

(Answer any five of the following questions)

1. a) Solve the following models. 10
- i) $Q_d = \alpha - \beta P$; $\alpha, \beta > 0$
 $Q_s = -\gamma + \delta P$; $\gamma, \delta > 0$
- ii) $Q_{d1} = 18 - 2P_1 + P_2$; $Q_{d2} = 20 + P_1 - P_2$
 $Q_{s1} = -2 + 3P_1$; $Q_{s2} = -3 + P_2$
2. Given the national income model
 $Y = C + I + G$
 $C = a + bY_d$; $Y_d = Y - T_0$
 $I = I_0$ and $G = G_0$
- a) Interpret 'a' and 'b'. 2
- b) Find equilibrium national income and consumption. Are the results meaningful? 8
3. a) What does difference quotient $\left(\frac{\Delta y}{\Delta x}\right)$ measure? Find $\left(\frac{\Delta y}{\Delta x}\right)$ as a function x_0 and Δx from the function $y = f(x)$. 4
- b) Given $y = x^2 + 2$. Does $\left(\frac{\Delta y}{\Delta x}\right)$ depend on Δx ? What about the function $y = 5x + 3$? 6
4. Differentiate the following functions 10
- i) $\left(\frac{x^2}{1+x}\right)^3$; ii) $(2x+3)^5(1-x)$; iii) $[(2+x)^3(5x^2-3x+8)]^7$
- iv) $\ln\left(\frac{7+x}{1-6x}\right)^4$; iv) $e^{-(x^2+7)^8}$
5. a) Suppose, $z = \frac{x_1 + 2x_1x_2}{x_1x_2} = f(x_1, x_2)$; find f_1, f_2, f_{12} and f_{21} . 6
- b) Given the production function $Q = K^{0.8}L^{0.2}$. Determine the amount of marginal physical product of labour when $K = 2$ and $L = 3$. 4
6. a) Compute price elasticity of demand from the demand function: $Q = 100 - P^2$. At which price is demand unitarily elastic? 5
- b) Demand for commodity A is as below:
 $Q_A = 20 - 2P_A + 3P_B - P_C + \sqrt{M}$; ($P_A=5$; $P_B=4$; $P_C=6$ and $M=4$)
 What are the values of own price elasticity, cross price elasticity and income elasticity of demand? Comment on the results. 5
7. Calculate total differentials from the following functions. 10
- i) $U = x^\alpha y^\beta$; ii) $z = x^2 + 2xy^3$; iii) $S = 0.2Y + 3r$;
 iv) $y = (x_1 + x_1x_2^3)^2$; v) $w = (5+x)(2-3y)^{-2}$