



## QUESTION BANK

### Karanjia Auto College, Karanjia, Mayurbhanj

#### **+3 1st YEAR ARTS (1st SEMESTER) CORE-02 MATHEMATICAL METHOD FOR ECONOMICS-I GROUP-A**

1. A null set is denoted by\_\_\_\_\_.
2. A void set is denoted by\_\_\_\_\_.
3.  $A \cup B = B$ \_\_\_\_\_  $A$ .
4. If  $A \subset B$ , then  $A \cap B =$ \_\_\_\_\_.
5. If  $A \subset B$ , then  $A \cup B =$ \_\_\_\_\_.
- 6  $A \cup B =$ \_\_\_\_\_.
7. \_\_\_\_\_ is regarded as the father of set theory.
8. The Venn diagram was introduced by\_\_\_\_\_.
9. Relation sets are obtained from\_\_\_\_\_.
10.  $Y = +5$  is a\_\_\_\_\_ function.
11.  $Y =$  \_\_\_\_\_ isa \_\_\_\_\_ function.
12.  $Y = 3 + 2x + 4$  is a \_\_\_\_\_ function.
13. A function is said to be\_\_\_\_\_ function when two or more elements of its domain are related to one elements of its codomain.
14. A function is said to be\_\_\_\_\_ function when no elements of its codomain is related with more than one element of its domain.
15. A function is said to be\_\_\_\_\_ function when all the elements of its domain are associated with a single element of its codomain.
16. A function that is obtained by interchanging the order pairs of a oneone onto function is called an inverse function.



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17. A function that is directly expressed in terms of independent variable is called \_\_\_\_\_ function.
18. A function in which each element of its domain corresponds to itself is called \_\_\_\_\_ function.
19. Differentiation of a constant function is \_\_\_\_\_.
20. Differential coefficient of  $a^x =$  \_\_\_\_\_.
21. Differential coefficient of  $x^a =$  \_\_\_\_\_.
22. Differential coefficient of  $\log a^x =$  \_\_\_\_\_.
23. Differential coefficient of  $\log x + 4 =$  \_\_\_\_\_.
24. If total cost is  $C = -5 + 31x$ , then marginal cost will be \_\_\_\_\_.
25. If total Cost  $C = -2x^2 + 43x$ , then average cost will be \_\_\_\_\_.
26. The first order partial derivatives of the function  $2x^2 + 5xy - (y^2)$  w.r.t. X is \_\_\_\_\_.
27. The first order partial derivatives of the function  $2x^2 + 5xy - (y^2)$  w.r.t. Y is \_\_\_\_\_.
28. In case of substitute commodity, the value of cross elasticity of demand will be \_\_\_\_\_.
29. In case of complementary commodity, the value of cross elasticity of demand will be \_\_\_\_\_.
30. A matrix consists of one element only is called \_\_\_\_\_ matrix.
31. A matrix that appears with equal number of rows and columns is called \_\_\_\_\_ matrix.



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32. A diagonal matrix in which all the leading diagonal elements are equal is called \_\_\_\_\_ matrix.
33. A square matrix in which all the leading diagonal elements are unity and all other elements are zeroes is called a \_\_\_\_\_ matrix.
34. If  $(A^{-1})^* = I$ , then A is \_\_\_\_\_ matrix.
35. \_\_\_\_\_ is a numerical value or expression associated with a square matrix.
36. The determinant of a matrix is same as the determinant of its \_\_\_\_\_.
37. If any row or column of the determinant consist of zeroes only the value of the determinant becomes \_\_\_\_\_.
38. If any two row or column of the determinant are identical then the value of the determinant becomes \_\_\_\_\_.
39. A square matrix with a non-zero matrix is called \_\_\_\_\_ matrix.
40. A square matrix A is said to be \_\_\_\_\_ if  $|A| = 0$ .
41. Determinant of the matrix  $\begin{vmatrix} 8 & 5 \\ 1 & 6 \end{vmatrix}$ , is \_\_\_\_\_.
42. Rank of the matrix  $\begin{vmatrix} 6 & 9 \\ 2 & 3 \end{vmatrix}$ , is \_\_\_\_\_.
43.  $\begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix}$ , is an example of \_\_\_\_\_ matrix.
44. \_\_\_\_\_ is the /o of  $\begin{vmatrix} 12 & 9 \\ 5 & 8 \end{vmatrix}$ .



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45. 10 of  $+^{-5}-4 -12^{-8}$ , is \_\_\_\_\_.
46. The matrix A is idempotent if  $A \times A$ : \_\_\_\_\_.
47. An adjoint matrix is the ..... of the cofactor matrix.

#### GROUP-B

Each question carries 2 marks

1. What do you mean by cardinality of a set?
2. What is void set?
3. What is valid set?
4. What is finite set?
5. What is infinite set?
6. What is singleton set?
7. What is multitone set?
8. What is equal set?
9. What is equivalent set?
10. What is disjoint set?
11. Set of all colleges of Odisha, explain this set by descriptive method?
12. Set of odd numbers between 5 and 50, explain this set by descriptive method?
13. Set of even numbers between 1 and 45, explain this set by descriptive method?
14. Set of natural numbers between 1 and 100, explain this set by descriptive method?
15. By using suitable example prove that  $A-(B \cup C) = (A-B) \cap (A-C)$ .
16. By using suitable example prove that  $A-(B \cap C) = (A-B) \cup (A-C)$ .



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17. What is reflexive relation?
18. What is symmetric relation?
19. What is order relation?
20. What is binary relation?
21. What is inverse relation?
22. Represent the function  $f(x) = 3 + 2x$  by means of the appropriate graph?
23. Represent the function  $f(x) = x + 5$  by means of the appropriate graph?
24. Represent the function  $f(x) = 7^x$  by means of the appropriate graph?
25. Find inverse of the function  $f(x) = 3x - 1$ .
26. Find inverse of the function  $Y = 5^x$
27. What is function?
28. What is image?
29. What is pre-image?
30. Write short note on Radix?
31. Write short note on Normalisation?
32. Write short note on fractional number?
33. Write short note on mixed number?
34. Write short note on floating point representation?
35. Convert the binary no.  $(111)_2$  into decimal equivalent?
36. Convert the binary no.  $(1101)_2$  into decimal equivalent?
37. Convert 54 into its binary equivalent?
38. Convert 5455 into its binary equivalent?
39. Convert 550 into its binary equivalent?
40. Convert 3565 into its binary equivalent?



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41. What is onto function?
42. What is into function?
43. What is one one function?
44. What is many one function?
45. What is constant function?
46. What is discontinuous function?
47. What is even function?
48. What is odd function?
49. What is composite function?
50. What is exponential function?
51. What is polynomial function?
52. What is rational function?
53. What is irrational function?
54. What is monotonic function?
55. What is parametric function?
56. Define limit of a function?  
89: #<7=#>?
57. Evaluate \_\_\_\_\_#→# #<>% .
58. Define continuity of a function? #<>@
59. Find if the function \_\_\_\_\_ is discontinuous at x = 3.  
#>'
60. What is differential coefficient?
61. What is differentiation?
62. State the product rule of differentiation?
63. State the quotient rule of differentiation?



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64. State the chain rule of differentiation?

65. Find the differential coefficients of  $y = \sin^{-1} x$  with respect to  $x$ ?

66. Find the differential coefficients of  $\frac{1}{\sqrt{x}}$  with respect to  $x$ ?

67. Find the differential coefficients of  $\log_5 x$  with respect to  $x$ ?

68. Find the differential coefficients of  $e^{2x}$  with respect to  $x$ ?

69. Find the differential coefficients of  $e^{-x}$  with respect to  $x$ ?

70. Find the differential coefficients of  $2x + 3$  with respect to  $x$ ?

Find the differential coefficients of  $y = \sin^{-1} x$  with respect to  $x$ ?

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72. Find average and marginal cost from the total cost function  $C = 5 + 31x$ .

73. What is homogeneous function?

74. Find the first order partial derivatives of the function  $z = x^2 + 5xy - y^2$ .

75. Find the first order partial derivatives of the function  $\log_3 x + y$ .

76. Find the first order partial derivatives of the function  $z = x^2 + y^2 + z^2$ .

77. Find the first order partial derivatives of the function  $z = 35 + 40y$ .

78. Find the first order partial derivatives of the function  $H(x, y, z)$ .

79. Find the first order partial derivatives of the function  $z = x^2 + y^2 + z^2$ .

80. Find the four second order partial derivatives of the function  $f(x, y) = x^2 + y^2$ .



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81. Find the four second order partial derivatives of the function

$$f(x,y) = 2x^2 - 5xy + C.$$

82. Find the partial elasticities  $Z = \ln G$ .

83. Determine the price elasticity of demand for the function  $X = 32 - 4p - J$  where  $p = 3$

84. Determine the price elasticity of demand for the function  $p = \frac{K}{\#}$  where  $k > 0$ .

85. What is null matrix?

86. What is singleton matrix?

87. What is scalar matrix?

88. What is identity matrix?

89. What is triangular matrix?

90. What is diagonal matrix?

91. What is minor?

92. What is cofactor?

93. What is orthogonal matrix?

94. What is symmetric matrix?

95. What is singular matrix?

96. What is non-singular matrix?

97. Define determinant of a matrix?

98. State any three properties of determinant?

99. What is rank of a matrix?

100. Find determinant of  $A = \begin{pmatrix} +12 & -6 \end{pmatrix}$ ,





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#### GROUP-C

Each question carries 3 marks 1. What is subset?

2. What is super set?
3. What is proper set?
4. What is power set?
5. What is Universal set?
6. What is complementary set?
7. What is overlapping set?
8. What is cartesian set?
9. What is proper subset?
10. By using suitable example prove that
11. By using suitable example prove that
12. By using suitable example prove that
13. By using suitable example prove that
14. What is anti-symmetric relation?
15. What is transitive relation?
16. What is equivalence relation?
17. Represent the function  $f(x) = x + 5$  by means of the appropriate graph?
18. Represent the function  $f(x) = x^7$  by means of the appropriate graph?
19. Find inverse of the function  $f(x) = 3x - 1$ .
20. Find inverse of the function  $y = 5^x$ .
21. Define domain of a function?
22. Define co-domain of a function?
23. Define range of a function
24. Convert the binary no.  $(10111)_2$  into decimal equivalent?
25. Convert the binary no.  $(101010)_2$  into decimal equivalent?
26. What is inverse function?
27. What is explicit function?
28. What is implicit function?



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29. What is continuous function?

$$89: \#^N > 00$$

30. Evaluate  $\frac{1}{x^2}$

31. Evaluate  $\frac{1}{x^2}$

32. Find if the function  $f(x) = \frac{1}{x}$  is discontinuous at  $x = 3$

33. Show that the function  $f(x) = x^2 + 3x + 4$  is continuous at  $X = 1$ .

34. Find if the function  $f(x) = \frac{1}{x}$  is continuous at  $x = 2$

35. State the chain rule of differentiation?

36. Find the differential coefficients of  $y = x^2$  with respect to  $X$ .

37. Find the differential coefficients of  $y = x^3$  with respect to  $x$ ?

38. Find the differential coefficients of  $y = x^4$ .

39. Find the differential coefficients of  $y = x^5$  with respect to  $x$ ? 40.

Find the differential coefficients of  $y = x^6$  with respect to  $x$ ?

$$\frac{d}{dx} x^7$$

41. Find the differential coefficients of  $y = (5 - 2x)^2$  with respect to  $x$ ?

42. Find the differential coefficients of  $y = \sqrt{5 - 2x}$  with respect to  $x$ ?

43. Find the differential coefficients of  $y = 2^x$  with respect to  $x$ ?

44. Find the differential coefficients of  $y = 3^x$  with respect to  $x$ ?

45. Find the differential coefficients of  $y = e^x$  with respect to  $x$ ? 46. Find the differential coefficients  $\frac{d}{dx} e^x$  with respect to  $x$ ?

47. Determine the price elasticity of demand for the function  $x = 32 - 4p - J$  where  $p = 3$ .

48. Determine the price elasticity of demand for the function  $p = k$  where  $k > 0$ .

49. Determine the price elasticity of demand for the function  $p = T_{UA}$ .



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50. Determine the price elasticity of demand for the function  $p = 370 - 0.0001Q$ .

51. Find average and marginal cost from the total cost function  $C = 3x^3 + 15x$

52. Find the four second order partial derivatives of the function  $f(x,y) = 2x^2 + 5xy + 3y^2$

53. Find the four second order partial derivatives of the function  $f(x,y) = \log(3xy)$

54. Find the four second order partial derivatives of the function  $f(x,y) = x^2 + y^2$

55. What is scalar matrix?

56. What is identity matrix?

57. What is singular matrix?

58. State any three properties of determinant?

59. What is rank of a matrix?

60. Find inverse of the matrix  $\begin{pmatrix} 3 & 4 \\ 1 & 2 \end{pmatrix}$ ,

61. Find the product of BA where,  $A = \begin{pmatrix} -22 & -41 \\ 61 & 2 \end{pmatrix}$ ;  $B = \begin{pmatrix} 3 & 1 \\ 0 & 1 \end{pmatrix}$

62. Find adjoint of the matrix  $\begin{pmatrix} 2 & 5 \\ 1 & 5 \end{pmatrix}$ ,

63. Solve the following linear equations by the method of matrix  $3x + 11y = 7$  and  $6x + 22y = 5$

64. Determine rank of the following matrix A



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65. Solve the following linear equations by using Cramer's rule  $4x+3y=8$  and  $6x+7y=17$

#### GROUP-D

Each question carries 7 marks

- If A and B are two sets then Prove that  $(A \cup B) = (B \cup A)$
- If A, B and C are three sets then Prove that  $(A \cup B) \cup C = A \cup (B \cup C)$
- If A, B and C are three sets then Prove that  $(A \cap B) \cap C = A \cap (B \cap C)$
- If A and B are two sets then Prove that  $(A \cap B) = (B \cap A)$
- If A, B and C are three sets then Prove that  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ .
- If A, B and C are three sets then Prove that  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ .
- If A and B are two sets then Prove that  $(A \cup B)^c = A^c \cap B^c$  (De Morgan's law-I).
- If A and B are two sets then Prove that  $(A \cap B)^c = A^c \cup B^c$  (De Morgan's law-II).
- If A, B and C are three sets then Prove that  $A - (B \cap C) = (A - B) \cup (A - C)$ .
- Write down the limit theorems involving two functions?
- Find the domain and range of the functions (I)  $Y = \frac{1}{X}$  (II)  $\sqrt{4 - X}$   $Y \geq 0$   
(III)  $Y = \frac{1}{X-1}$ .
- Prove that  $Y = 7x^2 + 3x - 2$  is an even function
- A Publishing house finds that the cost of production directly attributed to each book is Rs.30 and that the fixed cost are Rs.15000. If each book can be sold for Rs.45, then determine ;(I) the cost function (II) the revenue function (III) the profit function (IV) the break even point.



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15. Prove that  $\frac{d}{dx} \log \sqrt{1+x^2} = \frac{x}{1+x^2}$
16. Evaluate  $\int \frac{1}{\sqrt{1+x^2}} dx$
17. Determine whether the function is continuous or not at  $X=2$ ,  $F(x) = x^2 + 4x + 3$ .
18. Show that the function  $f(x) = 3 + 4x - 3$  is continuous at  $x=3$ . Also prove that  $f(x)$  is continuous for all value of  $X$ .
19. Find the differential coefficient of the following functions (I)  $3 + 5x^{\frac{\pi}{2}}$  (II)  $\log [(5-2x)(5+3x)]$
20. Find the derivative of the following functions; (I)  $\sqrt[3]{a}$  (II)  $\frac{1}{a}$
21. Determine the fourth order derivative of the function  $Y = \log \sqrt{3+4x}$
22. Determine the price elasticity of demand for the function,  $x = 32 - 4p - J$  where  $p=3$
23. Determine the price elasticity of demand for the function  $x = T_U_A$  Where  $x$  is the demand for goods at  $p$  price.
24. Determine the price elasticity of demand in terms of  $x$  for the function  $P = \frac{370}{x^0.7}$ .
25. A firm with linear demand function can sell 1000 units when the price is Rs.4 per unit, and 1500 units when the price is Rs2 per unit/ On the given premises determine (I) the demand function (II) the total revenue function (III) the average revenue function and (IV) the marginal revenue function.
26. Explain the relationship between average cost and marginal cost by using derivative?
27. Examine the average and marginal cost relations when the total variable cost is  $C = -3 + 15x$



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28. Show that the elasticity of demand is equal to \_\_\_\_\_ <sup>cd</sup> under the linear  $cd > ed$  demand law  $p = a + bx$ .
29. Verify Euler's theorem when  $z = \frac{1}{n} \sum_{i=1}^n x_i^n$
30. Verify Euler's theorem when  $z = \frac{1}{n} \sum_{i=1}^n x_i^n$ .

The demand function for the two commodities are given as  $U = U(x_1, x_2)$

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and  $U = U(x_1, x_2)$ , where  $p_1$  and  $p_2$  are prices and  $x_1$  and  $x_2$  denotes the quantities of the two commodities respectively. Shows that the two commodities are substitute of one another.

32. If  $A = \begin{pmatrix} 2 & 4 & 11 \\ 1 & 3 & 0 \end{pmatrix}$  and  $B = \begin{pmatrix} 0 & 1 & 5 \\ -1 & 2 & 0 \end{pmatrix}$  verify that  $(AB)^T = B^T A^T$

33. What is determinant? Explain the properties of determinant.

$$\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} + \begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = 0$$

35. Solve the following system of equations by using Cramer's rule  $3x - 4y + 5z = -6$ ,  $x + y - 2z = -1$ ,  $2x + 3y + z = 5$ .

36. Find inverse of the matrix  $A = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 5 \\ 1 & 5 & 12 \end{pmatrix}$ .

37. Solve the following equation by matrix method  $X + Y + 2Z = 4$ ,  $2X + Y + 3Z = 9$ ,  $3X - Y - Z = 2$



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