INSTITUTE OF ACTUARIES OF INDIA

CT7 – Business Economics

May 2011 EXAMINATIONS

INDICATIVE SOLUTION

1.	A	**[1.5]**
2.	D	**[1.5]**
3.	C	**[1.5]**
4.	D	**[1.5]**
5.	C	**[1.5]**
6.	A	**[1.5]**
7.	B	**[1.5]**
8.	D	**[1.5]**
9.	B	**[1.5]**
10.	A	**[1.5]**
11.	B	**[1.5]**
12.	B	**[1.5]**
13.	B	**[1.5]**
14.	B	**[1.5]**
15.	D	**[1.5]**
16.	A	**[1.5]**
17.	D	**[1.5]**
18.	C	**[1.5]**
19.	C	**[1.5]**
20.	B	**[1.5]**
21.	B	**[1.5]**
22.	D	**[1.5]**
23.	B	**[1.5]**
24.	A	**[1.5]**
25.	D	**[1.5]**
26.	D	**[1.5]**
27.	C	**[1.5]**
28.	D	**[1.5]**
29.	C	**[1.5]**
30.	C	**[1.5]**

31.

Item	Undervalued Private Benefits	Positive Externalities
a) Private provision of Long term care for the Elderly	People may not fully appreciate the need for long term care during their working lifetime (they may believe they shall never become dependent or they may lack foresight)	It would help the younger generation to not worry about the cost of providing for their parents. Also, taxes may not be raised for the general population since this is not publicly provided
b) Education for underprivileged children	The value of education may not fully appreciated by the children or by their parents	Better educated children can get out of poverty. They can add to better

		productivity to the nation.

[4]

32.

a) Government interventions is associated with a number of problems, including:

- shortages and surpluses when price controls are used

- problems caused by measurement difficulties and a lack of information

- bureaucracy and inefficiency

- a negative effect on incentives

- the reduction in individual freedom of choice

- the adverse effect on efficiency if there are frequent changes in government policy.

Yet a free market might be preferable because of:

- automatic adjustments to changes in market conditions

- incentives for risk taking and innovation

- a competitive environment (even where oligopoly and monopoly is prevalent).

b) Lower taxes on income, savings and profits are thought likely to increase incentives to work, save and invest and hence to increase output. This is the *substitution effect* of a tax cut .

For example, a decrease in income tax encourages people to substitute work for leisure as the after-tax wage rate is now higher (and the opportunity cost of leisure has increased).

However, the *income effect* of a tax cut might counteract this. For example, people might feel they can afford to work fewer hours while still maintaining (or even improving) their standard of living.

c) Devaluation causes imports to become costlier and exports to become cheaper

Costlier imports leads to cost-push inflation

Cheaper exports causes demand pull inflation viz., more demand from overseas as goods have become cheaper

d) High domestic demand can lead to rising imports and hence a current account deficit.

But high domestic demand also increases the demand for money which will lead to higher interest rates.

This can lead to huge quantities of "hot money" from overseas being deposited in domestic banks and hence a financial account surplus.

Short-term financial account movements tend to be much larger than current account movements, so the currency is likely to appreciate.

[10]

33. The following are the reasons other than Comparative Advantage

<u>Decreasing costs</u>

A country may choose to export goods made in a small inefficient industry in which it currently has no comparative advantage. Export sales should then increase economies of scale making the industry more efficient and ultimately providing a comparative advantage.

Small countries may find that domestic demand is insufficient to take full benefit of economies of scale in any particular industry. Small countries often have a high proportion of exports as it allows them to specialize in a small number of industries in which they can compete internationally.

Differences in demand

Countries will export goods for which the domestic supply exceeds the domestic

demand. This may be more efficient than switching production to goods that are in

demand, but that it is less well suited to making.

Increased competition

By exposing domestic industries to international competition the domestic economy

may benefit from:

- greater efficiency of domestic firms

- lower prices

- increased R&D spending by domestic firms

- more rapid adoption of new technology by domestic firms

- greater choice of products for consumers.

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Trade as an "engine of growth"

As the world economy grows, exporting nations will experience growth, especially if

these exports have a high income elasticity of demand.

Non-economic advantages

There may be political, social and cultural advantages to trade.

[6]

34. The item wise answers are :

Item	Workings	Result
a)	1-2	1000-400 = **600**
b)	-4-8+9	-5-10+7 **= -8**
c)	-11-12+13	-2-15+20**=3**
d)	a + b	600-8 = 592
e)	d+ c	592+3 **=595**

f)	-3+5-6+7-10	-300+100-15+100-200 **= -315**
g)	-e+14	-595+2=-593
h)	g-f	-593-(-315) = -278

[7]

35.

Number of security guards	Number of radios not stolen due to guard	Marginal cost (`)	Marginal benefit (`)	Net benefit (`)
0	-	-	-	-
1	50-30=20	200	20*25 = 500	300
2	30-20=10	200	10*25 = 250	50
3	20-14=6	200	6*25 = 150	-50
4	14-8=6	200	6*25 = 150	-50
5	8-6=2	200	2*25 = 50	-150

Firm should hire 2 guards because marginal benefit is higher than marginal cost up to this level after which marginal cost becomes greater than marginal benefit.

The firm would be willing to pay the maximum of `500 to hire the first guard because `500 is the marginal benefit from the first guard.

Note: Conclusive solution cannot be found through TC/TR approach over the given range of information.

[3]

36.

I. The effect of a price increase can be assessed by computing the point price elasticity of demand. Substituting the initial values of I and P_c yields

$$Q_x = 12,000 + 5(10,000) + 500(6) - 5,000P_x$$

Which is equivalent to

$$Q_x = 65,000 - 5000P_x$$

Note that dQ_x/dP_x = -5000. At P_x = `5, quantity demanded is 40,000 books. Using these data, the point elasticity is computed to be

$$E_p = -5000*(5/40,000) = -0.625$$

Because demand is inelastic, raising the price of the novels would increase total revenue

Alternatively, candidate can assume increase in own price by certain percentage and work out corresponding decrease in quantity demanded. If he finds that percentage decrease in quantity demanded is less than percentage increase in own price he will conclude that demand is relatively inelastic and hence conclude that price increase will lead to increase in total revenue. He may not use words like relative inelastic or inelastic, it does not matter. If he demonstrates familiarity with the principle in totality, give full marks.

II. The income elasticity determines whether a product is a necessity or a luxury. It has already been determined that the initial quantity demanded at the given values of the price and income variables is 40,000. From the demand equation the derivative dQ_x/dI = 5. Thus the income elasticity is

$$E_i = 5 * (10,000/40,000) = 1.25$$

Because $E_i > 1$, the novels are a luxury good. Thus as incomes increase, sales should increase more than proportionately.

Alternatively, candidate can assume increase in income by certain percentage and work out corresponding increase in quantity demanded. If he finds that percentage increase in quantity demanded is greater than percentage increase in income he will conclude that income elasticity of demand is greater than one (or income elasticity of demand is positive i.e, >0). Hence he will conclude that sale of novels would increase in a period of rising incomes. He may not use word like income elasticity, it does not matter. If he demonstrates familiarity with the principle in totality, give full marks.

III. Cross elasticity determines whether products are substitutes or complements. The demand equation implies that dQ_x/dP_c = 500. Thus the cross elasticity is

$$E_c = 500 * (6/40,000) = 0.075$$

Because $E_c > 0$ (positive), Comlin's novels and books from competing publishers are viewed by the consumers as substitutes. Thus if competing publishers raise their prices, demand for Comlin's novels would increase.

37.

Output	Total cost	Total fixed cost	Total variable cost	Average fixed cost	Average variable cost	Average total cost	Marginal cost
100	**260**	200	**60**	2.00	0.60	2.60	0.60
200	290	200	90	1.00	0.45	1.45	**0.30**
300	350	200	150	0.67	**0.50**	1.17	0.60
400	420	200	220	0.50	0.55	**1.05**	0.70
500	560	200	**360**	0.40	0.72	1.12	1.40
600	860	200	660	0.33	1.10	1.43	**3.00**
700	1,320	200	1,120	0.29	**1.60**	1.89	4.60
800	2,040	200	1,840	0.25	2.30	2.55	7.20

[4]

38.

Total revenue is maximized by increasing output until marginal revenue is zero. As a first step in deriving the marginal revenue equation, the demand curve must be written as a function of P. Thus,

$P = 40 - Q/50$.

Now, for a linear demand function, the marginal revenue equation has the same intercept and twice the slope.

Thus,

$MR = 40 - Q/25$

Equating this marginal revenue equation to zero gives:

$MR = 40 - Q/25 = 0$

Thus, the output rate for revenue maximization is:

Q = 1000

The price is determined by substituting quantity back into the demand equation.

Thus,

P = 40 – (1000/50) = 20.

[4]

39.

I. With first-degree price discrimination, output is expanded until price equals marginal cost. Thus,
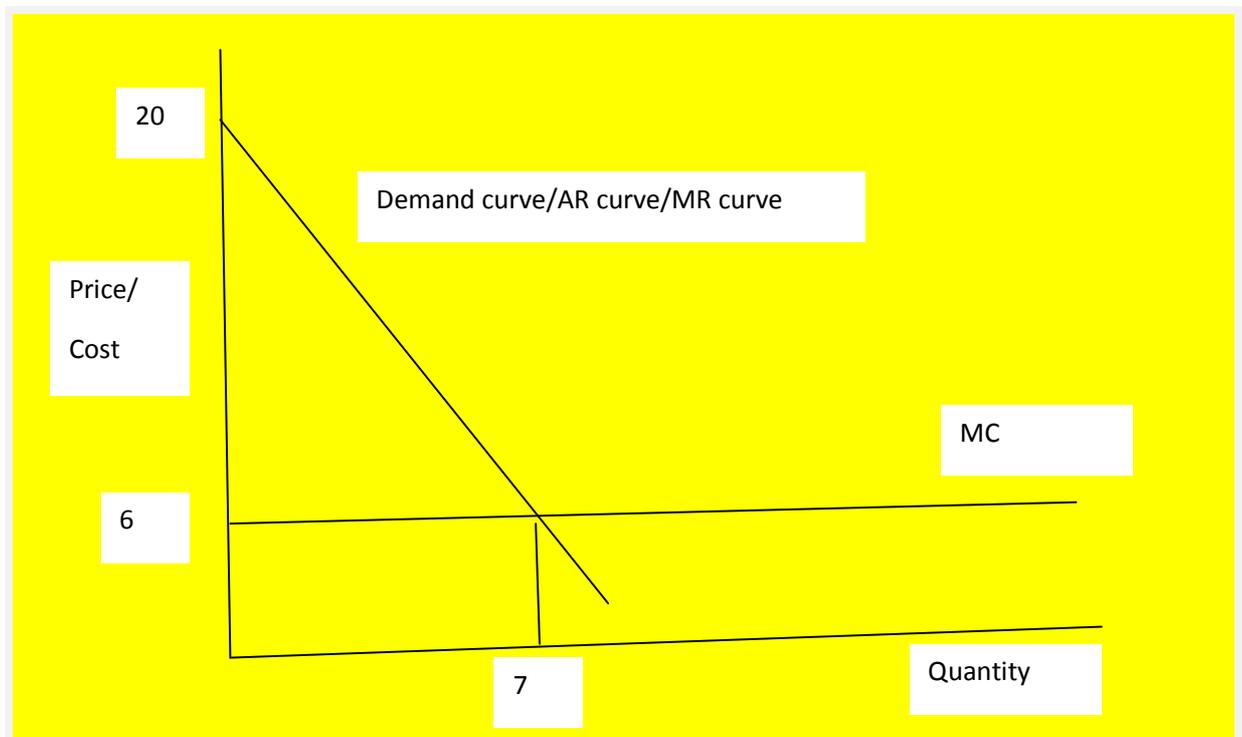
$$P = 20 - 2Q = 6$$

$$2Q = 20 - 6 = 14$$

$$Q = 14/2 = 7$$

Economic profit is the area under the demand curve and above the constant marginal cost of `6. This area is right triangle with base equal 7 and height equal 14. Thus,

$$\text{Economic profit} = (7*14)/2 = `49$$

Note: No marks for diagram; it is meant only to facilitate better understanding of solution

II. With no discrimination the optimal output rate is the solution to

MR=MC

$TR = P*Q = (20 -2Q)*Q = 20Q – 2Q^2$

$MR = 20 – 4Q$

$20 – 4Q = 6$

$Q = 3.5$

The price as determined by the demand equation, will be

$P = 20 – 2(3.5) = `13$

Thus, the firm earns economic profit of $7 (13 – 6) on each of the 3.5 units sold. Hence economic profit is $24.50 (7*3.5).

[4]

40. 'Economies of scale' refers to the situation where long-run average costs fall as the scale of production is increased. Diseconomies of scale refer to the situation where long-run average costs rise as the scale of production is increased.

Causes of economies of scale

1. **Specialization and the division of labor** – where work is broken down into smaller and smaller tasks in which workers specialize, thereby becoming more efficient and productive
2. **Indivisibilities -** which refers to the impossibility of dividing some factors (eg large machinery) into smaller units.
3. The **"container" principle**, whereby the average cost of a unit of output produced by capital equipment that contains things (eg oil tankers) falls with the size of the capital equipment
4. The greater efficiency of large machines
5. The production of **by-products**, in sufficient amounts that they can be sold profitably
6. **Multistage production**, which saves the time and cost involved in moving unfinished goods between locations.
7. Organizational – perhaps due to **rationalization**, which involves reorganizing production to reduce waste and duplication
8. Spreading **overhead costs**, ie the general costs associated with running a business that are only loosely related to output level, eg marketing, human resources
9. **Financial economies**, eg lower interest costs, discounts for bulk purchases

10. **Economies of scope**, when increasing the range of goods produced reduces the cost of producing each good, eg shared marketing.

Note: Give full marks in all three following situations:

Only bullet/bold points

Only explanations

Both bullet/bold points

Causes of diseconomies of scale

1. Managerial problems of co-ordination and communication
2. Alienation and poor motivation of the workforce
3. Poor industrial relations
4. Problems in one area holding up all production.

[4]

[Total Marks – 100]

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