21. If $U = x^{0.5}y^{0.5}$ is the utility function, find the marginal rate of substitution between the two commodities.

Group - C

Answer any ***two*** questions. 10×2=20

22. A constant elasticity of substation (CES) production function is given by $Q = 5\left[0.3L^{-2} + 0.7k^{-2}\right]^{-\frac{1}{2}}$. Show that the function obeys constant returns to scale. Calculate the elasticity of substitution of this function.

23. Find the equilibrium values of x and y given the utility function, $U = 4x^{0.5}y^{0.5}$ and the budget constraint $60 = 2x + y$.

24. Consider the rate of price change in a market is 3 times the amount of excess demand in the market. If the demand and supply functions are given respectively as $D = 5 - 3p$, $S = 3 - 2p$, examine the stability of the market in the dynamic sense. The initial condition given as $p = p_0$ when $t = 0$.

25. What do you mean by feasible solution? Solve the following LPP problem with simplex method.

Maximise $Z = 5x + 6y$

Subject to $x + y \le 5$

$2x + 3y \le 12$

$x \ge 0,\ y \ge 0$

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Total Pages : 4 **B.Sc./2nd Sem (H)/ECO/24(CBCS)**

2024

2nd Semester Examination

ECONOMICS (Honours)

Paper : C 4-T

(Mathematical Methods in Economics - II)

[CBCS]

Full Marks : 60 Time : Three Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Group - A

Answer any ***ten*** questions : 2×10=20

1. What is the rank of a matrix where every element of which is unity?

2. When the Indifference curve will be of convex shape?

3. When the value of Elasticity of Substitution will be 0?

4. Show that $U = x + y$ is a homogenous function.

5. If $U = (x + 2)^2 (y + 3)^3$, what will be the value of MU_x?

6. Consider the implicit function : $y - 3x^4 = 0$. Derive the value of dy/dx.

P.T.O.

7. What is a slack variable in LPP?

8. What is meant by indirect objective function?

9. Let $x(u,v)=u^2-v^2$, $y(u,v)=2uv$. Find the Jacobian $J(u,v)$.

10. Briefly state the Euler's theorem.

11. Find and interpret the slope of the following equation, which gives the demand function for rice for a given period. $\rightarrow\rightarrow$

$q=-0.15p+0.14$

12. Given $S=\{5,15,30\}$, define all the possible sets.

13. Use L Hospital's rule and find the limit of the following function : $\lim_{x\to 1}\left(\frac{1-x^2}{1-x}\right)$.

14. The revenue function of a firm is, $R=5Q+2Q^2+Q^3$, Derive the Marginal Revenue Function.

15. Find the price elasticity of the following demand function : $P = 18/2Q$.

Group - B

Answer any ***four*** questions. 5×4=20

16. A function is given by $y=3x^3-6$. Describe its geometric shape if x can assume only positive values.

17. Find the inverse of the matrix :

$$\begin{bmatrix} 4 & -2 & 1 \\ 7 & 3 & 3 \\ 2 & 0 & 1 \end{bmatrix}$$

18. Formulate the dual of the LPP :

Min $C=10x+14y$

Subject to $x+2y\geq 6$

$x+5y\geq 4$

$3x+y\geq 3$, where $x, y>0$

19. The profit function of the firm is given by $\pi=80x-1.5x^2-xy-y^2+60y$, find the profit maximizing combination of output and maximum profit of the firm.

20. Consider the following National Income model.

$C = a + bY$

$I = d + eY$

$Y = I + C$; where C = Aggregate Consumption, I = Investment, Y = National Income; and a, b, d and e are constants.

Solve for the endogenous variables by using Cramer's rule.

P.T.O.