M.A. Examination, 2018
Semester-II
Economics
Course-C8
(Quantitative Economic Analysis)

Time: Three Hours **Full Marks: 40**

Questions are of value as indicated in the margin

Answer **Question no 1** and ***any three*** from the rest of the following questions

1. Find the optimal control path that will

Maximize $\int_0^2 (2y - 3u)dt$

Subject to $\dot{y} = y + u$, $y(0) = 4$, $y(2)$ free and $u(t) \in [0,2]$. 10

2. Find the optimal control path for the following problems that will

(a) Maximize $\int_0^1 (y - u^2)dt$

Subject to $\dot{y} = u$ and $y(0) = 5$, $y(1)$ free.

(b) Maximize $\int_0^T -(t^2 + u^2)dt$

Subject to $\dot{y} = u$, $y(0) = 4$, $y(T) = 5$ and T free. 4+6

3. Given the input matrix and the final demand vector

$$A = \begin{bmatrix} 0.05 & 0.25 & 0.34 \\ 0.33 & 0.10 & 0.12 \\ 0.19 & 0.38 & 0 \end{bmatrix} \quad d = \begin{bmatrix} 1800 \\ 200 \\ 900 \end{bmatrix}$$

(a) Explain the economic meaning of the elements 0.33, 0 and 200.

(b) Explain the economic meaning (if any) of the third-column sum.

(c)Explain the economic meaning (if any) of the third-row sum.

(d) Find the output levels of three industries by Cramer's rule. 2+2+2+4

4. (a) Show that if any of the constraints in the primal problem be a perfect equality, then the corresponding dual variable is unrestricted in sign.

(b) Prove that the dual of the dual is primal in LPP. 6+4

5 (a) Solve the following LPP graphically.

Minimize $z = x_1 + x_2$

Subject to $5x_1 + 9x_2 \leq 45$,

$x_1 + x_2 \geq 2$,

$x_2 \leq 4$ and $x_1, x_2 \geq 0$.

(b) Find the dual of the following LPP

Maximize $z = 6x_1 + 5x_2 + 10x_3$

Subject to $4x_1 + 5x_2 + 7x_3 \leq 5$,

$3x_1 + 7x_3 \leq 10$,

$2x_1 + x_2 + 8x_3 = 20$,

$2x_2 + 9x_3 \geq 5$,

$x_j \geq 0$, $j = 1,3$ and x_2 is unrestricted in sign. 5+5

6. Show that the long-run equilibrium is a saddle point in the Ramsey-Solow model. 10

7. Write a note on Leontief Static Open Model. 10

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