23. A radio manufacture produces 'X' sets per week at total cost of Rs. $\left(\frac{x^2}{25}+3x+100\right)$.

He is a monopolist and the demand for this market is x = 75 – 3p, where p is the price in rupees per set. Show that the maximum net revenue is obtained when about 30 sets are produced per week. What is the monopoly price ?

24. Describe the equilibrium of a utility function of a single commodity.

25. Describe the demand function of a single commodity. **(4×5=20)**

PART – D

Long essay – answer **any two** questions. Answer should **not** exceed **6** pages **each**.

26 Elucidate the Stackelbury Duopoly model.

27. Derive the constant elasticity demand function of a commodity 'x' with price 'p' under consumer's aggregate income 'y' with co-effectuates b_1, b_2, b_3 being price, income and cross elasticity of demand respectively.

28. The production function of a commodity is given by $Q = 40F + 3F^2 - \frac{F^3}{3}$ where

Q = output and F – units of input

i) Find the number of units of input required to give maximum output.

ii) Find the minimum value of marginal cost.

iii) Verify that when the average product is maximum, it is equal to marginal product.

29. The following inter-industry transaction table was constructed for an economy for the year 2017.

Industry	1	2	Final Consumption	Total
1	500	1,600	400	2,500
2	1,750	1,600	4,650	8,000
Labour	250	4,800	–	5,050
Total	**2,500**	**8,000**	**5,050**	**15,550**

Construct technological co-efficient matrix showing direct requirements. Does a solution exist for the system ? **(2×10=20)**

K18P 0394

Reg. No. : .....

Name : .....

Fourth Semester M.A. Degree (Reg./Suppl./Imp.) Examination, March 2018

Economics /Development Economics

(2014 Admn. Onwards)

ECO 4E15 : MATHEMATICAL ECONOMICS

Time : 3 Hours Total Marks : 60

PART – A

Objective type questions. Answer **all** questions.

1. The relation between marginal revenue and price elasticity is

a) MR = P(1/e – 1) b) MR = P – e/P

c) MR = P (1 – 1/e) d) MR = e(1 – 1/P)

2. What is the return to scale of the following function

$Q = b_0L^{0.7}K^{0.3}$

a) Increasing b) Decreasing

c) Constant d) Indeterminate

3. If the price of all goods increases by the same proportion as income then the quantity of good X demanded will

a) Decrease b) No change

c) Increase d) Will change by the same proportion

4. What is the marginal product of Labour (MP_L) of the production function.

$F(L, K) = LK^2$

a) 2LK b) 2L

c) K^2 d) $0.5L^2K^2$

P.T.O.

5. Under which type of market is price rigidity (stickiness) often predicted
   a) Perfect competition b) Oligopoly
   c) Monopoly d) Imperfect competition

6. If a monopolist switches from profit maximization to sales maximization, it will plan to
   a) Reduce price b) Increase price
   c) Reduce output d) Increase MR

7. Consider the following two – person game, what is Y's best strategy ?

	Y_1	Y_2
X_1	3	6
X_2	2	– 2

   a) X_1 b) X_2
   c) Y_1 d) Y_2

8. The saddle point in a pay-off matrix is always the
   a) Largest number is the matrix
   b) Smallest number is its column and the smallest number is its row
   c) Smallest number is the matrix
   d) Largest number is its column and the smallest number in its row. **(8×½=4)**

PART – B

Short answer questions, answer **any 8** questions. Answer should **not** exceed **1½** pages **each**.

9. If the demand function is $P = \sqrt{9-Q}$. Find at what level of output 'Q' the total revenue (TR) will be maximum and what will it be ?

10. If the total cost function is
    $C = 1/3Q^3 - 3Q^2 + 9Q$
    Find at what level of output, Average Cost (AC) be minimum and what level will it be ?

11. Differentiate between mixed and pure strategy.

12. Explain indirect utility function.

13. Given an example of a input demand function.

14. Suppose that the demand and total cost function of a monopolist are $P = 20 - 4x$ and $C = 4x$ respectively. And the tax is ½ per unit of quantity produced. Then what should be the quantity produced to maximize the profit of the monopolist.

15. What is second degree price discrimination ?

16. What is Degeneracy in Linear programming ?

17. What is the difference between closed and open Input – Output models ?

18. Define Lerner index under of monopoly power. Calculate Lerner index when the elasticity of demand for the firm is – 4.

19. Define saddle point. **(8×2=16)**

PART – C

Short essay, answer **any 4** questions. Answer should **not** exceed **2½** pages **each**.

20. An economy produces only coal and steel. The two commodities serve as intermediate input in each other's production, 0.4 tonne of steel and 0.7 tonne of coal are needed to produce a tone of steel. Similarly 0.1 tonne of steel and 0.6 tonne of coal are required to produce a tone of coal. No capital inputs are needed. Do you think that the system is viable. 2 and 5 labour days are required to produce a tone of coal and steel respectively. If the economy needs 100 tonnes of coal and 50 tonnes of steel. Calculate the gross output of the two commodities and the total labour required.

21. For the Cobb-Douglas function
    $Q = aK^{0.25} L^{0.75}$
    Prove the Euler's Theorem is satisfied.

22. Explain with example a simple Two-Person Zero-Sum game.