INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
Mid-Spring Semester Examination 2022-23

Full Marks: 30 **Duration:** 2 hrs
Subject No.: EM21202/HS21202 **Subject Name:** Microeconomics-II
Department/Center/School: Humanities & Social Sciences
Specific charts, graph paper, log book etc., required. No
Special Instruction: All the questions are compulsory. Read the question paper carefully. No queries will be entertained during examination.

1. Argue whether the following statements are true or false giving appropriate reason(s) in favour of your answer. If required, prove or disprove the statement: 3x4 = 12

a) Expansion path is linear only when the production function is linearly homogeneous.

b) A profit maximizing firm may operate in the positively sloped portion of an isoquant.

c) All homothetic production functions are homogeneous production functions and vice-versa.

2. Consider a production function: $Q = AL^{\alpha}K^{\beta}$ where α and β are positive constants. Let marginal productivity of labour is falling. What can you conclude about the marginal productivity of capital if the production function exhibits increasing returns to scale technology (IRS)? Will your answer change if instead you have constant returns to scale (CRS) or decreasing returns to scale (DRS)? 8

3. Suppose life expectancy in years (L) is a function of two inputs, health expenditures (H) and nutrition expenditures (N) in hundreds of dollars per year. The production function is $L = cH^{0.8}N^{0.2}$. 5 × 2 = 10

(a) Beginning with a health input of \$400 per year ($H = 4$) and a nutrition input of \$4900 per year ($N = 49$), show that the marginal product of health expenditures and the marginal product of nutrition expenditures are both decreasing.

(b) Does this production function exhibit increasing, decreasing, or constant returns to scale?

(c) Suppose that in a country suffering from famine, N is fixed at 2 and that $c = 20$. Plot the production function for life expectancy as a function of health expenditures, with L on the vertical axis and H on the horizontal axis.

(d) Now suppose another nation provides food aid to the country suffering from famine so that N increases to 4. Plot the new production function.

(e) Now suppose that $N = 4$ and $H = 2$. You run a charity that can provide either food aid or health aid to this country. Which would provide a greater benefit: increasing H by 1 or N by 1?