Answer any 4 groups. Each group is worth 5 marks.

Group 1

1. A consumer of two goods faces positive prices and has a positive income. His utility function is $u(x_1, x_2) = x_1$.

   a) (1.5 marks) Derive the Marshallian demand functions.
   b) (0.5 marks) Compute the indirect utility function.
   c) (0.5 marks) Determine the expenditure function.
   d) (1 mark) Using Shephard's lemma, derive the compensated (or Hicksian) demand functions.

2. (1.5 marks) In a world of two goods, let the preferences of a consumer be given by the following:

   (x_1, x_2) is "at least as good as" (y_1, y_2) if and only if $x_1 > y_1$ or $x_1 = y_1$ and $x_2 \geq y_2$.
Can these preferences be represented by a utility function? Explain.

Group 2

1. Marc is risk averse. He has initial wealth of w and suffers a loss $D < w$ with probability p. With probability $1 - p$ Marc's wealth does not suffer any change. Marc can buy an amount of insurance A (receiving A in case the loss occurs), paying a price qA. Show that:

   a) (1.5 marks) Marc wants to buy full insurance (i.e., $A = D$) when $p = q$.
   b) (1.5 marks) Marc wishes to buy insurance $A < D$ if $q > p$.
   c) (1 mark) Explain intuitively.

2. (1 mark) Explain the Weak Axiom of Revealed Preference (WARP).

Group 3

1. Consider a firm whose technology is:

$$f(x_1, x_2) = (x^a_1 + x^a_2)^{1/a}$$

   a) (2 marks) Determine the conditional input demands.
   b) (1 mark) Compute the cost function.
   c) (1 mark) Show that the cost function is homogeneous of degree one in the prices of inputs.

2. (1 mark) Let $y = f(x_1, x_2)$ be a constant returns-to-scale production function. Show that if the average product of x_1 is rising, the marginal product of x_2 is negative.

Group 4

1. A monopolist faces linear demand $p = a - bq$ and has cost $C = cq + F$, where all parameters are positive, $a > c$, and $(a - c)^2 > 4bF$.

   a) (2 marks) Solve for the monopolist's output, price, and profits.
   b) (1.5 marks) Calculate the deadweight loss and show that it is positive.

2. (1.5 marks) "Consumer surplus is an exact measure of consumer welfare." Under which conditions is this statement true? Explain.

Group 5

Consider the Battle of Sexes with incomplete information, where player 2 (the column-player) may have two types:

Type I

	F	O
F	3,1	0,0
O	0,0	1,3

Type II

	F	O
F	3,0	0,1
O	0,3	1,0

   a) (2.5 marks) Compute all Nash equilibria (in pure and in mixed strategies) when player 1 (the row-player) knows that player 2 is Type I.
   b) (2.5 marks) Now assume player 1 does not know the type of player 2. Compute the Bayes Nash equilibria in pure strategies of the incomplete information game. (Let p be the probability with which player 1 believes player 2 is of Type I.)

Group 6

Compute all weak Bayesian perfect equilibria of the following signaling game.