|  |  |  |
| --- | --- | --- |
| **1/Eco/(C)-103** | | |
|  | **2013**  **[**December]**]**  **ECONOMICS**  **Mathematics for Economists**  Full Marks: 75; Time: 3 hours  *The figures in the margin indicate full marks for the questions*  Answer **five** questions, selecting at least **one** from each Credit |  |
|  | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  |
|  |  |  |
|  | **CREDIT – I** |  |
|  |  |  |
| 1. | (a) Prove that for subsets of a given universal set U | 3+3 |
|  |  |  |
|  |  |  |
|  | Illustrate each case on a Venn diagram. |  |
|  |  |  |
|  | (b) Verify if the given matrix ‘A’ is an orthogonal matrix: | 9 |
|  |  |  |
| 2. | (a) Provide geometric interpretation of a determinant having two rows and two columns. | 7 |
|  |  |  |
|  | (b) Given the function, find the Hessian matrix and determine the sign of the Hessian matrix evaluating its principal minors. | 3+5 |
|  |  |  |
|  |  |  |
|  | **CREDIT – II** |  |
|  |  |  |
| 3. | (a) Write an explanatory note on Cobb-Douglas production function and its properties. | 8 |
|  |  |  |
|  | (b) Given the cost (C) function of a multi-product firm and the sales prices (P1, P2) of commodities produced, find the maximum level of profit earned by the firm if quantity of commodities produced are Q1, and Q2: | 7 |
|  |  |  |
|  |  |  |
|  |  |  |
| 4. | (a) Derive the necessary and sufficiency conditions of utility maximization given the following utility function (U) and budgetary constraint (B) as follows: | 8 |
|  |  |  |
|  |  |  |
|  |  |  |
|  | (b) Given the function,test whether the function ‘H’ is homogeneous and homothetic. | 5+2 |
|  |  |  |
|  | **CREDIT – III** |  |
|  |  |  |
| 5. | (a) Solve the following market model: | 5 |
|  |  |  |
|  |  |  |
|  |  |  |
|  | (b) Make a critical assessment of Domar growth model | 10 |
|  |  |  |
| 6. | (a) Solve the following second order linear differential equation having constant coefficients and constant term: | 10 |
|  |  |  |
|  | (b) Explain the procedure of solving a Bernoulli equation. | 5 |
|  |  |  |
|  |  |  |
|  | **CREDIT – IV** |  |
|  |  |  |
| 7. | (a) Derive the time path of Y, given the first order difference equation having constant coefficient and constant term: | 8 |
|  |  |  |
|  | (b) What is a Cobweb model? What does it explain? | 7 |
|  |  |  |
| 8. | (a) Given the following demand and supply functions, find the inter temporal equilibrium price and determine whether the equilibrium is stable: | 8 |
|  | (b) Examine the stability conditions of equilibrium price of a market in which inventory exists. | 7 |