Department of Economics

Jadavpur University

MA Admission Test Examination, 2013

Time 3 hours **Full marks 100**

Answer the questions in Group A following the instructions given in Group A. Then answer three questions taking one from each group: B, C and D.

Group A

Answer all questions 1 to 5 from Section I. Choose any five questions from Section II.

Section I: Choose the correct answer and give reasons for your choice.

1. Consider the following type of utility function u = f(x) + y, called quasi-linear utility function. Prices of the commodities are p_1 and p_2 respectively. The marginal utility of money is

   (i) function of both p_1 and p_2 (ii) independent of p_1

   (iii) independent of p_2 (iv) independent of both 2

2. Suppose, you want to measure consumer's welfare due to price change through consumer surplus. This can be done for:

   (i) Cobb-Douglas utility function (ii) Leontief utility function

   (iii) Quasi-linear utility function (iv) All the above 2

3. A profit-maximizing competitive firm has production function $f(x_1, x_2) = (\min\{x_1, 2x_2\})^{1/2}$. Suppose price per unit of both the inputs is equal to 1. If price of the product is 48 how many units of output are produced by the firm?

   (i) 16/3 (ii) 16 (iii) 1/8 (iv) 12 2

4. Consider a duopoly market for a homogeneous product with market demand D(p) = a – p. Assume the firms compete in terms of their prices. Suppose, the firms have the following identical cost structure: $C(q_i) = F + cq_i$ with F > 0 and c > 0 for i = 1, 2. What price combination will the firms at the equilibrium charge?

   (i) Both charge the monopoly price (ii) Both charge the marginal cost price

   (iii) Both charge the average cost price (iv) None of the above 2

5. Consider a market with infinitely elastic demand curve and a positively sloping supply curve. Suppose a unit tax is imposed on the commodity. The consumers bear:

(i) full burden of the tax (ii) no burden of the tax

(iii) 50% burden of the tax (iv) 25% burden of the tax 2

Section II: Give short answers

6. Derive the value of marginal utility of income of an individual having the preference pattern represented by the utility function $u = x_1^{\alpha} x_2^{1-\alpha}$, $0 < \alpha < 1$. Define a positive monotonic transformation of the utility function and check if the value of marginal utility of income remains unchanged with the transformation. 3

7. Consider two consumers with following demand functions:
   $X = 50 - p$
   $X = 100 - 2p$
   The marginal cost of producing the good is 6. Calculate the equilibrium consumption levels of the consumers,
   (i) if the good is a private good;
   (ii) If the good is a public good. 3

8. Suppose a monopoly is forced to charge the same price in two markets with the following demand curves: $q_1 = 20 - 2p_1$ and $q_2 = 10 - p_2$. The marginal cost of production is $c > 0$. What price does it charge? 3

9. Consider an economy with two individuals with utility functions $u_1 = x_{11}^{0.4} x_{21}^{0.6}$ and $u_2 = x_{12}^{0.6} x_{22}^{0.4}$ (where x_{ij} is the amount of good i consumed by individual j) and endowment bundles (1,0) and (0,1) respectively. Solve for the competitive price of the economy. 3

10. A monopsonist uses only factor X to produce her output Q which she sells in a competitive market at the fixed price p = 28. Her production and input supply functions are q = log x and r = 1

+ x respectively. Determine the values of x and r. Calculate the amount of monopsonistic exploitation. 3

11. Consider a monopoly with market demand function D(p) = a – p. The cost function is C(q) = c q. We assume, a > c > 0. Compare the monopoly output in the following two situations:

    (i) the monopoly is subject to a specific tax at the rate of t .

    (ii) the monopoly is subject to an ad-valorem tax at the rate of t.

    Which one of the two situations is more desirable from the social point of view? 3

Group B

12. What is the Phillips' curve? How would you explain its shape in the short run and the long run? Give reasons. 25

13. (a) In the complete Keynesian model, it is claimed that either liquidity trap or wage rigidity may lead to underemployment. Explain in terms of Aggregate Demand and Aggregate Supply diagrams. 15

    (b) Do you agree that an underemployment equilibrium is only possible under wage rigidity but not under liquidity trap. Explain. 10

Group C

14 a). Find the values of h and k that make the following function g continuous:

$$g(x)=\begin{cases} x^2+h & \text{if } x\le -1 \\ x+h & \text{if } -1< x\le 1 \\ \dfrac{x}{x+k} & \text{if } x>1 \end{cases}$$ 6

b) Find the domain of the following function

$$f(x,y)=\frac{x+y}{y^2-4x^2}$$ 3

c) Is the function given below always continuous and differentiable?

$f(z) = |z - 6| - 3$ 6

d. Consider the following function

$$f(x) = \frac{16}{3x^3} - \frac{3}{x^2} - \frac{1}{x}$$

Find the domain of this function. Then find absolute maxima and minima in the interval $1 \leq x \leq 4$. Find the inflexion points. 10

15 a) The utility you derive from exercise (X) and watching movies (M) is described by the function $U(X, M) = 100 - e^{-2X} - e^{-M}$. Currently you have 4 hours each day you can devote to either watching movies or exercising. Solve for the optimal amounts of time exercising and watching movies. Write down the second order condition. How does the value function change as you devote more time for the mentioned activities? Write down the dual problem. 12

b. Consider the problem

$$\text{Max} - (x_1 - 4)^2 - (x_2 - 4)^2$$

Subject to

$$x_1 + x_2 \leq 4$$
$$x_1 + 3x_2 \leq 9$$

Write down the optimization problem with complementary slackness conditions. Solve for optimum solution. 13

Group D

16 a) Explain the major differences between Binomial and Poisson Variables. Consider a Binomial distribution B (150, 0.7) . Deduce its Poisson approximation. Work out the first two central moments for both the distributions and comment. 10

b) Explain the following highlighting the major differences: i) standard deviation and standard error ii) Type I and Type II errors 5

c) Explain two variable linear regression model. Justify inclusion of disturbance terms in the model. Find out the least square estimates of regression coefficients of your chosen model from the information given below and also find out variance estimate of the estimate of slope parameter.

N= 22

Sum of observations on variable W= 88, Sum of squares of observations on variable W= 580

Sum of observations on variable Z= 66, Sum of squares of observations on Variable Z= 308

Sum of all cross products of observations on W and Z = 156 10

17a) Show how moments are used to describe the characteristics of a distribution viz. central tendency, dispersion, skewness and kurtosis. 6

b) In a socio-economic survey, variable X (i.e. poverty) assumes two distinct values, 0 and 1 where 0=BPL, 1=Not BPL; of the total number of observations N, a fraction p are ones and fraction q are zeros. Find the standard deviation of the N observations. 6

c) In how many ways can a group of N persons arrange themselves in a row and in a circle? 6

d) In a bulb factory, machines A, B and C manufacture 25%, 35% and 40% of the total output of bulbs; 5%, 4% and 2% are found to be defective bulbs respectively. One bulb is drawn at random and found to be defective. What are the probabilities of the bulb being manufactured by machines A, B and C respectively? 7