INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH, BHOPAL

MID-SEMESTER EXAMINATION
BATCH: 2018-19, SEMESTER-I

COURSE: ECO101 **FULL MARKS: 60**

► *Answer all the following questions. (Two and half hours.)*

Q 1. Consider the following demand and supply functions : (i) p+q=100 and (ii) p=q+10. Calculate the consumer surplus and the producer surplus (in rupees). Suppose an excise (per unit) tax of Rs 10 is imposed. Find the new market equilibrium price and quantity. Calculate the tax revenue (in rupees). Find dead-weight loss. Consider the Govt. introduces a price floor of Rs 50. What would be the market equilibrium price and quantity now. What would be the market equilibrium price and quantity if the Govt. provides a per unit subsidy of Rs 10. (1+1+1+1+1+1+2+2)

Q 2. (i) State the law of demand. Explain why the law of demand implies that MR (marginal revenue) $\leq$ Price (or buyer's maximum willingness to pay). (1+2)

(ii) Consider public policy aimed at smoking. Studies indicate that the price elasticity of demand for cigarettes is about 0.2. If a pack of cigarettes currently costs Rs. 200 and the government wants to reduce smoking by 10%, by how much should it increase the price? (2)

(iii) Suppose that a budget equation is given by $p_1x_1 + p_2x_2 = m$. The government decides to impose a lump-sum tax of u, a quantity tax on good 1 of t, and a quantity subsidy on good 2 of s. What is the formula for the new budget line? (3)

(iv) Give a demand function for an inferior good with unitary demand elasticity ($\eta = 1$). Also provide a demand function for a normal good with unitary demand elasticity ($\eta = 1$). (1+1)

Q 3. (i) If the demand function is $q = 50 - p/2$, find the inverse demand function. Draw the inverse demand curve. Draw the marginal revenue (MR) curve. Find the value of MR, when elasticity of demand is 1. (1+1+1+1)
(ii) If the consumer is consuming exactly two goods and he/she is always spending all of his money, show that, then both the goods can not be inferior. (2)

Q 4. (i) Consider the preferences of an individual represented by the following utility functions $U(x, y) = x + y$. Derive the demand function (for good X) when the consumer's budget line is given by $p_xx + p_yy = M$ where(x, y) is a representative commodity bundle and p_x, p_y & M respectively denotes price of commodity X, price of commodity Y and money

income of the consumer. (3)

(ii) Draw Engel curve for good X. (1)
(iii) Suppose $p_x = 50, p_y = 100, M = 1000$, then find optimal consumption bundle (x^*, y^*). (2)

Q 5. Draw indifference curve for each of these following cases: (1+1+1+1+1+1)

(i) X: good, Y: bad.
(ii) X: good, Y: good. $A = (x_A, y_A)$, $B = (x_B, y_B)$ is such that $A \sim B$ and $C = (x_C, y_C) = \alpha A + (1-\alpha)B$ where $\alpha \in (0,1)$. But $A(or\ B) \succ C$.
(iii) X: bad, Y: bad. $A = (x_A, y_A)$, $B = (x_B, y_B)$ is such that $A \sim B$ and $C = (x_C, y_C) = \alpha A + (1-\alpha)B$ where $\alpha \in (0,1)$. But $A(or\ B) \prec C$.
(iv) X: bad, Y: neutral.
(v) X: bad, Y: good. $A = (x_A, y_A)$, $B = (x_B, y_B)$ is such that $A \sim B$ and $C = (x_C, y_C) = \alpha A + (1-\alpha)B$ where $\alpha \in (0,1)$. But $A(or\ B) \succ C$.
(vi) X: good, Y: good. X and Y are perfectly substitute until consumption of product X is less than or equal to 100 units. Beyond 100 units of consumption X is treated as neutral good.

Q 6. Describe Hicksian price decomposition and Slutsky price decomposition for normal as well as inferior good. "All Giffen goods are inferior but all inferior goods are not necessarily Giffen goods." Explain. (2+2+2)

Or

Consider a consumer whose utility function is given by $U(x, y) = xy + 5$. Suppose p_x, p_y & M respectively are Rs 150, 100 and 3000. Let p_x reduces by Rs 50. Calculate the effect of price change on quantity demanded. Calculate Hicksian substitution effect and Slutsky substitution effect of this price reduction. (2+2+2)

Q 7. Consider the following utility functions:

(i) $U(x, y) = xy + 10$.
(ii) $U(x, y) = x^2y^2 + 10$.
(ii) $U(x, y) = log_e x + log_e y + 10$.

(a) Show that (just with geometric intuition and no calculus), each utility function has diminishing MRS (Marginal rate of substitution of X for Y). (1+1+1)
(b) Show that, marginal utilities are constant for case (i), increasing for case (ii) and decreasing for case (iii). (1+1+1)

Q 8. In case of production with a single variable input, define total, marginal and average product (with respect to the single input). Elaborate the relationship between marginal and average productivity. Describe stages of production. Prove that a profit maximizing firm to operate in the second stage of production (if the firm is at all producing). (3+1+2+4)