e: 3 Hours

Max. Marks: 50

Questions 1 and 2 are compulsory. Answer any two from questions 3-5.

Mario just cares about the total consumption of units of instant noodles (good x) and units of potato chips (good y), with equal weight on both (assume the weight to be 1 for each). Price of instant noodles in 10 and price potato chips is 5 and the maximum amount she can spend on these two goods is Rs. 50.

i. Calculate the utility maximizing amounts of x and y that Mario will choose. Now, if the price of instant noodles falls to 7.5, what is the income and substitution effect of this price change on the consumption of instant noodles? Provide numerical answer as well as use appropriate graphs to show your answer graphically.

ii. What happens if the price of instant noodles falls further to 2.5? What are the income and substitution effects? What will be the impact on the consumption of both the goods (compare with the baseline case)? Use graphs. Explain your result. If you are a producer of potato chips, mention one way you can use this information to improve your sales.

iii. Is substitution effect always negative? Explain. Define marginal rate of substitution of y for x. In this example, does the utility function have diminishing marginal rate of substitution? Explain with appropriate indifference curves

5+5+5

The production function for photo-frames is: $Q = (L^{1/2} + K^{1/2})^2$, where L stands for labor and K stands for capital. Price of labor is 10 per unit and price of capital is 1 per unit

i. Find the cost minimizing combination of labor and capital for this manufacturer who wants to produce 121,000 frames. Also, show graphically.

ii. Define elasticity of substitution. What does this measure signify and how can managers use this information? Discuss. Find out the elasticity of substitution for the production function given here.

iii. What is the Law of Demand? In this case, does the labor demand follow the law of demand? Derive the labor demand function and draw the demand curve. Is there a connection between wage elasticity of labor demand and bargaining power of the suppliers for extracting a favorable wage from the companies? Explain. (*Hint:* Who are the suppliers here?)

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Rillette has a monopoly in the market for razor blades in a country, *Panem*. The market demand curve for blades in *Panem* is $P = 968 - 20Q$, where P is the price of blades and Q is the annual demand. *Rillette* has two plants that can manufacture blades: one in District 11 and the other in District 12. In District 11 plant, marginal cost of production is a constant and given by $MC_1(Q_1) = 8$. The District 12 plant has a marginal cost function given by $MC_2(Q_2) = 1 + 0.5Q_2$. The two districts are well connected to the rest of the country and transportation is costless.

i. Find *Rillete*'s profit-maximizing price and quantity of output for the overall *Panem* market. How much production will take place in each of these plants? Answer graphically as well as numerically. (*Hint:* Think of total profit).

ii. A natural disaster causes District 12 to be completely physically isolated from the rest of the country. *Rillete* now has two demand functions: demand for blades in District 12 is: $P_2 = 328 - 40Q_2$, and that for the rest of the country (minus District 12): $P_1 = 1608 - 40Q_1$. Marginal cost structures remain the same. Can *Rillette* engage in price discrimination? Explain. Suggest a pricing and output scheme that *Rillette* can follow for the two regions. Answer numerically as well as graphically. Is this scheme (chosen by you) increasing *Rillete*'s total profit (as compared to part i)?

5+5

Demand and supply functions for Frisbees are as follows: $Q_d = 95 - 5P$ and $Q_s = -40 + 10P$.

i. Is the demand for Frisbees price elastic or inelastic at equilibrium? What should the producers do at this point to increase total revenue? Find the value of

price elasticity at equilibrium to answer these questions. What is the value of price elasticity of supply at equilibrium and what is the significance of this value?

ii. Frisbee manufacturers persuade the government that Frisbee production improves scientists' understanding of aerodynamics and thus is important for national security. The Legislative Houses vote to impose a price floor of 3 above the equilibrium price. What is the new market price and quantity of Frisbees? How do we measure whether this policy intervention is going to be more efficient (as compared to the no-intervention case)? Answer by comparing consumer and producer surpluses and also comment on the whether there is dead weight loss (if yes, how much?). Calculate how much the government would have to spend to purchase the excess supply as a result of this price floor. Show graphically

5+5

5. Write short notes on:

i. Solving a Prisoner's Dilemma game (either by using the concept of Nash Equilibrium or Dominant Strategy Equilibrium)

ii. Five special properties of a Cobb Douglas Production Function with two inputs.

5+5