QR}{OQ}$.

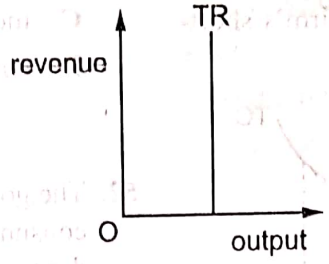
C equal to $\frac{OP}{OQ}$.

D measured by the slope of the line OR.

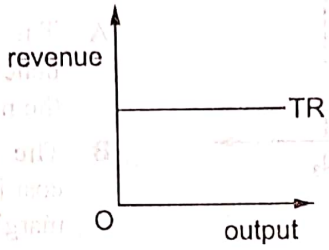
[N17/P3/Q7]

56. Which diagram shows the total revenue function for a firm in perfect competition?

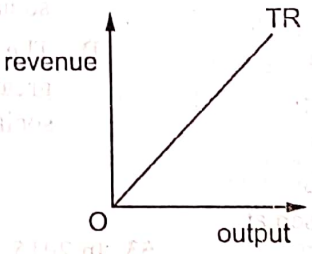
A



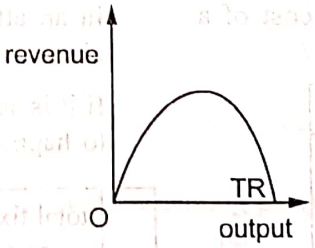
B



C



D



[N17/P3/Q8]

57. In the year ending July 2016, airline fuel prices fell by 20.4% while the price of passenger aircraft increased by around 1.1%.

Assuming no other changes in the passenger airline industry, what was the outcome for fixed costs and variable costs?

HELPS to MCQ

54. B Diminishing returns causes MP to fall and therefore MC to rise, Q_1 can be marked as the lowest point on AVC and after that it rises therefore **A** is incorrect. Economies of scale are operative in the long run while curves suggest short run, therefore **C** is incorrect. For profit we need to have revenue curves along with cost curves, this rules out **D**.

55. C At zero output TC = FC and AFC = $\frac{FC}{Q}$.

56. C Since a firm in a perfectly competitive market can sell its output at the market price, therefore its AR = MR = P. So each additional unit sold adds same to the TR and hence TR increases at a constant rate.

	fixed costs	variable costs
A	decreased	decreased
B	decreased	increased
C	increased	decreased
D	increased	increased

[J18/P3/Q8]

58. The schedule shows the short-run marginal cost of producing good X.

units of X	1	2	3	4	5
marginal cost ($)	45	40	30	20	20

Given that the total fixed cost is $50, which level of output minimises average total cost?

A 2 units B 3 units
C 4 units D 5 units

[N18/P3/Q6]

HELPS to MCQ

57. C Cost on fuel is dependent on output, therefore it is part of airline's variable cost and with no other changes a fall in fuel price must have decreased airline's variable cost. Therefore an increase in price per passenger must have resulted from an increase in airline's fixed cost.

58. D When output = 0, firm's TC = FC. We then progressively add MC in order to obtain TC for each increasing level of output and in order to obtain ATC we divide TC at each level of output on its corresponding level of output.

Unit of X	MC	TC	ATC =TC/Q
0		50	-
1	45	95	95
2	40	135	67.5
3	30	165	55
4	20	185	46.25
5	20	205	41

TOPIC 1.2

Types of Cost, Revenue and Profit, Short-run and Long-run Production

ESSAY Section

LIST OF QUESTIONS

Q1 (N09/P4/Q2)

In 2007 BHP Billiton, a large mining group, made a bid to take over Rio Tinto, the world's third largest mining group. Such a takeover would create the largest producer of copper and aluminium in the world.

(a) Explain whether increasing its scale of production will always reduce a company's costs. [12]

Q2 (N10/P4/Q3)

(a) Explain what is meant by internal economies of scale, and analyse the link between economies of scale and a firm's long run average cost curve. [12]

Q3 (J11/P4/Q4)

(a) Discuss whether it is always advantageous for a firm to grow in size. [12]

Q4 (N11/P4/Q3)

(a) Consider whether small firms should be encouraged in an economy. [12]

(b) Economic theory states that large firms have lower average costs than small firms.

Discuss whether this statement is necessarily true. [13]

Q5 (N12/P4/Q2)

A study found that demand for tickets for exhibitions at a major art gallery had unitary price elasticity.

(b) Discuss whether the law of diminishing returns contradicts the concept of economies of scale. [13]

Q6 (N15/P4/Q3)

(a) Explain the meaning of, and the relationship between, diminishing returns, total product and marginal cost. Use a diagram to illustrate your answer. [12]

(b) 'Firms undertake vertical and horizontal integration to grow in size. They achieve beneficial economies of scale through growth.'

Consider whether economies of scale are always caused by integration and whether, therefore, there is no place for small firms in a modern economy. [13]

Question 1

In 2007 BHP Billiton, a large mining group, made a bid to take over Rio Tinto, the world's third largest mining group. Such a takeover would create the largest producer of copper and aluminium in the world.

(a) Explain whether increasing its scale of production will always reduce a company's costs. [12]

[N09/P4/Q2(a)]

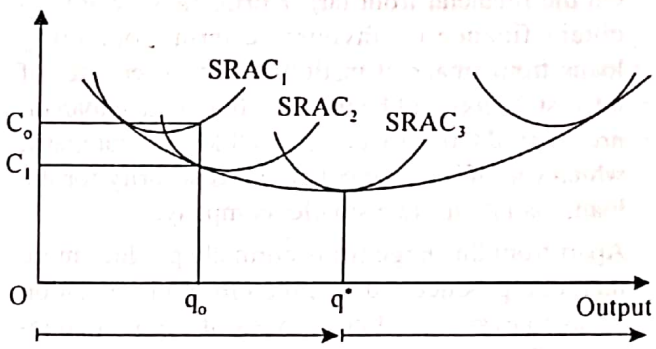
Essay

(a) Costs can be viewed as the total amount paid by a firm for the factors of production it uses. From an economist point of view costs is considered in terms of opportunity cost i.e. the best alternative forgone. In the short run total cost is divided into total fixed costs and total variable costs. But in the long run no such distinction exists owing to the varying nature of all different costs. The analysis of cost structure becomes more meaningful with the calculation of average cost. Average cost simply measures cost per unit of output. In the real world per unit cost is an important tool that businesses use in their decision making. Average cost can be measured as:

$$AC = \frac{\text{Total Costs}}{\text{output}}$$

Total cost (TC) increases as a firm increases its scale of production, but the rate of increase in TC varies which makes AC to first fall and then to rise both in the short and long run.

Expensive investment in acquiring other firms is a long run decision. Thus it must result in expansion of scale of production. The impact of changes in cost structure due to the new investment can be explained on a firm's long run average cost curve. A long run average cost curve (LRAC) shows how per unit cost varies with output on the assumption that the least cost method of production will be chosen for each level of output. If the firm experiences economies of scale its LRAC curve will fall but if diseconomies of scale predominate, the LRAC curve will rise. If the firm experiences neither economies nor diseconomies of scale, the LRAC curve will be horizontal as shown in the figure below:



In the figure above, initially an expansion of output over time leads to a reduction in the unit costs. These cost saving benefits are referred to as economies of scale. They occur because the firm's output is rising proportionately faster than the inputs; hence the firm is benefiting from economies of scale. These benefits come in a variety of ways known as technical, marketing, financial, managerial and risk bearing economies.

Firstly the firm gains from technical economies. For instance, as a firm grows in size it may be able to take advantage of increased specialisation. If the firm produces only a small output it may not be possible to employ a worker solely on one process but as the level of production increases workers may be able to specialise, leading to a lowering of the firm's costs.

Also the firm can reduce its per unit costs through what is known as increased dimensions. For example, if the size of a container is doubled its surface area is increased 4 fold and its volume is increased 8 fold. It is possible, therefore, to obtain cost savings by making use of larger containers, say, for the storage or distribution of finished products since the cost per unit will fall. A large firm may also devote proportionately more resources to research and development which could lead to an improvement in the quality of the goods and services produced, and possibly to a lowering of the cost per unit.

Firm also gains on marketing its products. For instance, when a firm buys its raw materials in bulk it may obtain preferential terms in the form of a discount, thus reducing the cost of each unit. A large firm may employ specialist buyers whose sole responsibility it is to purchase raw materials at the cheapest price. Administration, advertising, and packaging costs may also be lower for larger companies since they can spread the cost over larger orders. For example, the packaging costs per item for 1 million units is likely to be substantially lower than if 100 items were packaged.

On the financial front larger firms may be able to obtain finance on favourable terms, obtaining loans from financial institutions at lower rates of interest. Banks will be more willing to give loan on preferential terms to a large, well-known company, which can offer more collateral as security for the loan, than it will to a smaller company!

Apart from this large firms normally produce more than one product and are, therefore, in a position to take advantage of economies of scope. Economies of scope refer to the reduction in average total cost (ATC) made possible by a firm increasing the number of different goods it produces. The reason is that the firm is able to take advantage of skilled staff and technology which can be shared by the different goods produced.

As seen in Figure above, at a certain level of output the firm's average costs may increase in the long run with the firm experiencing diseconomies of scale. These diseconomies of scale also come in a variety of ways. For instance, as a firm grows in size it will possibly have a larger management team and, unlike a small firm, it will find it difficult to make decisions quickly. This can often be the case where companies have merged and there are two sets of management with different ideas. It may be difficult to coordinate planning, marketing, production and so on, with a resulting increase in the company's cost per unit.

Moreover the workforce may feel remote and alienated from the management. They may find their jobs boring and repetitive, particularly if mass production methods are used, and this may result in low morale and poor motivation. There may be a feeling on the part of the workforce that they are not part of the firm and this may lead to a deterioration in the quality of work undertaken. A 'them and us' situation may also develop between the management and the workforce, possibly resulting in an increase in the number of industrial disputes.

Thus an increase in the scale of production will increase total costs but will not always reduce company's per unit costs.

Question 2

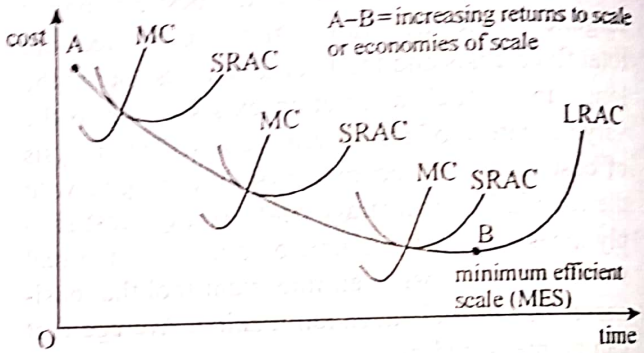
Explain what is meant by internal economies of scale, and analyse the link between economies of scale and a firm's long run average cost curve.

[12]

[N10/P4/Q3(a)]

Essay

As a result of becoming bigger the firm gains internal economies of scale and enjoys a situation where costs per unit of output fall as the scale of production increases. Thus internal economies arise from within the firm itself as a result of its decision to become large. Their impact on cost structure is analyzed on a firm's long run average cost curve. A long run average cost curve (LRAC) shows how per unit cost varies with scale of production on the assumption that the least cost method of production will be chosen for each level of output. If the firm experiences internal economies of scale its LRAC curve will fall as shown in the graph below:



In the figure above, initially an expansion of output over time leads to a reduction in the unit costs. As explained above these cost saving benefits are referred to as internal economies of scale. They occur because the firm's output is rising proportionately faster than the inputs; hence the firm is getting increasing returns to scale. There are a number of reasons why firms are likely to experience economies of scale.

Firstly, technical economies refer to the advantages gained directly in the production process. For instance, as a firm grows in size it may be able to take advantage of increased specialization and division of labour. If the firm produces only a small output it may not be possible to employ a worker solely on one process but as the level of production increases workers may be able to specialise, leading to division of labour and hence lowering of the firm's per unit costs.

Furthermore, the firm benefits from what is known as increased dimensions. For example, if the size of a container is doubled its surface area is increased 4 fold and its volume is increased 8 fold. It is pos-sible, therefore, to obtain cost savings by making use of larger containers, say, for the storage or distribution of finished products. A large firm may also devote proportionately more resources to research and development which could

lead to an improvement in the quality of the goods and services produced, and possibly to a lowering of the cost per unit. Moreover a large firm can afford to link certain processes which lower cost per unit of output. For instance, a large firm can afford to have a rolling mill next to a steel mill, thus the steel is immediately rolled flat while still hot thus avoiding the need to reheat the steel sheet.

Secondly, the firm also gains on marketing its products. For instance, when a firm buys its raw materials in bulk it may benefit from preferential terms in the form of a discount, thus reducing the cost of each unit. Also a large firm may employ specialist buyers whose sole responsibility is to purchase raw materials at the cheapest price. Administration, advertising, and packaging costs may also be lower for larger companies since they can spread the cost over larger orders. For example, the pack-aging cost per item for 1 million units is likely to be substantially lower than if 100 items were packaged.

On the financial front larger firms may be able to obtain finance on favourable terms, obtaining loans from financial institutions at lower rates of interest. Banks will be more willing to give loan on preferential terms to a large, well-known company, which can offer more collateral as security for the loan, than it will to a smaller company.

Apart from this large firms normally produce more than one product and are, therefore, in a position to take advantage of economies of scope. Economies of scope refer to the reduction in average total cost (ATC) made possible by a firm increasing the number of different goods it produces. The reason is that the firm is able to take advantage of skilled staff and technology which can be shared by the different goods produced.

Thus increasing scale of production may generate internal economies of scale leading to a reduction in costs per unit of output.

Question 3

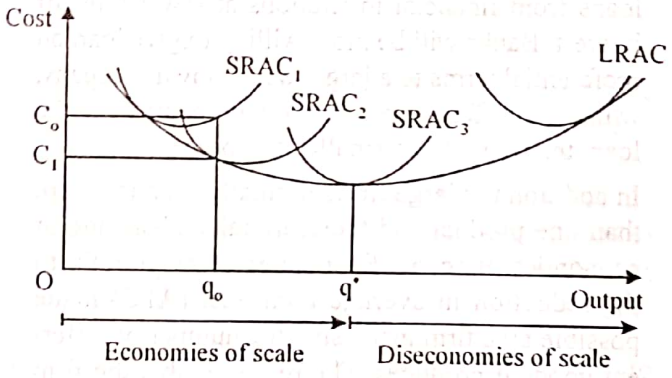
Discuss whether it is always advantageous for a firm to grow in size. [12]

[J11/P4/Q4(a)]

Essay

There are a number of reasons for a firm to wish to grow. In most cases firms target growth as their objective in order to reduce their average costs and hence take advantage of economies of scale. Economies of scale have the effect of increasing the productive capacity of the business and they help to raise profit margins. They also give a business a competitive edge in domestic and international markets. In other cases firms may wish to grow to increase their market dominance thereby giving them increased pricing power in specific markets. Monopolies for example can engage in price discrimination. Also the expansion of a business might be motivated by a desire to diversify production and sales so that falling sales in one market might be compensated by healthier demand and output in another market.

Whatever motivates a firm to grow, the impact can be explained on the firm's long run average cost curve. A long run average cost curve (LRAC) shows how per unit cost varies with output on the assumption that the least cost method of production will be chosen for each level of output. If the firm experiences economies of scale its LRAC curve will fall but if diseconomies of scale predominate, the LRAC curve will rise. If the firm experiences neither of them, the LRAC curve will be horizontal as shown in the figure below:



In the figure above, initially an expansion of output over time leads to a reduction in the unit costs. These cost saving benefits are referred to as economies of scale. They occur because initially the firm's output rises proportionately faster than the inputs. These benefits come in a variety of ways known as technical, marketing, financial, managerial and risk bearing economies.

Firstly the firm gains from technical economies. As a firm grows in size it may be able to take advantage of increased specialisation. If the firm produces only a small output it may not be possible to employ a worker solely on one process but as the level of production increases workers may be

able to specialise, leading to a lowering of the firm's costs.

Secondly, the firm can reduce its per unit costs through what is known as increased dimensions. For example, if the size of a container is doubled its surface area is increased 4 fold and its volume is increased 8 fold. It is possible, therefore, to obtain cost savings by making use of larger containers, say, for the storage or distribution of finished products since the cost per unit will fall. A large firm may also devote proportionately more resources to research and development which could lead to an improvement in the quality of the goods and services produced, and possibly to a lowering of the cost per unit.

Firm also gains on marketing its products. For instance, when a firm buys its raw materials in bulk it may obtain preferential terms in the form of a discount, thus reducing the cost of each unit. A large firm may employ specialist buyers whose sole responsibility it is to purchase raw materials at the cheapest price. Administration, advertising, and packaging costs may also be lower for larger companies since they can spread the cost over larger orders. For example, the packaging costs per item for 1 million units is likely to be substantially lower than if 100 items were packaged.

On the financial front larger firms may be able to obtain finance on favourable terms, obtaining loans from financial institutions at lower rates of interest. Banks will be more willing to give loan on preferential terms to a large, well-known company, which can offer more collateral as security for the loan, than it will to a smaller company!

In addition the large firms normally produce more than one product and therefore take advantage of economies of scope. Economies of scope refer to the reduction in average total cost (ATC) made possible by a firm increasing the number of different goods it produces. The reason is that the firm is able to take advantage of skilled staff and technology which can be shared by the different goods produced.

As mentioned above, with the firm experiencing diseconomies of scale its average costs may increase. These diseconomies of scale also come in a variety of different ways. For instance, as a firm grows in size it will possibly have a larger management team and, unlike a small firm, it will find it difficult to make decisions quickly. This can often be the case where companies have merged and there are two sets of management with different ideas. It may be difficult to coordinate planning, marketing, production and so on, with a resulting increase in the company's cost per unit.

Moreover the workforce may feel remote and alienated from the management. They may find their jobs boring and repetitive, particularly if mass production methods are used, and this may result in low morale and poor motivation. There may be a feeling on the part of the workforce that they are not part of the firm and this may lead to a deterioration in the quality of work undertaken. A 'them and us' situation may also develop between the management and the workforce, possibly resulting in an increase in the number of industrial disputes.

It is incontestable that nowadays, firms that operate on a large scale and can thereby maximise the potential of economies of scale and scope. However, economic realities also mean that amidst the big firms there are small businesses competing in the same markets and industries.

One cannot ignore the impact of specialisation and quality. While firms that exploit economies of scale and can become major players in an industry as a whole, there is always room for countless small firms to find a niche in which they can perform better than any other firm, including the biggest ones. A great example of this is in the financial services industry. There are several large players – Citigroup, AIG, Bank of America, HSBC, Merrill Lynch and JP Morgan to name a few) – however there also exist myriad small businesses that have a niche (often very obscure) in which they can perform better than anyone else.

Also the continued survival of small firms in markets where large firms might dominate is caused by the size of the market itself and the factors such as demand for specialised or high-quality product, that can not necessarily be answered by large firms capable of exploiting economies of scale.

Thus the growth of firm is not always advantageous rather large firms are prone to suffer from disadvantages when they grow in size larger than the optimum.

Question 4

(a) Consider whether small firms should be encouraged in an economy. [12]

(b) Economic theory states that large firms have lower average costs than small firms.

Discuss whether this statement is necessarily true. [13]

(N11/P4/Q3)

Essay

(a) It is incontestable that nowadays, firms that operate on a large scale and can thereby maximise the potential of economies of scale and scope. However, economic realities also mean that amidst the big firms there are small businesses competing in the same markets and industries.

One cannot ignore the impact of specialisation and quality. While firms that exploit economies of scale and can become major players in an industry as a whole, there is always room for countless small firms to find a niche in which they can perform better than any other firm, including the biggest ones. A great example of this is in the financial services industry. There are several large players – Citigroup, AIG, Bank of America, HSBC, Merrill Lynch and JP Morgan to name a few – however there also exist myriad small businesses that have a niche in which they can perform better than anyone else.

In other cases firms usually continue to operate at relatively smaller scale where the markets have been confined to fairly small regions. Thus small firms are useful in satisfying market demand where the absolute size of the market is small.

A more general advantage of small firms is that, while costs may fall for standardized goods, there is often a demand for variety, which can involve large firms in exceptionally high costs. This allows small flexible firms producing a few differentiated products to survive.

More often small firms are attributed with product innovation and introduction of new products and ideas. At the early stage of a new product, total demand is typically low, costs of production are high and many small firms try to get ahead of their competitors by finding the twist that appeals to consumers or the technique that slashes their costs.

In certain industries, such as restaurants and beauty parlors, personal services are required due to the variation in the customers' requirements. It is not feasible for larger firms to provide that kind of attention to the individual buyers.

Some small firms exist because they supply standardized parts to a large firm. The costs of components in certain industries may rise sharply as output increases, giving advantage to small size.

In addition encouraging small businesses is viewed as part of the government policies to reduce unemployment. Governments around the world support small firms because they not only create employment but also provide necessary competition to large firms. Governments adopt various measures to assist small firms such as financial and technical support and most importantly tax rebates.

Thus small firms, so the theory goes, operate in those industries, which provide personal services, produce expensive luxury items and satisfy demand for variety products.

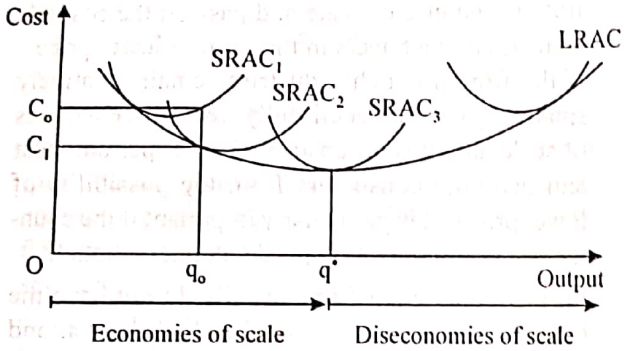
However having small firms can prove disadvantageous in certain industries. Particularly in industries where substantial economies of scale exist, large firms are preferable because they can benefit from economies of scale and pass on the cost advantages to the buyers in the form of lower prices. If the firms in such industries remain relatively small they cannot benefit fully from the economies of scale and thus produce at a higher per unit cost and deny the consumers from the possibility of lower prices. It is particularly important if the country is looking to sell its products internationally.

Furthermore, small firms usually do not have the capacity and finances available for research and development. Industries such as pharmaceuticals and engineering need to invest heavily in research and development in order to develop new products and production processes. There is, therefore, a need to have relatively large firms with enough finances to afford the much needed research and development.

Thus it follows that small firms should be encouraged because not only they fill the spaces in the market left by large firms but they also provide necessary competition to large firms and in many cases help the authorities to keep the level of unemployment low. However in particular cases the existing small businesses should be encouraged to grow big and gain from possible large scale cost advantages.

(b) There are a number of reasons for a firm to wish to become large. In most cases firms target to reduce their average costs by taking advantage of economies of scale. Economies of scale have the effect of increasing the productive capacity of the business and give a business a competitive edge in domestic and international markets. In other cases firms may wish to become large to increase their market dominance thereby giving them increased pricing power in specific markets. Monopolies for example can engage in price discrimination. Also the expansion of a business might be motivated by a desire to diversify production and sales so that falling sales in one market might be compensated by healthier demand and output in another market.

Whatever motivates a firm to increase its size of production, the impact can be explained on the firm's long run average cost curve. A long run average cost curve (LRAC) shows how per unit cost varies with output on the assumption that the least cost method of production will be chosen for each level of output. If the firm experiences economies of scale its LRAC curve will fall but if diseconomies of scale predominate, the LRAC curve will rise. If the firm experiences neither of them, the LRAC curve will be horizontal as shown in the figure below:



In the figure above, initially an expansion of output over time leads to a reduction in the unit costs. These cost saving benefits are referred to as economies of scale. They occur because initially the firm's output rises proportionately faster than the inputs. These benefits come in a variety of ways known as technical, marketing, financial, managerial and risk bearing economies.

Firstly the firm gains from technical economies. As a firm grows in size it may be able to take advantage of increased specialisation. If the firm produces only a small output it may not be possible to employ a worker solely on one process but as the level of production increases workers may be able to specialise, leading to a lowering of the firm's costs.

Secondly, the firm can reduce its per unit costs through what is known as increased dimensions. For example, if the size of a container is doubled its surface area is increased 4 fold and its volume is increased 8 fold. It is possible, therefore, to obtain cost savings by making use of larger containers, say, for the storage or distribution of finished products since the cost per unit will fall. A large firm may also devote proportionately more resources to research and development which could lead to an improvement in the quality of the goods and services produced, and possibly to a lowering of the cost per unit.

Firm also gains on marketing its products. For instance, when a firm buys its raw materials in bulk it may obtain preferential terms in the form of a discount, thus reducing the cost of each unit. A large firm may employ specialist buyers whose sole responsibility it is to purchase raw materials at the cheapest price. Administration, advertising, and packaging costs may also be lower for larger companies since they can spread the cost over larger orders. For example, the packaging costs per item for 1 million units is likely to be substantially lower than if 100 items were packaged.

On the financial front larger firms may be able to obtain finance on favourable terms, obtaining loans from financial institutions at lower rates of interest. Banks will be more willing to give loan on preferential terms to a large, well-known company, which can offer more collateral as security for the loan, than it will to a smaller company!

In addition the large firms normally produce more than one product and therefore take advantage of economies of scope. Economies of scope refer to the reduction in average total cost (ATC) made possible by a firm increasing the number of different goods it produces. The reason is that the firm is able to take advantage of skilled staff and technology which can be shared by the different goods produced.

As mentioned above, with the firm experiencing diseconomies of scale its average costs may increase. These diseconomies of scale also come in a variety of different ways. For instance, as a firm grows beyond a certain size it will possibly have a larger management team and, unlike a small firm, it will find it difficult to make decisions quickly. This can often be the case where companies have merged and there are two sets of management with different ideas. It may be difficult to coordinate planning, marketing, production and so on, with a resulting increase in the company's cost per unit.

Moreover the workforce may feel remote and alienated from the management. They may find their jobs boring and repetitive, particularly if mass production methods are used, and this may result in low morale and poor motivation. There may be a feeling on the part of the workforce that they are not part of the firm and this may lead to deterioration in the quality of work undertaken. A 'them and us' situation may also develop between the management and the workforce, possibly resulting in an increase in the number of industrial disputes.

Thus, from the above discussion it seems obvious to conclude that large firms do not necessarily produce at a lower per unit cost. Rather as the firm grows beyond a certain size its per unit costs might be higher than the other relatively small firms in the same industry.

Question 5

A study found that demand for tickets for exhibitions at a major art gallery had unitary price elasticity.

Discuss whether the law of diminishing returns contradicts the concept of economies of scale.

[13]

[N12/P4/Q2(b)]

Essay

Short run production function is subject the law of diminishing returns while a firm may benefits from economies of scale in the long run.

The short run is a time period where at least one factor of production is in fixed supply. In order to construct an example let's assume that it is not possible to change the quantity of capital i.e. fixed in supply however it is possible to employ extra labour and purchase raw material in the short run, hence they are called variable factors.

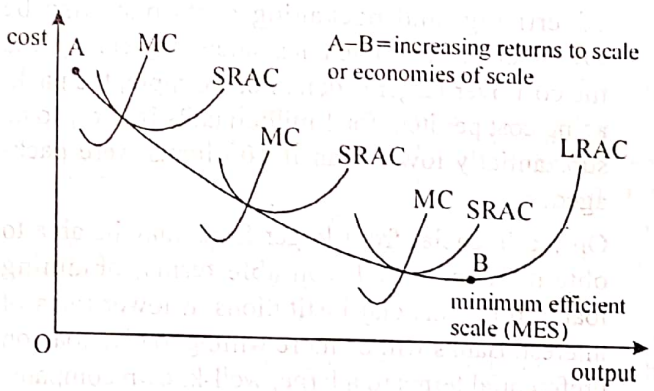
In the short run, the **law of diminishing returns** states that as we add more units of a variable input to fixed amounts of other inputs, the change in total output will at first rise and then fall. In other words diminishing returns to labour occurs when marginal product of labour starts to fall. This means that total output will be increasing at a decreasing rate. This can be illustrated from the table below;

Capital	Number of workers	Total product (TP)	Marginal product (MP)	Average product (AP)
20	0	0	-	-
20	1	5	5	5
20	2	16	9	8
20	3	30	14	10
20	4	56	26	14
20	5	85	29	17
20	6	114	29	19
20	7	140	26	20
20	8	160	20	20

Average product measures output per-worker-employed and is obtained by dividing TP on workers. Marginal product is the change in TP resulting from employing one more worker. MP is calculated by dividing the change in TP on the change in workers. Alternatively we calculate MP by $TP_n - TP_{n-1} = MP$.

Initially, marginal product is rising – e.g. the 4th worker adds 26 to output and the 5th worker adds 28 and the 6th worker increases output by 29. Marginal product then starts to fall. The 7th worker adds 26 units and the 8th worker just 20 units. At the point of 7th worker production demonstrates diminishing returns. The reason why diminishing returns becomes operative is that beyond a certain point, new workers will not have as much capital equipment to work with so it becomes diluted among a larger workforce. However total output will continue to rise as long as marginal product is positive and average product will rise if marginal product > average product.

On the other hand economies of scale result in the long run when all factors of production are variable. As a result of becoming bigger the firm gains internal economies of scale and enjoys a situation where costs per unit of output fall as the scale of production increases. Thus internal economies arise from within the firm itself as a result of its decision to become large. Their impact on cost structure is analyzed on a firm's long run average cost curve. A long run average cost curve (LRAC) shows how per unit cost varies with scale of production on the assumption that the least cost method of production will be chosen for each level of output. If the firm experiences internal economies of scale its LRAC curve will fall as shown in the graph below:



In the figure above, initially an expansion of output over time leads to a reduction in the unit costs. As explained above these cost saving benefits are referred to as internal economies of scale. They occur because the firm's output is rising proportionately faster than the inputs; hence the firm is getting increasing returns to scale. There are a number of reasons why firms are likely to experience economies of scale.

Firstly, technical economies refer to the advantages gained directly in the production process. For instance, as a firm grows in size it may be able to take advantage of increased specialization and division of labour. If the firm produces only a small output it may not be possible to employ a worker

solely on one process but as the level of production increases workers may be able to specialise, leading to division of labour and hence lowering of the firm's per unit costs.

Furthermore, the firm benefits from what is known as increased dimensions. For example, if the size of a container is doubled its surface area is increased 4 fold and its volume is increased 8 fold. It is possible, therefore, to obtain cost savings by making use of larger containers, say, for the storage or distribution of finished products. A large firm may also devote proportionately more resources to research and development which could lead to an improvement in the quality of the goods and services produced, and possibly to a lowering of the cost per unit. Moreover a large firm can afford to link certain processes which lower cost per unit of output. For instance, a large firm can afford to have a rolling mill next to a steel mill, thus the steel is immediately rolled flat while still hot thus avoiding the need to reheat the steel sheet.

Secondly, the firm also gains on marketing its products. For instance, when a firm buys its raw materials in bulk it may benefit from preferential terms in the form of a discount, thus reducing the cost of each unit. Also a large firm may employ specialist buyers whose sole responsibility is to purchase raw materials at the cheapest price. Administration, advertising, and packaging costs may also be lower for larger companies since they can spread the cost over larger orders. For example, the packaging cost per item for 1 million units is likely to be substantially lower than if 100 items were packaged.

On the financial front larger firms may be able to obtain finance on favourable terms, obtaining loans from financial institutions at lower rates of interest. Banks will be more willing to give loan on preferential terms to a large, well-known company, which can offer more collateral as security for the loan, than it will to a smaller company.

From the above explanation, it follows that there is no contradiction between law of diminishing returns and the concept of economies of scale. The former is operative in the short run while the latter is applied in the long run. In fact the two concepts can be used together to explain the behavior of production and costs but in different time periods.

Question 6

(a) Explain the meaning of, and the relationship between, diminishing returns, total product and marginal cost. Use a diagram to illustrate your answer. [12]

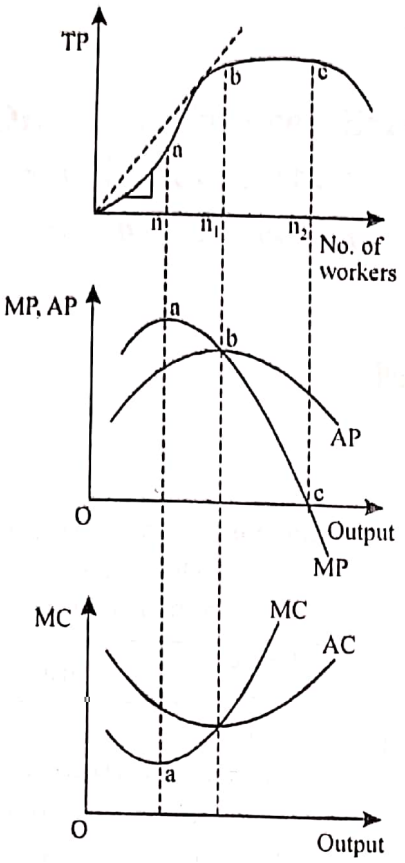
(b) 'Firms undertake vertical and horizontal integration to grow in size. They achieve beneficial economies of scale through growth.'

Consider whether economies of scale are always caused by integration and whether, therefore, there is no place for small firms in a modern economy. [13]

[N15/P4/Q3]

Essay

(a) Production in the short run is subject to the law of diminishing returns also known as the law of variable proportion. Short run is the time period when at least one factor of production is fixed in supply and the law states that when increasing amounts of a variable factor are used with a given amount of a fixed factor, there will come a point when each extra unit of the variable factor will produce less extra output (marginal product MP) than the previous unit. In other words it means that the increase in total output will become progressively smaller as more units of the variable factor are applied to the same quantity of fixed factors. Total product (TP) represents the output of a product obtained from a given mix of resources per period of time. In order to explain the law let's assume that the fixed factor is land and the variable factor is labour and the firm increases its number of workers on the same amount of land. We can analyze the results on the following sequence of three different graphs.



It can be noted that the TP rises at a lower rate beyond point 'a'. It signifies a decrease in MP because the slope between two successive points becomes flatter. So point 'a' is marked as the onset of diminishing returns. When we trace the same point on the graph below we find that beyond this point MP declines and when MP falls to zero TP is maximized. On its way down MP intersects AP at point 'b' that is marked as the highest value of AP. We can trace this point on the TP curve as indicating by the highest slope on a point from the origin. So we obtain this typical pattern of MP curve that initially shows a rise in MP and then beyond a certain point when diminishing returns sets in, it starts to fall.

But what is more significant to note is the pattern of marginal cost (MC) curve that is directly linked to MP and hence diminishing returns. MC is defined as the extra cost incurred for the production of an additional unit of a good and it is linked to the cost incurred on variable factor. Initially as more of the workers are employed, extra units of output cost less than the previous units indicated by a fall in the MC curve. This corresponds to the rising portion of MP curve that leads to a fall in average variable cost. Beyond a certain point, however, diminishing returns takes effect and causes MP to decrease and hence MC to rise.

Thus it can be concluded that the shape of the MC curve follows directly from the law of diminishing returns.

(b) Firms can grow in size either by investment in new plants and machines that is known as internal growth or else they can opt for some form of integration that is called external growth. In many cases firms target growth through integration in order to reduce their average costs and hence take advantage of economies of scale. These advantages come in a variety of ways known as technical, marketing, financial, managerial and risk bearing economies.

As a firm grows in size it may, for instance, benefit from increased specialization. The firm may also gain on marketing its products. When, for instance, a firm buys its raw materials in bulk it may obtain preferential terms in the form of a discount, thus reducing the cost of each unit. On the financial front a larger firm may be able to obtain finance on favourable terms, obtaining loans from financial institutions at lower rates of interest. In addition to this a large firm normally produces more than one product and therefore takes advantage of economies of scope. Economies of scope refer to the reduction in average total cost (ATC) made possible by a firm increasing the number of different goods it produces. The reason is that the firm is able to take advantage of skilled staff and technology which can be shared by the different goods produced.

Economies of scale have the effect of increasing the productive capacity of the business and they help to raise profit margins. They also give a business a competitive edge in domestic and international markets. However there are a number of other reasons for firms to wish to become large through integration. Taking advantage of economies of scale is only one of them and it is not necessarily achieved only through integration. In fact it can be achieved by internal growth as much as through integration. In other cases firms may wish to become large to increase their market dominance thereby giving them increased pricing power in specific markets. Monopolies for example can engage in price discrimination. Also the expansion of a business might be motivated by a desire to diversify production and sales so that falling sales in one market might be compensated by healthier demand and output in another market. Usually the underlying objective of integration is to achieve a rapid growth of market. This usually is typical with manager-controlled businesses where the annual salaries and other perks might be more closely correlated with total sales revenue rather than profits.

So firms achieve growth by integration for a variety of different purposes and achieving economies of scale is just one of them.

Secondly it is true that firms through growth manage to gain cost advantages that they can use them to drive the small firms out of the industry who normally don't have the same advantages. However, it is also true that small firms such as sole traders and many partnerships, while operating with the view to maximize profit, prefer to remain small and survive successfully. One of the prime reasons for this continued existence of small concerns is the desire to be one's own boss; once this desire is met entrepreneurs may be content with a relatively quiet life and achievement of a satisfactory level of profit. Not only this the firm may remain small in order to take advantage of a low price elasticity of demand and high income elasticity of demand for specialist "niche' goods and services - these products can be sold at a higher price and with a bigger profit margin. Also some firms remain small because they can avoid diseconomies of scale associated with larger firms. Other small firms survive because they assist the larger firms by producing some components of their products at relatively lower cost.

So we conclude that there is a possibility of firms achieving economies of scale regardless of the method they choose for their growth. Secondly whether integration takes effect into economies of scale is also uncertain; there is, therefore, room for small firms to survive successfully.