Exam. Code : 103203
Subject Code : 1116

B.A./B.Sc. 3rd Semester

QUANTITATIVE TECHNIQUES

(Quantitative Techniques—III)

Time Allowed—3 Hours] [Maximum Marks—100

Note :— Answer **FIVE** questions with at least **ONE** question from each Section.

SECTION—A

1. The cost function of a competitive firm is given by $C = 3 + 0.5Q^2$. The price of the product is Rs. 10. How much will he produce and what will be his profit ? Now the government imposes a unit tax of Rs. 2 on the good. How much will he produce now ? What will be his profit now ? How much tax will he have to hand over to the government ? 20

2. Consider a person whose income is Rs. 100. His Utility function is given by $U = 4X^2Y$. The price of X is Rs. 4 and that of Y is Rs. 10. How much of X and Y will he consume ? 20

SECTION—B

3. The demand curve of a good is given by $Q^D = 10 - P$. The supply curve is given by $Q^S = P$. What will be the consumer surplus ?

4. Integrate :

(a) $\int \ln(x)/x^2 dx$

(b) $\int (x)/(x^2+1)dx$ 10×2=20

SECTION—C

5. The supply curves of three goods, x, y and z are given by $Q^S(x) = P_X$, $Q^S(y) = 2P_Y$, $Q^S(z) = 3P_Z$ respectively. The demand curves are given by $Q^D(x) = 7 - 2P_X + P_Y - P_Z$, $Q^D(y) = 1 - P_X - P_Y$, $Q^D(z) = 4 + P_X + 2P_Y - P_Z$. Find out the equilibrium prices and quantities. 20

6. Find the inverse of the matrix :

$$\begin{matrix} 0 & -3 & -2 \\ 1 & -4 & -2 \\ -3 & 4 & 1 \end{matrix}$$

Verify by multiplying the inverse with the original. 20

SECTION—D

7. Consider a chocolate manufacturing company which produces only two types of biscuits – A and B. Both the biscuits require Milk and Chocolate only. To manufacture each unit of A and B, following quantities are required : Each kg of Biscuit A requires 1 kg of Milk and 3 kg of Chocolate. Each kg of Biscuit B requires 1 kg of Milk and 2 kg of Chocolate. The company store has a total of 50 kg of Milk and 120 kg of Chocolate. On each sale, the company makes a profit of Rs. 60 per kg A sold and Rs. 50 per kg B sold. Now, the company wishes to maximize its profit. How many units of A and B should it produce respectively ? 20

8. Consider the following input-output matrix of 3 by 3 sector model of an economy given below where the entries signify how much the production a unit of each sector demands from all sectors :

Sector	Primary	Services	Manufacturing
Primary	0.02	0.04	0.04
Services	.05	.03	0.01
Manufacturing	.2	.01	.1

The required net production of the three sectors are 4 trillion, 2 trillion and 6 trillion rupees respectively. What should be the gross production of all the three sectors ? 20