

INSTITUTE OF ACTUARIES OF INDIA
EXAMINATIONS

29th October 2007

Subject CT7 – Economics

Time allowed: Three Hours (14.30 – 17.30 Hrs)

INSTRUCTIONS TO THE CANDIDATES

- 1) *Do not write your name anywhere on the answer sheet/s. You have only to write your Candidate Number on each answer sheet/s.*
- 2) *Mark allocations are shown in brackets.*
- 3) *Attempt all questions, beginning your answer to each question on a separate sheet. However, answers to objective type questions could be written on the same sheet.*
- 4) *Fasten your answer sheets together in numerical order of questions. This, you may complete immediately after expiry of the examination time.*
- 5) *In addition to this paper you should have available graph paper, Actuarial Tables and an electronic calculator.*

Professional Conduct:

“It is brought to your notice that in accordance with provisions contained in the Professional Conduct Standards, If any candidate is found copying or involved in any other form of malpractice, during or in connection with the examination, Disciplinary action will be taken against the candidate which may include expulsion or suspension from the membership of ASI.”

Candidates are advised that a reasonable standard of handwriting legibility is expected by the examiners and that candidates may be penalized if undue effort is required by the examiners to interpret scripts.

AT THE END OF THE EXAMINATION

Please return your answer sheets and this question paper to the supervisor separately.

- Q. 1)** The utility function $U(w) = a+bw^{-5}$, where $a>0$ and $b>0$, depicts
- A. increasing absolute risk aversion and increasing relative risk aversion.
 - B. decreasing absolute risk aversion and increasing relative risk aversion.
 - C. decreasing absolute risk aversion and constant relative risk aversion.
 - D. Increasing absolute risk aversion and constant relative risk aversion. **[1.5]**
- Q. 2)** A smoker who goes out to take insurance from a company which has same rates for smokers and non-smokers is posing a ----- problem for the company
- A. Adverse selection
 - B. Moral hazard
 - C. Both of the above
 - D. D. None of the above **[1.5]**
- Q. 3)** Which of the following functions represents constant relative risk aversion?(assume $a>0$ and $b>0$)
- A. $U(w)= a+bw^{-2}$
 - B. $U(w)= a+bw^{-3}$
 - C. $U(w)= a+bw^{-4}$
 - D. D. All of the above **[1.5]**
- Q. 4)** Which of the following may not lead to an increase in demand for houses in a city suburban area?
- A. Population explosion leading to need for more dwellings
 - B. A new metro rail project linking the suburb with city's business district
 - C. Everything else remaining same, a lowering of prices of houses
 - D. Recent phenomenon of Double income no kids ("DINK") amongst young couples leading to higher disposable incomes **[1.5]**
- Q. 5)** Historically, farmers in India have been always provided with a Minimum support price ("MSP") on their wheat produce. This MSP is generally more than the free market price of wheat grains. In such a scenario, what could be the consequences?
- i) There would be an excess supply and government would have to step in to purchase the excess supply
 - ii) Some suppliers might break the official minimum price barrier and offer the produce at a price lower than the official minimum
 - iii) No effect of MSP, free market price would always prevail
- A. (i) only
 - B. (i) and (ii)
 - C. (i), (ii) and (iii)
 - D. D ii) and iii) **[1.5]**

- Q. 6)** Government of a country decides to impose a tax of Re. 1 per stick on the producers of cigarettes. If the demand for cigarettes is perfectly elastic, then this is expected to increase the cost to the consumers by
- A. Re 1
 - B. Less than Re 1
 - C. More than Re 1
 - D. D. Zero, entire cost has to be borne by the producers
- [1.5]**
- Q. 7)** Coke and Pepsi are substitutes of each other. An increase in the price of Coke is likely to
- A. increase the demand for Coke
 - B. increase the demand for Pepsi
 - C. keep the demand for Pepsi unchanged
 - D. D. keep the demand for Coke unchanged
- [1.5]**
- Q. 8)** Assume that the demand curve for compact discs slopes downwards, and the supply curve slopes upwards. If the price of CD players decreases, then:
- A. the equilibrium price of compact discs will fall
 - B. the equilibrium price of compact discs will rise
 - C. the equilibrium price of compact discs will stay the same
 - D. None of the above are correct
- [1.5]**
- Q. 9)** If the income elasticity of demand for a Mercedes Benz Car is 150, a 4% increase in consumer income will increase the quantity demanded of Mercedes Benz by:
- A. 250%
 - B. 267%
 - C. 550%
 - D. D. 600%
- [1.5]**
- Q. 10)** For a firm that is a price-taker in its output market, the marginal revenue product of a factor is found by multiplying the:
- A. marginal physical product of that factor and marginal revenue
 - B. marginal physical product of that factor and the price of the output
 - C. marginal physical product of that factor and the cost of the output
 - D. Both A and B are correct
- [1.5]**
- Q. 11)** A firm trying to maximize its profits should produce till
- A. marginal cost equals marginal revenue on the falling portion of marginal
 - B. cost curve
 - C. Average cost equals marginal revenue
 - D. marginal cost equals marginal revenue on the rising portion of marginal cost
 - E. D. Price is more than long run average cost
- [1.5]**

- Q. 12)** The level of wages is constant in a country at 36 units of currency. The marginal revenue product of labour is defined by the following equation: $-(N-100)^2 + 100$ units. Identify N, i.e. the number of labourers that maximizes the output.
- A. 164
 - B. 100
 - C. 108
 - D. D. 92
- [1.5]**
- Q. 13)** What can you say about the price elasticity of demand for a product supplied by a profit maximizing monopolist? Assume that marginal costs are positive.
- A. It must be negative with a magnitude of at least 1
 - B. It must be negative with a magnitude of less than 1
 - C. It must be inelastic
 - D. None of the above
- [1.5]**
- Q. 14)** The price of a product in perfect competition under long run equilibrium is equal to:
- i) the marginal cost of all firms
 - ii) the average revenue of all firms
 - iii) the long run average cost of all firms
 - iv) marginal revenue of all firms
- A. (i) and (ii)
 - B. (ii) and (iii)
 - C. (i), (ii) and (iii)
 - D. (i), (ii), (iii) and (iv)
- [1.5]**
- Q. 15)** Ceteris paribus, short-run aggregate supply decreases in response to:
- A. a decrease in the price level
 - B. a decrease in personal income tax rates.
 - C. an increase in consumers expecting future decline in income
 - D. an increase in the price of a major input, such as oil.
- [1.5]**
- Q. 16)** If aggregate demand increases and short-run aggregate supply is horizontal, the price level -----, real GDP -----, and the unemployment rate -----
- A stays the same; increases; increases.
 - B increases; decreases; stays the same.
 - C Stays the same; increases; decreases.
 - D decreases; stays the same; decreases.
- [1.5]**

- Q. 17)** The long-run aggregate supply curve is:
- A.** horizontal at the price level associated with the natural rate of unemployment (full employment).
 - B.** a vertical line at equilibrium output for all recessionary gaps.
 - C.** vertical at the output level associated with the natural rate of unemployment (full employment).
 - D.** horizontal at the natural rate of unemployment (full employment). **[1.5]**
- Q. 18)** If the actual unemployment rate is greater than the natural unemployment rate:
- A.** a recessionary gap exists and there is a surplus of labour.
 - B.** an inflationary gap exists and there is a shortage of labour.
 - C.** a recessionary gap exists and there is a shortage of labour.
 - D.** an inflationary gap exists and there is a surplus of labour **[1.5]**
- Q. 19)** In the Keynesian model, the primary determinant of consumption spending is -----
-- and the primary determinant of saving is -----.
- A.** disposable income; the interest rate
 - B.** saving; investment.
 - C.** supply; demand.
 - D.** disposable income; disposable income. **[1.5]**
- Q. 20)** All of the following statements are true except:
- A.** the marginal propensity to consume gives the change in consumption spending that occurs in response to a change in disposable income.
 - B.** $MPC + MPS = 1$
 - C.** the marginal propensity to save is negative when consumer spending is greater than disposable income.
 - D.** If the $MPC = 0.9$, the $MPS = 0.1$. **[1.5]**
- Q. 21)** If the marginal propensity to consume is 0.90, then the value of the simple spending, tax, and balance-budget multipliers are -----, -----, and ----- respectively.
- A.** 9; 10; -9
 - B.** 5; -4; 1
 - C.** 10; 9; 1
 - D.** 10; -9; 1 **[1.5]**
- Q. 22)** If the tax liability is Rs. 2200 when income is Rs. 20,000 and Rs. 4800 when income is Rs. 40,000, the income tax structure is:
- A.** regressive
 - B.** proportional
 - C.** progressive
 - D.** categorical **[1.5]**

- Q. 23)** Increases in government spending that lead to decrease in private sector activity refers to:
- A.** crowding out which tend to increase the effectiveness of fiscal policy
 - B.** crowding out which tend to decrease the effectiveness of fiscal policy
 - C.** policy lags which tend to increase the effectiveness of fiscal policy
 - D.** policy lags which tend to decrease the effectiveness of fiscal policy
- [1.5]**
- Q. 24)** The unemployment that occurs when workers do not have the skills demanded in labour markets is called ----- unemployment.
- A.** frictional
 - B.** structural
 - C.** seasonal
 - D.** cyclical
- [1.5]**
- Q. 25)** An increase in the required reserve will:
- A.** increase the value of the simple money multiplier.
 - B.** decrease the value of the simple money multiplier.
 - C.** have no impact on the value of the simple money multiplier.
 - D.** nullify the value of the simple money multiplier.
- [1.5]**
- Q. 26)** If c (the ratio of cash held by the public to their deposits) = 0.05 and r (bank's required reserve ratio) = 0.20, a \$200 increase in the monetary base will result in a maximum increase in the broad money supply of:
- A.** \$100
 - B.** \$420
 - C.** \$840
 - D.** None of the above.
- [1.5]**
- Q. 27)** Which of the following individuals would be classified as frictionally unemployed?
- A.** A college graduate that has been offered two jobs but is still looking what other jobs might be available.
 - B.** A restaurant manager that has been laid off because business is slow.
 - C.** A construction worker that has been prevented from working due to bad weather.
 - D.** An automobile worker that has been off because the autoworker's union is out on strike.
- [1.5]**
- Q. 28)** Which type of the following technological innovations might directly, significantly affect the LM curve?
- A.** ATM Cards
 - B.** More efficient ships
 - C.** Faster computer chips
 - D.** None of the above
- [1.5]**

Q. 29) Imagine a closed economy described by these behavioral equations and parameters:

Consumption Function: $C = 300 + 0.4(Y-T)$

Investment Function: $I = 200 - 75i$

Government Expenditure: $G = 100$

Tax Revenue: $T = 375$

Aggregate Demand Function: $AD = Y = C + I + G$

Demand for Money : $(M/P)^d = 0.9Y - 450i$

Nominal Money Supply : $M = 450$

Price Level : $P = 1$

- a. Write down the expression for the IS curve by analyzing the equilibrium in the market for goods. Interpret your findings. (2)
- b. Write down the expression for the LM curve by analyzing the equilibrium in the money market. Interpret. (2)
- c. Solve for the equilibrium interest rate, output, consumption and investment. (4)
- d. After many bad years, this country's economy has undergone a fragile recovery. The government decided that the situation requires a policy boost to maintain the expansion of output and investment. What would you advice them? Monetary or fiscal policy? (4)
- e. For this question, disregard the specifics of the model from above. Can you think a situation when fiscal policy is completely ineffective? When monetary policy is ineffective? (3)

[15]

Q. 30) Use the table given below to answer the following questions:

Disposable Income	Consumption Spending
\$ 0	\$ 500
\$ 500	\$ 900
\$ 1000	\$ 1300
\$ 1500	\$ 1700
\$ 2000	\$ 2100
\$ 2500	\$ 2500

- a. What is the value of autonomous consumption? (1)
- b. What is the value of disposable income when saving is zero? (1)
- c. What is the value of marginal propensity to consume? (1)

[3]

Q. 31) What is a Phillips curve? Explain why there should be an inverse relationship between the rate of unemployment and the rate of inflation as a result of shifts in aggregate demand along a stable, positively sloped aggregate supply curve. [5]

Q. 32) How can a deficit or surplus in a nation's balance of payment be corrected under a fixed-exchange rate system? How is it corrected under a flexible exchange rate system? [6]

- Q. 33)**
- a) An economy has only one public sector tele-communications firm Bharati Spice Nigam limited (:BSNL”) which operates for the purpose of maximizing its profits. The firm enjoys absolute monopoly. Sketch a diagram to demonstrate what would be the welfare cost for this monopoly. (2)
- b) Now assume that the firm is able to practice perfect price discrimination. Show with the help of a diagram the firm’s position in such a case. Also mention a few practical ideas about how could such a firm practice price discrimination. (3)
- c) Government decides to open the market for telecommunications and suddenly there are a lot of players in the market. List down the conditions with relevant examples about how could there be perfect competition in such a scenario. (3)

[8]

- Q. 34)** a) The non-cooperation movement: Suppose there are 2 exactly similar companies operating highly polluting petrochemical refineries. The figure below shows the payoffs available to them in case of choosing high Vs low polluting facilities

		IOC	
		Low pollution	High pollution
RIL	Low pollution	(100,100)	(-30,120)
	High pollution	(120,-30)	(100,100)

The two companies are Rescience Industries Limited (“RIL”) and Indian olive-oil corporation (“IOC”). The above pay offs matrix shows RIL and IOC in that order. Assuming rational behaviour by each firm and non-collusion, identify the strategy that the players are most likely to adopt. (2)

- b) Comment on your answer above in context of the effect on society. (2)
- c) Government steps in to correct the situation and gives incentives to companies which install pollution control devices and charges companies which don’t do so. Assuming the above pay off matrix as a starting point and the fact that the firms which follow pollution control get additional 50 units and the firms which don’t follow pollution control are penalized 50 units from their payoffs. Recreate the payoff matrix assuming that this is the only simplistic change and comment on the new emerging strategy(s). (2)
- d) Assume that the government gives equal absolute amount of incentives and disincentives. For example if X units are added to firms practicing pollution control, same X units are deducted from firms not opting for pollution control. Assuming the initial payoff matrix as a starting point, calculate the minimum value of X to ensure players are forced to assume a low pollution strategy according to game theory. (2)

[8]

- Q. 35)** Sev Anand of the Great Gambler fame realizes one fine day that he is left with only 10,000 rupees and he decides to risk all his money in gambling. He decides to stake all his money in a hand of cards where the payoff is 400 times the amount staked if he wins and nil otherwise. [The game is very simple where he pulls out three cards from a standard pack of cards one by one without replacement. He wins if all three cards he picks are same e.g. 3 aces, 3 10's etc.]
- a) Comment with calculations whether this is an unfair gamble or otherwise. (2)
- b) Assuming that over the range of 0 to 4,000,000 rupees, Sev Anand exhibits a utility function of the form $U(w) = bw^2$ ($b=100$), calculate the value of his certainty equivalent for this gamble. Please also comment on the results. (3)
- c) The casino owner has suffered losses in the past few years and decides to lower the stakes offered. He has progressively made all gambles unfair and hence lowered the stakes. Calculate how unfair the casino owner can get in offering payoffs on this gamble so that Sev Anand still would want to play the unfair gamble at a level of wealth of 10,000 rupees. (3)
- d) Assume that he wins the stake and he accumulates a total wealth of 4,000,000. At this point, his risk loving nature increases manifold and his utility function has a discontinuity, and utility function beyond this level of wealth is assumed to be $U(w) = bw^4$ ($b=100$). (Sketch the graph of his utility function over all ranges) (2)
- e) He decides to turn producer and actor of a movie with a new heroine roped in. He starts with 4,000,000 rupees made as a part of earlier gamble and also sees a sudden increase in his fortune by another 6,000,000 coming to him as part of a legacy his aunt Kekta Kapoor left for him. Hence he makes this movie with a total of 1 crore rupees. The chances of the movie succeeding are 1 in a thousand (even worse than that of the gamble he played earlier) and the payoff on success is 100 times the amount invested. If the movie flops, then he gets back to just over 4,000,000. Comment on the assertion whether he would still produce the movie? (3)

[13]
