

**General Equilibrium and Welfare Economics (HS30212)**

**Mid-Semester Examination (Spring 2022-23)**

**Full Marks: 30**

*Answer All Questions*

1. Consider the following endowment economy where, preference and endowment of Individual 1 is: utility:  $u^1(x_1^1, x_2^1) = (x_1^1)^\alpha (x_2^1)^{1-\alpha}$ ;  $0 < \alpha < 1$ . Here,  $x_1^1$  is the consumption of good 1 by individual 1, and  $x_2^1$  is the consumption of good 2 by individual 1. Suppose, the endowment of good 1 to individual 1 is  $\omega_1^1$ , and the endowment of good 2 to the individual 1 is,  $\omega_2^1$ . The preference and endowment of Individual 2: utility:  $u^2(x_1^2, x_2^2) = (x_1^2)^\beta (x_2^2)^{1-\beta}$ ;  $0 < \beta < 1$ . Here,  $x_1^2$  is the consumption of good 1 by individual 2, and  $x_2^2$  is the consumption of good 2 by individual 2. Suppose, the endowment of good 1 to individual 2 is  $\omega_1^2$ , and the endowment of good 2 to the individual 2 is,  $\omega_2^2$ . Price of good 1 is  $p_1$ . Price of good 2 is,  $p_2$ . Total endowment of good 1:  $\omega_1 = \omega_1^1 + \omega_1^2$ . Total endowment of good 2:  $\omega_2 = \omega_2^1 + \omega_2^2$ . (20)

- Derive the Marshallian demand functions for both goods for individual 1 and individual 2. (2+2+2+2=8)
- Assuming good 2 as *numeraire*, derive the market clearing relative price for good 1 relative to good 2,  $p_1^*$ . (4)
- Calculate,  $p_1^*$  when,  $\alpha = \beta = 0.5$ ;  $\omega_1^1 = \omega_2^2 = 10$ ;  $\omega_2^1 = \omega_1^2 = 0$ . (2)
- Calculate, Marshallian demand for both goods for both individuals when,  $\alpha = \beta = 0.5$ ;  $\omega_1^1 = \omega_2^2 = 10$ ;  $\omega_2^1 = \omega_1^2 = 0$ . (4)
- Write down the competitive/Walrasian equilibrium of the economy. (2)

2. Consider an economy where, individual lives only two periods – current period, and future period. Utility function of the individual is,  $u = u(c, c_f) = c^\alpha c_f^{1-\alpha}$ ;  $0 < \alpha < 1$ ,  $c$  is the real consumption in the current period, and  $c_f$  is the same for the future period. Endowment of the current period is,  $\omega$ ; and the same for the future period is,  $\omega_f$ . Individual saves ( $s$ ) in current period and earns nominal interest,  $i$ . Price in the current period is,  $p$ , and the same for future period is,  $p_f$ . Net inflation rate is,  $\pi$ , and gross inflation rate is,  $1 + \pi = \frac{p_f}{p}$ . (10)

- Derive the Marshallian demand functions for real current and future consumption. (2+2=4)
- Assuming current real consumption as *numeraire*, derive the market clearing gross real interest rate. (2)
- Calculate, the market clearing gross real interest rate,  $(1 + r)$  when,  $\omega = 12$ ,  $\omega_f = 5$ ,  $\alpha = 0.5$ . (1)