

Institute of Actuaries of India

Subject CT7 – Business Economics

September 2016 Examination

INDICATIVE SOLUTION

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.

Solution: 1.5 Mark to each answer

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

[Q.No. 1 to 30=45 Marks]

Solution 31:

i) A Nash equilibrium is the position resulting from everyone making their optimal decision based on their assumptions of rivals' decisions. Without collusion, neither firm can improve its payoff given the other firm's strategy, so there is no incentive for any firm to change its position.

[1]

ii) (Low, Low) is the Nash equilibrium.

If firm A chooses High, best move for firm B is to choose Low

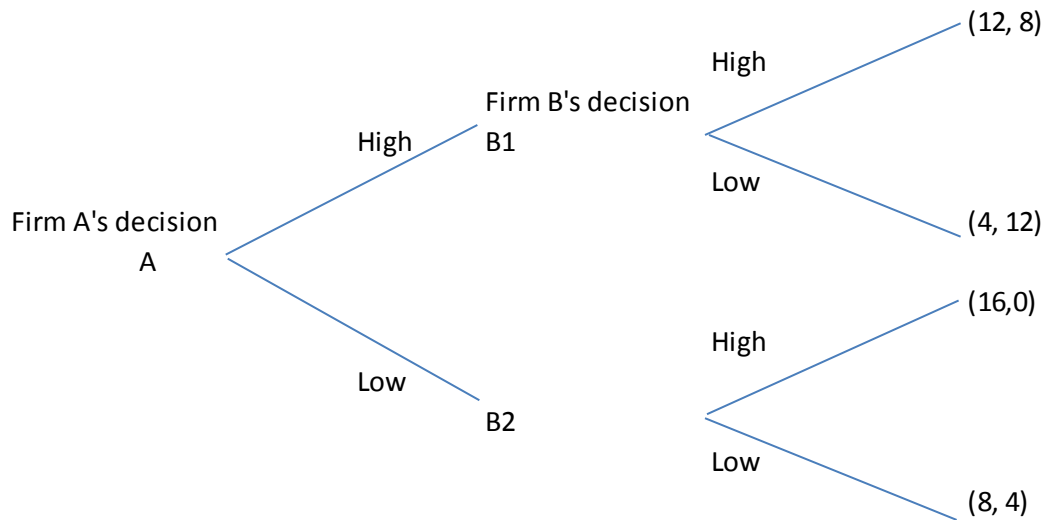
If firm A chooses Low, best move for firm B is to choose Low

If firm B chooses High, best move for firm A is to choose Low

If firm B chooses Low, best move for firm A is to choose Low

[2]

iii) The following diagram shows the decision tree assuming A moves first. Following the same logic as in ii it can be seen that the (Low, Low) is Nash equilibrium



[1]

iv) None of the firms have first mover advantage as it does not matter whether a firm goes first or second, it will always choose Low strategy

[1]

[5 Marks]

Solution 32:

i) The expected utility theorem says that when making a choice you should choose the course of action that gives the highest expected utility (rather than the highest expected pay-out).

Suppose that there are $i = 1, \dots, n$ possible outcomes each yielding a wealth of W_i with probability $p(W_i)$ and that the individual obtains utility $U(W_i)$ from a certain level of wealth W_i . The individual's expected utility is then given by:

$$E(U(W)) = \sum_{i=1}^n U(W_i)p(W_i)$$

[2]

ii) Consider the scenario where an individual X has initial wealth of 100. He is given a gamble where there is 45% chance that he will lose 50 and 55% chance that he will gain 50.

Let utility function of the X be $U(W) = W^{1/2}$

Suppose X takes the gamble. Then, expected wealth of X is

$$E(W) = 55\% (150) + 45\% (50) = 102.5$$

However, expected utility of X is

$$E(U(W)) = 55\% (150^{1/2}) + 45\% (50^{1/2}) = 9.92$$

Initial expected utility of $X = 10$

So, if X were to maximise expected wealth, he should take the gamble, but if he were to maximise expected utility, he should not take the gamble.

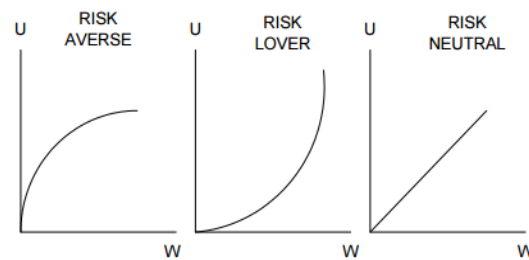
[3]

iii)

Risk averse $U(W) = W^{1/2}$

Risk lover $U(W) = W^2$

Risk neutral $U(W) = 2W$



[3]

[8 Marks]

Solution 33:

i)

1. Since each firm has a tiny fraction of the market, all firms are price takers.
2. There is complete freedom of entry into the industry.
3. Firms produce an identical (homogeneous) product.
4. There is perfect knowledge in the market.

[2]

ii)

$$P = 20$$

$$Q = 625$$

$$\text{Quantity produced by each firm} = 625/25 = 25$$

[2]

iii)

$$TR = P \cdot Q = 20Q$$

$$\Pi = TR - TC$$

$$= 20Q - (5 + 10Q + 0.2Q^2)$$

$$= -5 + 10Q - 0.2Q^2$$

$$d\Pi/dQ = 10 - 0.4Q = 0$$

$$Q^* = 25$$

$$d^2\Pi/dQ^2 = -0.4 < 0 \text{ at } Q = 25$$

⇒ Profit is being maximised.

[2]

iv)

In the long run equilibrium, in a perfectly competitive market, $P = ATC$ at the profit maximising level of output

$$ATC = TC/Q$$

$$= (5 + 10Q + 0.2Q^2)/Q$$

$$= 5Q^{-1} + 10 + 0.2Q$$

$$= 5(25)^{-1} + 10 + 0.2(25)$$

$$= 15.2$$

$$\neq 20 = P^*$$

Alternatively,

The profits for each individual firm in equilibrium in a perfectly competitive market in long term must be zero. At current level of output, profit for each firm is

$$\Pi = -5 + 10(25) - 0.2(25)^2 = 120 \neq 0$$

Since firms are making positive economic profits, new firms will enter the market till the point at which profits are competed away.

[2]

[8 Marks]

Solution 34:

i) Advertising/sales ratio = Total expenditure on advertising a product/Total value of sales of the product

It depends upon market structure – with the ratio tending to be high in oligopolistic markets

product characteristics – with the ratio tending to be high for products that:

- represent a large expenditure for consumers, eg consumer durables
- are new
- have a constantly changing customer base, eg educational services.

A limitation on the use of the advertising/sales ratio is that the ratio does not indicate the absolute amount spent advertising a product

[2]

ii)

Advantages (any three)

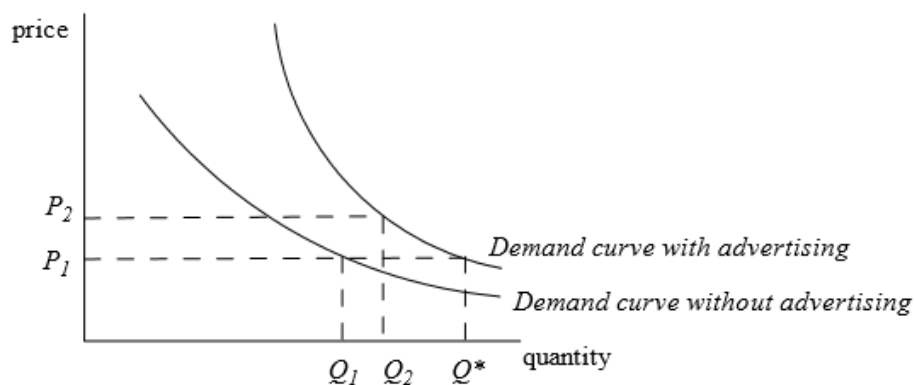
- providing information to consumers
- breaking down barriers to entry, aiding the introduction of new products and new firms
- enabling firms to emphasize product features, thereby aiding product development
- more competition on price
- increased sales leading to economies of scale

Disadvantages (any three)

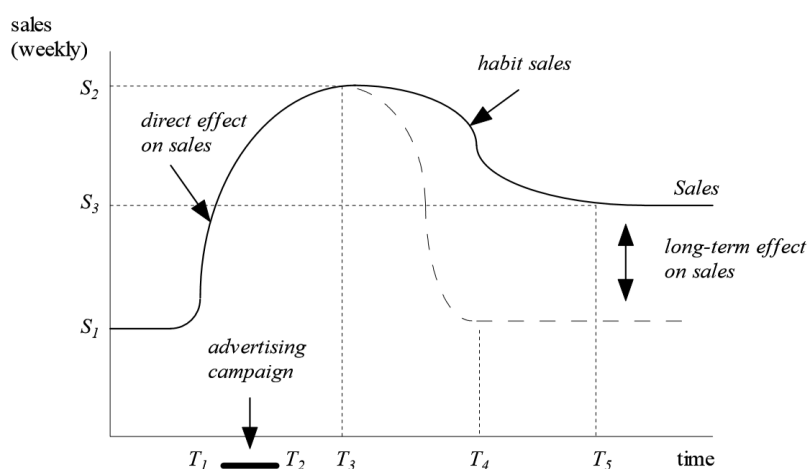
- distorting consumers' decisions, as imperfect information might persuade them to buy an inferior but widely advertised product
- creating wants and so increasing scarcity
- the opportunity cost, ie alternative (better?) uses of the resources
- increased materialism
- increased costs and so prices (if there are no economies of scale)
- creating a barrier to entry by promoting loyalty to existing brands

[3]

iii) Intended effect is to shift the demand curve to the right and make it less price elastic. It can be shown on the same diagram or two separate diagrams



Or other intended effect is to increase the sales and part of this increase may become a habit.



[2]
[7 Marks]

Solution 35:

Market-orientated supply-side policies include

- reducing the tax burden on workers, savers and firms to increase the incentive to work, save and invest
- keeping the minimum wage low (or removing it altogether) to reduce labour costs, increase profits and hence increase investment
- reducing the monopoly power of trade unions to reduce labour costs and hence increase investment
- reducing welfare payments to reduce/remove the “poverty trap” and increase the incentive to work and relocate if necessary
- encouraging competition, eg by privatisation and deregulation, to increase national output
- removing trade barriers to allow goods to be bought from the cheapest source
- removing restrictions on international capital movements to allow capital to be allocated to the projects in which it will be most effective.

[3 Marks]

Solution 36:

Policies to reduce disequilibrium unemployment will depend on the cause.

Demand-deficient unemployment and disequilibrium unemployment caused by an increase in the supply of labour may be cured using demand-management policies to ensure there is sufficient aggregate demand in the economy.

Demand-management policies include:

- expansionary fiscal and monetary policies to increase aggregate demand
- devaluation of the exchange rate to increase the demand for exports and reduce the demand for imports
- direct controls, eg import controls to encourage spending on domestic products.

Real-wage unemployment may be cured using supply-side policies to increase the flexibility of the labour market.

Supply-side policies to increase wage flexibility include:

- the introduction of legislation designed to curtail trade union power, so as to lessen the extent to which they are able to prevent wages adjusting to their equilibrium level
- the abolition of any minimum wage legislation – so as to allow wages to adjust freely in the market and so reach their free market equilibrium level
- a reduction in the term of wage contracts – so that they are renegotiated more frequently to reflect current labour market conditions and hence should not stray too far from the equilibrium wage level.

[5 Marks]

Solution 37:

The short-run aggregate supply curve shows the aggregate output of the economy that firms are willing to supply in the short run – ie between long-run equilibria – for each price level.

The short-run aggregate supply curve slopes upwards because wages are not fully flexible in the short run.

This is due to either money illusion, which means that workers base their decisions the level of their money wages as opposed to their real wages, ...

... and/or fixed wage contracts, which mean that workers are unable to immediately renegotiate their wages in response to changes in the price level.

Now, an increase in the price level resulting from increased aggregate demand means that firms will enjoy higher marginal revenue for their output.

Given that inflexible wages will not immediately rise to the same extent the marginal cost that firms face will not have risen by as much as marginal revenue.

Therefore it will be profitable for firms to expand output by employing more workers.

Thus, in the short run higher prices are associated with higher output (and vice versa), and so the short-run aggregate supply curve is upward sloping.

[4 Marks]

Solution 38:

- i) INR 50 billion [1]
ii) INR 140 billion [1]
iii)
- Open market operations — buying or selling government securities.
 - Reserve requirement — banks are required to keep a cash reserve deposited with the central bank.
 - Discount rate — controlling the rate at which the central bank lends to banks as lender of last resort.
- [3]
[5 Marks]

Solution 39:

The exchange rate of the Indian Rupees against other currencies is determined by supply and demand.

Demand for Indian Rupees comes from two main sources:

- Overseas firms and consumers buying Indian goods and services. Indian firms will want to be paid in Indian Rupees (or to convert payment into Indian Rupees).
- Overseas investors making investments in the India. To buy Indian assets they will need Indian Rupees.

Similarly supply of Indian Rupees comes from two sources:

- Indian residents purchasing foreign goods and services.
- Indian residents purchasing foreign assets.

Generally, the Indian Rupees will increase if there is an increase in the demand for Indian Rupees (as US citizens increase their demand for Indian goods, services and assets) and/or a decrease in its supply (as Indian citizens decrease their demands for US goods, services and assets).

Short run

In the short run speculation is the main determinant of the exchange rate.

For example, if RBI increases interest rates, and Indian assets offer higher expected returns than foreign assets, capital (or hot money) will be attracted into the India. This is an example of the second source of demand for Indian Rupees given above (foreigners buying Indian Rupees assets). The higher demand will tend to increase the exchange rate. There will also be a lack of supply of Indian Rupees from Indian investors who will decide not to invest abroad when Indian assets offer high returns.

A speculative increase in the exchange rate makes a subsequent fall more likely since the exchange rate must follow a unique long run path (as described below). Eventually the flow of capital from abroad will be reduced as high returns in Indian Rupees are offset by the expectation of currency losses. Short-run equilibrium is achieved when the exchange rate has risen enough to stop these capital flows.

Long run

For a given level of output (including the full employment level of output), there is a unique real exchange rate which produces external balance, ie a position where the balance on the current account of the balance of payments is just zero.

In the long run, the nominal exchange rate will move in order to maintain the real exchange rate required to achieve this external balance.

For example, suppose the India has a high rate of inflation, which has caused a lack of competitiveness and a balance of payments deficit. The lack of demand for Indian Rupees will cause the nominal exchange rate to fall until competitiveness is restored. The nominal exchange rate will have moved onto its purchasing power parity path in order to restore the unique real exchange rate.

Real changes to the economy (eg the discovery of oil, or improvements in productivity) might change the real exchange rate needed to produce external balance.

[10 Marks]
