

Institute of Actuaries of India

Subject CT7 – Business Economics

November 2012 Examinations

INDICATIVE SOLUTIONS

Introduction

The indicative solution has been written by the Examiners with the aim of helping candidates. The solutions given are only indicative. It is realized that there could be other points as valid answers and examiner have given credit for any alternative approach or interpretation which they consider to be reasonable.

CT7 (Business Economics) | November 2012 | Solution | October 2, 2012

Multiple choice questions

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

1.5 each [45]

Solution 31.

a) At equilibrium, income equals the aggregate demand in the economy. Thus, the equilibrium level of income is given by:

$$Y = C + I + G = \text{Aggregate demand}$$

$$Y = 100 + 0.8Y + 50 + 50$$

$$\text{Therefore, } Y = (200/0.2) = \text{Rs } 1000$$

The first approach:

Saving in the economy = Income – Expenditures in the economy

We know from a) that income is Rs 1000

Expenditure = Consumption expenditure plus government expenditure

$$= 100 + 0.8 * 1000 + 50$$

$$= 950$$

Therefore, Saving = 1000 – 950

$$= \text{Rs } 50$$

OR

The second approach:

In equilibrium Saving = Investment

Therefore Saving= Rs 50

b) The new equilibrium is given by:

$Y=C+I+G=$ Aggregate demand

$$Y=100+0.8Y+100+50$$

Therefore, $Y= (250/0.2)=$ Rs 1250

c) The multiplier is given by $\frac{\Delta \text{Income}}{\Delta \text{Expenditure}} = \frac{1}{1-c}$

where $c=$ marginal propensity to consume

Therefore multiplier=5

d) With taxes in the economy, the disposable income= Income (Y) – Taxes (tY)

where t is the tax rate, here $t=0.2$

Therefore the equilibrium is given by:

$$Y=100+0.8(Y-0.2Y)+50+50$$

Therefore, $Y= (200/0.36)=$ Rs 555.5

The multiplier will now change in the economy

$$Y = C + I + G$$

$$Y = C + c(1-t)Y + I + G$$

$$Y - C + c(1-t)Y + I + G$$

$$Y = \bar{E} + c(1-t)Y$$

$$Y = \frac{\bar{E}}{1 - c(1-t)}$$

Therefore multiplier is now given by $\frac{1}{1-c(1-t)}$

Multiplier = $1/0.36= 2.77$

Therefore after imposing taxes the multiplier falls

e) With transfer payments in the economy, the disposable income= Income (Y) + Transfer payments

Therefore the equilibrium is given by:

$$Y=100+0.8(Y+20)+50+50$$

Therefore, $Y= (216/0.2) =$ Rs 1080

[9]

Solution 32.

a) The below diagram depicts the welfare effects of imposing tariffs on imports by country A

The S_{dom} gives the domestic supply curve for Maggots. The D_{dom} gives the domestic demand curve for Maggots. The world price is given by P_w which increases to $P_w+t= P_w +2$ after taxes are imposed.

Domestic demand: The equilibrium quantity of Maggots consumed falls from Q_2 to Q_4 after tariff is imposed.

Domestic supply: The proportion of domestic Maggots supply increases after tariff is imposed with the quantity of domestic supply increasing from Q_1 to Q_3 .

Imports: Quantity of imports fall from Q_2-Q_1 to Q_4-Q_3

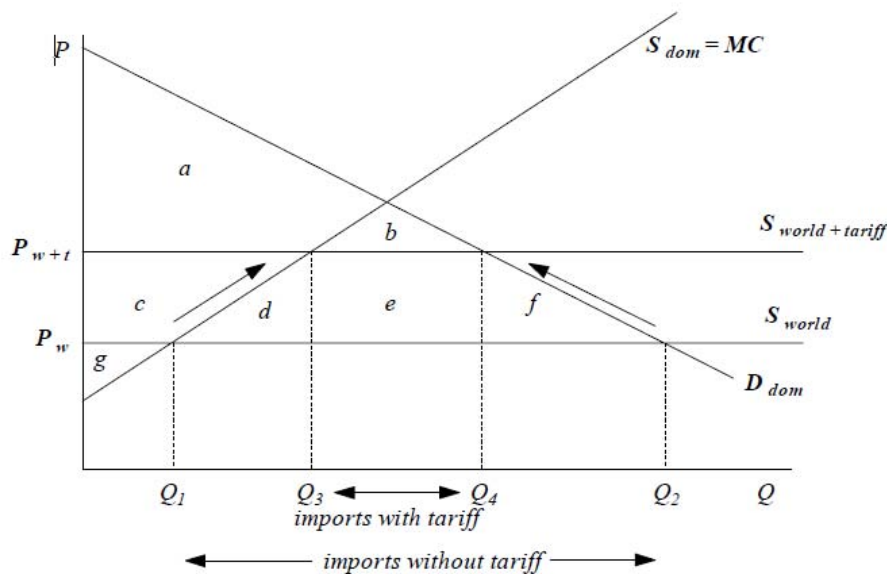
Consumer surplus: Consumer surplus before protection was 'a+b+c+d+e+f' which after tariff is imposed reduces to 'a+b'

Producer surplus: Producer surplus before protection was 'g' which now after tariff is imposed increases to 'c+g'

Government surplus: Government surplus was zero without protection which after tariff is imposed increases to 'e'

Total welfare: The total welfare is given by the total of consumer, producer and government surplus. It falls from 'a+b+c+d+e+f+g' to 'a+b+c+e+g'.

[1 mark for a clear graph]



b) The diagram below shows the effect of quota imposition:

The S_{dom} gives the domestic supply curve for Maggots. The D_{dom} gives the domestic demand curve for Maggots. The world price is given by P_w . After the Quota is imposed the supply curve for Maggots changes to S' (highlighted in red). At each price level (above the P_w) the supply increases by the quantum of 'Quota'.

Domestic demand: The equilibrium quantity of Maggots consumed falls from Q_2 to Q_4 after quota is imposed.

Domestic supply: The proportion of domestic Maggots consumed increases after quota is imposed with the quantity of domestic supply increasing from Q_1 to Q_3 .

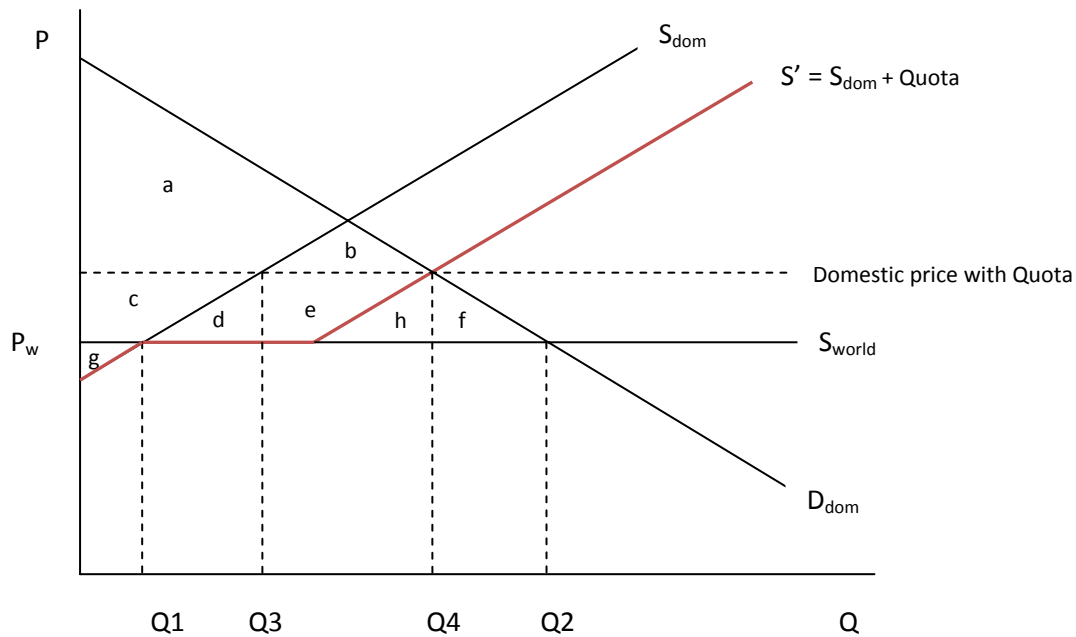
Imports: Quantity of imports fall from $Q_2 - Q_1$ to $Q_4 - Q_3$

Consumer surplus: Consumer surplus before protection was 'a+b+c+d+e+f+h' which after quota is imposed reduces to 'a+b'

Producer surplus: Producer surplus before protection was 'g' which now after quota is imposed increases to 'c+g'

Government surplus: Government surplus was zero without protection and after imposition of quota the amount 'e+h' is redistributed between the import license holders and the government depending on the revenue generated from selling import licenses. Thus, 'e+h' is the surplus allocated to government and traders

Total welfare: The total welfare is given by the total of consumer, producer, government and traders' surplus. It falls from 'a+b+c+d+e+h+f+g' to 'a+b+c+e+h+g'.



[9]

Solution 33.

Supply side policies aim to increase the aggregate supply either by increasing factors of production or by improving the productivity of the factors.

Market oriented supply side policies increase the output in the economy by increasing the role of markets and decreasing the role of government. They encourage private enterprises and competition by reducing government intervention. These can be implemented through reduction in government expenditures, reduction in taxes imposed by government, reduction in transfer payments like unemployment allowance, restructuring of labour laws to reduce the power of labour, privatisation of nationalised firms, deregulation in industries to allow more competition, implementation of government projects through public private partnerships and removal of barriers to trade and capital movements.

Interventionist policies on the other hand improve output through intervention by government in areas where free markets fail to produce efficient level of output. Thus these policies work through replacing or modifying the market. This is likely to be in sectors which have externalities or which require huge investment in the beginning.

These policies can be implemented through nationalisation of resources, provision of capital in sectors like infrastructure development, encouraging R&D through subsidization or provision of funds, providing training and education to enhance human capital or by better information provision where asymmetric information may hinder functioning of markets.

[4]

Solution 34.

Devaluation of Indian currency makes imports to India more expensive and export from India less expensive.

Short term

In the short term devaluation may not improve current account balance of payments as most trade occurs in response to plans made months in advance. Thus in the short term the effect of devaluation on volume of imports and exports will be very less.

There is no effect on value of exports as the exports are priced in rupees while since imports are priced in foreign currency, the rupee value of imports will increase. This in the short terms will cause a fall in net value of exports resulting in worsening of current account deficit.

Medium term

In the medium term devaluation of rupee is likely to reduce demand for imports in India and increase demand for exports from India, thus resulting in increased volume of exports and decreased volume of imports.

The effect on value of net exports depends on the elasticity of demand for imports and exports. As long as the demand for imports and exports is sufficiently elastic the current account deficit will reduce in the medium term.

[5]

Solution 35.

A firm sells its product in a perfectly competitive market where other firms charge a price of \$80 per unit. The firm's total costs are $C(Q) = 40 + 8Q + 2Q^2$.

a.

$$MR = 80 ; MC = 8 + 4Q$$

$$MR = MC$$

$$80 = 8 + 4Q$$

$$4Q = 72$$

$$Q = 18$$

b.

\$80 because in this perfectly competitive market firms is a price taker.

c.

$$\text{Profits} = TR - TC$$

$$80 \times 18 - (40 + 8 \times 18 + 2 \times 18 \times 18)$$

$$1440 - (40 + 144 + 648) = 1440 - 832 = 608$$

d.

Prospective firms will get attracted to these super normal profits in this industry and therefore they enter in this industry. Their entry increases the supply of homogenous product in the market which consequently decreases the price of the product in this industry. Ultimately, entry of new firms continues until price decreases up to a level at which no firm enjoys supernormal profits or profits are reduced to normal profits.

[6]

Solution 36

You are the manager of a monopoly, and your demand and cost functions are given by $P = 200 - 2Q$ and $C(Q) = 2000 + 3Q^2$, respectively.

a)

$$TR = P \times Q = (200 - 2Q)Q = 200Q - 2Q^2$$

$$MR = 200 - 4Q$$

$$TC = 2000 + 3Q^2$$

$$MC = 6Q$$

$$MR = MC$$

$$200 - 4Q = 6Q$$

$$10Q = 200$$

$Q = 20$ (Profit maximizing level of output)

$$P = 200 - 2 * 20 = 200 - 40 = 160.$$

b)

Profits = TR - TC

$$160 \times 20 - (2000 + 3 * 20 * 20) = 3200 - 3200 = 0 \text{ (firm is earning only normal profits) [1 mark]}$$

c)

$$PED = - 1/2 * 160/ 20 = -4 \text{ (it is elastic) .}$$

d)

Revenue is maximized when TR is maximum which is only possible when $MR=0$.

$$MR = 200 - 4Q = 0$$

$Q = 50$ (revenue maximization level of output)

$$P = 200 - 2 * 50 = 200 - 100 = 100$$

e)

The revenue is maximum when firm is producing 50 units and selling it at a price of 100

$$50 * 100 = 5000$$

f)

$$PED = -1/2 * 100/50 = - 1 \text{ (Unitary)}$$

[8]

Solution 37.

The *life cycle* of a product typically has four stages:

1. *launch*
2. a period of rapid sales *growth*
3. a levelling off in sales – *maturity*
4. a period of *decline* – as the market becomes saturated with alternatives or the product becomes obsolete.

Consumer demand, competition and the other factors affecting the pricing decision will generally vary between these stages.

The launch stage

Here the lack of substitutes, and resulting inelastic demand, may enable the firm to charge high prices and make large profits, particularly for a new product that is unlike existing products.

However, if the firm is worried about possible competition from new entrants, then it may charge a lower price to get as large a market share and as much brand loyalty as possible before new firms enter.

The two key factors to consider are:

1. the current price elasticity of demand
2. the likelihood of new entrants.

The growth stage

Rapid sales growth is likely to attract new entrants, possibly leading to an oligopolistic market in which firms may compete by offering slightly different products.

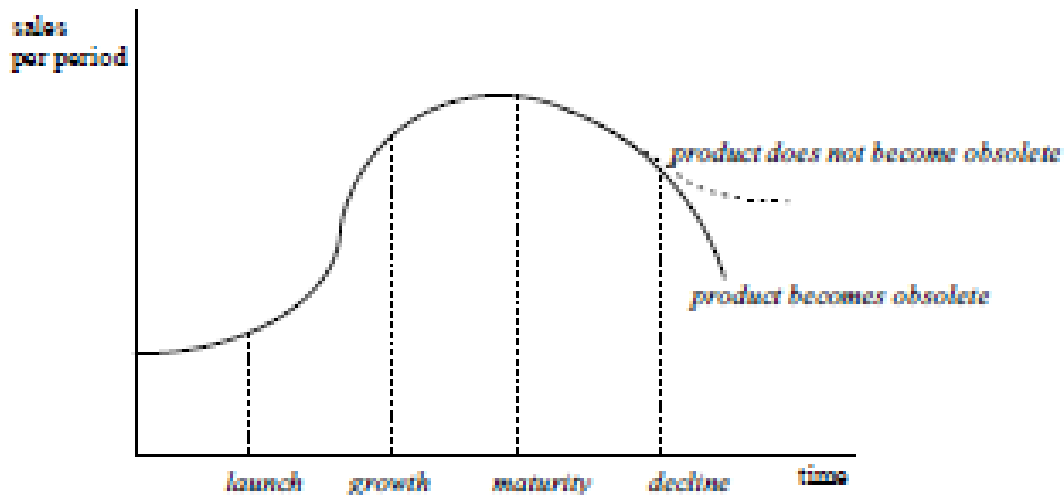
The maturity stage

As more firms enter the market, competition is more intense and any collusion might begin to break down. Price wars might break out and firms may innovate to try and prolong the life of the product.

The decline stage

Competition may increase further as firms struggle to retain sales and some firms may be driven from the market. Eventually sales will level out at the replacement level, or else fall to zero if the product becomes obsolete.

The following diagram illustrates how sales might vary over the life cycle of a typical product.



[5]

Solution 38.

To market a product, a firm must first determine its product/market strategy, *ie*:

- *product* – promote current product or develop new one(s)?
- *market* – increase share of current market or enter new one(s)?

The four possible combinations of answers to these questions give rise to four possible marketing strategies:

- *market penetration* – current product to current market. This is likely to be the least risky strategy. It may lead to increased competition, especially if the market is not expanding.
- *product development* – new product to current market. This may involve horizontal or vertical product differentiation.
- *market development* – current product to new market. The new market may be in a new physical location, or may be a different segment of the market in the current location. It may involve new uses for the product.
- *diversification* – new product to new market. This is likely to be the most risky strategy as it involves the most unknowns.

These four possible choices of product/market strategy can be illustrated in a **growth vector (Ansoff) matrix**:

		Product	
		Current	New
Market	Current	Market penetration	Product development
	New	Market development	Diversification

Firms devise their marketing strategy around their **marketing mix**, *ie* their choices in relation to the **four Ps**:

- *Product*, *eg* quality, branding, packaging, after-sales service
- *Price*, *eg* price relative to competition, credit terms, customer discounts
- *Place* (distribution), *eg* where sold, where stored, how transported
- *Promotion*, *eg* advertising, special offers, public relations.

The choices made for each of these are *not independent*. The image created by these policies must be consistent and appropriate. A firm's choices will depend partly on:

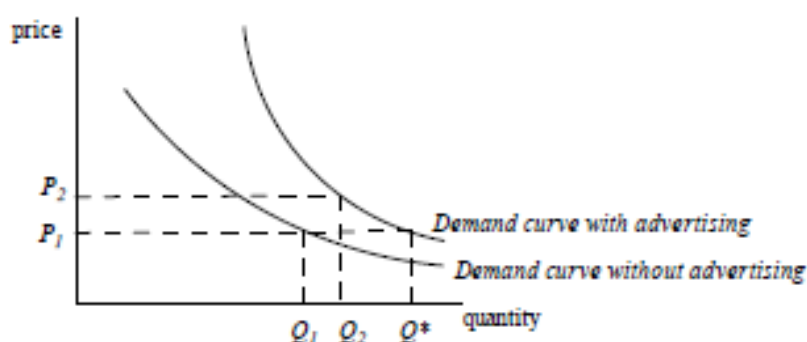
- how *sensitive* (elastic) product demand is to each factor
- the stage in the *product life cycle*

The intended effects of advertising

The effects on the demand curve

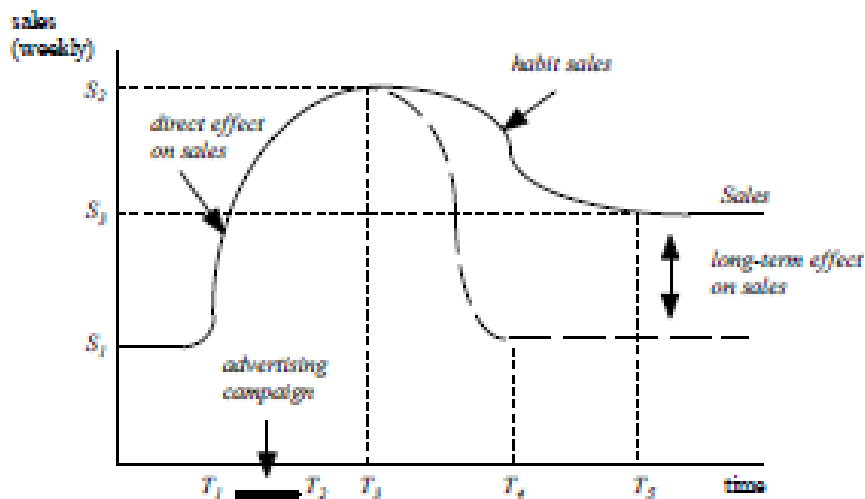
Advertising of a product is intended to:

- shift the product's demand curve to the right (by bringing the product more to consumers' attention and increasing the attractiveness and marginal utility of the product)
- make the product's demand less price-elastic (by creating brand loyalty and so reducing the number of perceived substitute goods, enabling the firm to increase prices without a substantial decrease in demand).



The graph shows that the shift of the demand curve to the right would enable an increased quantity (Q^*) to be sold at the original price. However, as the advertising has also reduced the elasticity of demand, the firm may be able to do better than this by increasing its price to P_2 and still increasing sales (to Q_2).

The effect on sales over time



An advertising campaign conducted between times T_1 and T_2 leads to an immediate increase in sales from S_1 to S_2 . The direct effect of advertising wears off between times T_3 and T_4 , but actual sales fall more slowly because new customers continue to buy out of habit. Sales level off at S_3 after time T_5 , so the long-term effect of advertising is an increase from S_1 to S_3 .

The most successful brands advertise consistently, even during recessions.