

Question Bank

Paper - Mathematical methods for Economics

Semester-1/CC-1

Questions in right hand indicates marks.

Part-1

[1 marks]

Q.A -Fill in the blanks.

1. The theory of set introduced by _____
2. Each objects belonging to a set is called _____
3. According to L.W.T.Stafford what is set ?
4. $A = \{x: x \text{ is a letter in word 'MATHEMATICS'}\}$. Write the following sets in Tabular Form ?
5. $B = \{(x,y) : x=2y, x, y \text{ belongs to } N \text{ and } y \text{ less then or equal to } 4\}$. Write it in a tabular form ?
6. $V = \{x: x \text{ is a letter of the word 'Consonant'}\}$. Write it in a roster form ?
7. $B = \{1,3,5,\dots\}$. Express it in set- builder form ?
8. $Q = \{5, 10,15,20,25,\dots\}$. Write it in set builder form ?
9. $S = \{101,102,103,104, \dots\}$.write it in set builder form ?
10. What is finite set?
11. what is infinite set?
12. Give a example of finite set ?
13. what is Null set or empty set ?
14. what is singleton set or unit set ?
15. Give a example of singleton set ?

16. What is Universal set ?
17. Give a example of universal set ?
18. What we can denote the subset ?
19. what we can denote the superset ?
20. Null set or empty set is a _____ of every set.
21. Every set is a _____ of itself.
22. What is proper subsets ?
23. whats the two conditions of proper subset ?
24. What is power set of a set ?
25. what is Equivalent set ?
26. what is Equal sets ?
27. $M = \{a,c,e,h,t\}$ $N = \{a,c,y,h,t\}$, Is it a Equal set ?
28. what is Disjoint sets ?
29. If X and Y is a set and X and Y have no element in common and as such they are _____
30. set of natural numbers less than 10 . Is it a finite set ?
31. set of prime numbers between 1 and 1000. Is is a finite set ?
32. If a set contains n elements, then its number of subsets is 2^n and number of proper subsets is _____
33. which of the following is true?
 - a. Every subset of a finite set is finite.
 - b. Every subset of a finite set is infinite.
34. A is included in B. Denote it in symbolically ?

35. B is not a super set of A. Denote it in symbolically ?
36. State whether each of the following is finite or infinite set ? (1x6=6)
- set of integers which are factors of 112.
 - set of natural numbers less than 10.
 - set of natural numbers greater than 20.
 - set of real numbers.
 - set of the months of a year
 - set of all integers.
37. _____ introduced the venn- Diagrams.
38. Union of sets denoted by _____
39. Give the answers in multiple choice .
- $\{x; x \text{ belongs to } A \text{ or } x \text{ belongs to } B\}$
 - $A \cup B$
 - $A - B$
 - $A \sim B$
 - $A = B$
 - Order of the power set $P(A)$ of a set A of order n is equal to
 - n^2
 - n
 - $2n$
 - 2^n
40. Intersection of two parts can be divided into which parts ?
41. what is called intersection of two parts ?
42. $\{x; x \text{ belongs to } A \text{ and } x \text{ belongs to } B\} = \underline{\hspace{2cm}}$
43. The difference of two sets A and B is the set of those elements which belongs to set A but do not belongs to set B. The difference is denoted by _____
44. $\{x; x \text{ belongs to } A \text{ and } x \text{ not belongs } B\} = \underline{\hspace{2cm}}$
45. $(A - B)$ is always a subset of _____
46. The intersection of $A - B$ and $B - A$ is an _____

47. what is complement of a set ?
48. \sim is known as _____.
49. In the words of Taro Yamane , a set is a collection of _____ and _____ objects.
50. $C = \{x : x \text{ is an integer and } 3 < x < 4.\}$. It is a which set ?
51. relation is denoted by _____
52. The function $f : A \rightarrow B$ defined by $f(x) = 4x + 7, x \in R$ is _____
53. The smallest integer function $f(x) = [x]$ is _____
54. The function $f : R \rightarrow R$ defined by $f(x) = 3 - 4x$ is _____
55. The number of bijective functions from set A to itself when A contains 106 elements is _____
56. Relation can be represented algebraically in _____ ways.
57. what is Roster form ?
58. What is Equivalence relation ?
59. The set of all first components of the ordered pairs in function is called _____
60. what is called range ?
61. What is implicit Function ?
62. What is Explicit Function ?
63. A single valued functions is said to be _____.
64. Where for a given value of x there exists multiple values of y. then it is called _____.

65. _____ functions can be expressed in terms of power and roots of the independent variable.
66. Give an example of even functions ?
67. Give an example of odd functions ?
68. Give an example of polynomial functions ?
69. A rational function is defined as the ratio of _____ polynomials.
70. What is a composite function ?
71. What is an exponential function ?
72. What is a logarithmic function ?
73. The function which associates each real number to itself is called the _____
74. What is a cubic function ?
75. The wider set of numbers which includes both integers and fractions is called the set of _____.
76. A relation between two objects is said to be _____ when the expression of the relation remains the same.
77. A set having only one element / object is termed as _____ set.
78. Delhi is the capital of India. This statement is a _____ proposition.
79. As there are only _____ digits in decimal numbers.
80. A single digit or a group of digits denoting a number are called _____
81. The expression of numbers in words is called _____
82. In case of _____ infinite decimal a block of digits repeats infinitely.

83. A recurring infinite decimal number is a _____ number.
84. both rational and irrational numbers together are called _____ numbers.
85. _____ is a set of numbers that lie between two numbers on a number line.
86. _____ value of a real number refers to actual distance between two points on a number line .
87. Reasoning based on consistent rules of logic is called _____ reasoning .
88. There is _____ variable in a univariate function.
89. _____ is a technique of calculating change , growth and motion.
90. When the values of x and y are not indepent of each other the function $y= f(x)$ is called _____ function.
91. differential coefficient means _____ of a continuous function.
92. Relation between two objects is said to be _____ when the expression of relation remain the same.
93. $y= f\{g(x)\}$ is _____ function.
94. According to Prof. G.H.Hardy ‘ what is continous of a function’.
95. Find dy/dx if $y= 5x^5$.
96. Matrix having same number of rows and columns is called _____ matrix
97. $d/dx (\log x)=$ _____.
98. Partial derivatives considers the case _____ independent variable.
99. Inverse of matrix $A^{-1}=$ _____.

100. A single digit or a group digits denoting a number are called _____.
101. The expression of number in words is called _____.
102. In case of _____ infinite decimal a block of digits repeats infinitely.
103. A recurring infinite decimal number is a _____ number.
104. Both rational and irrational numbers together are called _____ number.
105. _____ is a set of numbers that lie between two numbers on a number line.
106. _____ value of a real number refers to actual distance between two points on a number line .
107. Reasoning based on consistent rules of logic is called _____ reasoning.
108. The process of finding the rate of change in a function is known as _____.
109. A symbol representing exactly one number is called _____.
110. A symbol representing any one of a set of numbers is called a _____.
111. Derivative of a constant is always equal to _____.
112. If $a^x = y$ then x is defined to be the _____ of y to the base a .
113. If the base of logarithm is 10 ,it is called the _____.
114. Logarithm to the base e are called _____.
115. Derivative of the sum of function is called _____.
116. _____ rule is applied for the differentiation of a function or derivative of a composite function.
117. _____ means the sales or receipts of a firm.

118. For the necessary condition for maximum profit is _____.
119. In a matrix the horizontal line are called _____ and the vertical line are called _____.
120. If a matrix has only one row it is called _____.
121. A matrix consisting of only one column is called _____.
122. If every element of $m \times n$ matrix is zero, the matrix is called _____.
123. Any matrix in which the number of rows is equal to the number of columns is called _____.
124. In a square matrix in which all elements except those in the leading diagonal are zero is called _____.
125. A diagonal matrix whose diagonal elements are all equal is called _____.
126. The inverse of a _____ symmetric matrix is symmetric.

Part – 2**2 marks**

1. $A = \{a, b, c\}$ and $B = \{b, c, d\}$ find $A \cup B$?
2. If given $A = \{0, 1, 2\}$ $B = \{3, 4, 5\}$ find $A \cup B$?
3. $A = \{2, 4, 6, 8, 10\}$ $B = \{4, 8, 10\}$ Find $A \cup B$?
4. What is universal set ? Give examples ?
5. What is difference of sets ? Give examples?
6. Explain the finite and infinite set ?
7. Explain equal or equivalent sets ?

8. If $A = \{c, f\}$ $B = \{c, d, g\}$ then find $A - B$?
9. Give two difference between null set and singleton set ?
10. Find difference between union and intersection with one example ?
11. Let $A = \{1, 2, 3\}$ $B = \{4, 5, 6\}$ find $A \times B$?
12. What is reflexive relation ? find it with a example ?
13. When a relation is called equivalent relation ?
14. What are domain of the function ?
15. What are range of the function ?
16. What are analytical function ?
17. What are monotonic function?
18. What is polynomial function ? Give the example.
19. What is many one functions?
20. Explain in two sentence injective and surjectivity?
21. What is cubic function? Give the example.
22. Write down the number 1345 as decimal number ?
23. What is Absolute value?
24. What is deductive and inductive of a reasoning ?
25. Convert binary numbers into their decimal equivalent .
 $(1010)_2 = ?$
26. Convert the binary fractions into their decimal equivalent. $(.001)_2 = ?$

27. What is binary multiplication ?

28. What is binary division ?

29. What is evaluate of function ? Give the example.

30. What are the three steps are involved in graphing a function ?

31. Find the Limit of $\frac{x^2-9}{x+3}$ as $x \rightarrow 3$

32. Find the limit of the following functions

$$\lim_{x \rightarrow 2} \frac{(x+2)^2}{2}$$

33. what is continuity ? Write the two sense of continuity.

34. Causes and kinds of discontinuity ?

35. Evaluate limit $\log_{x \rightarrow 0}(3x^2 + 4x + 5)$.

36. Find the derivatives of the following .

a. 10^x

37. find the derivative of $Y = (6x - 7)^4$.

38. $Y = 5x^4 - 3x^2 + 1$ Find the derivatives.

39. $Y = (2x-1)(3x+1)$

40. What is product rule ? write it with the formula ?

41. What is elasticity of supply ?

42. $C = 5000 + 1000x - 500x^2 + \frac{2}{3}x^3$. Find MC ?

43. $C = 60 - 12q + 2q^2$. Find AC ?

44. What is increasing function ? give the example .
45. What is decreasing function ? give the example.
46. What is triangular matrix ? explain its type .
47. find the partial derivative of the function $Z = f(x,y) = x^2 + 5xy - y^2$.
48. find the determinant and its value from the foowing matrix.

$$A = \begin{bmatrix} 11 & 12 \\ 9 & 10 \end{bmatrix}$$

49. find the minors of the determinants.

$$A = \begin{bmatrix} 8 & 9 \\ 7 & 11 \end{bmatrix}$$

50. Given the cost function $C = 50x - 15x^2 + x^3$. Find MC.
51. What transpose of a matrix ? Give the eample.
52. Write the two properties of transpose ?
53. what is adjoint of a square matrix ?

Part-3

3 marks

1. Prove that the distributive property ?
2. Show that $(A \cap B)' = A' \cup B'$.
3. Prove that De-morgan's law ?

$$(A \cup B)' = A' \cap B'$$

4. In a class of 60 boys, 45 boys play cards and 30 boys play carom. How many boys play both games ? How many boys play cards only and how many play carom only ?
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5. verify the following identities by taking any sets A & B .

$$A \cup (A' \cap B') = B \cup (A \cap B')$$

6 . Let $A=\{x,y,z\}$ and $B =\{1,2\}$ find the number of relations from A and B.

7. Determine the domain and range of the relation R defined by $R=\{ (x,x+1):x \in (0,1,2,3,4,5)\}$.

8. Let $A = \{1,2,3,\dots,14\}$. Define a relation R from A to A by $R= \{(x,y):3x-y=0,\text{where } x,y \in A\}$. write down its domain ,co-domain and range.

9. If a $f(x) = \frac{1}{x+1}$ prove that $f[f\{f(x)\}]=x$

10. If $f(x) = \frac{5x^2+3x+1}{x+1}$ find $f(1)$ and $f(2)$.

11. if $f(x) = \frac{1}{x^2-1}$ find $f(1)$.

12. prove that $\sqrt{2}$ is not a rational number.

13. Convert binary into their decimal equivalent.

$$(11011000100)_2 = (?)_{10}$$

14. convert real decimal numbers into binary numbers $(1200.625)_{10}$.

15. graph the quadratic function $y=3x^2+x-2$.

16. $\lim_{x \rightarrow 3}(x^2 - 9)$.

17. find the limit of $\frac{\sqrt{x+5}-\sqrt{6}}{x-1}$ as $x \rightarrow 1$.

18. evaluate $\lim_{h \rightarrow 0} \frac{\sqrt{x+h}-\sqrt{x}}{h}$.

19. Shows that $\frac{x^2+1}{x^2-1}$ is continuous at $x=2$.

20. $(6-3x)^5$ differentiate with respect to x.

21. differentiate the function $\log(\log x)$ with respect to x .
22. evaluate the derivative of $x^3 + 3x^2 - 5x + 6$ when $x = 2$.
23. find the derivative of following $y = u^4 + 3u^3$ and $u = x^2$ with respect to x .
24. find $\frac{dy}{dx}$ when $y = x(x + 5 - 3x^2)$
25. find $\frac{dy}{dx}$ when $x^2 - y^2 = 1$.
26. $U = 2x^2 + 3xy$ find $\frac{du}{dx}$ and $\frac{du}{dy}$.
27. Prove that elasticity is the ratio of the marginal function and the average function.
28. transpose of the sum of matrices is the sum of the transpose of the individual matrices prove that.
29. if $A = \begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & -6 \\ 0 & -1 & 3 \end{bmatrix}$ evaluate $3A - 4B$.
30. If $A = \begin{bmatrix} 5 & -2 \\ 0 & 7 \end{bmatrix}$ $B = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$ find $5A - 2B$.

Part-iv

7 marks

1. Out of 1200 students in a college 336 played football, 360 played cricket, 504 played hockey, 96 played hockey and cricket, 120 played football and hockey, 60 played cricket and football, while 36 students played all the three games find.

i. The number of students who played at least one game.

ii. The number of students who played no game.

2. Given the following sets .

$$A = \{9, 10, 11, 12, 15, 17\} \quad B = \{7, 8, 9, 12\}$$

$C = \{3,4,5,6,7\}$ then verify that.

i. $(A \cup B) \cup C = A \cup (B \cup C)$

ii. $(A \cap B) \cap C = A \cap (B \cap C)$

3. A & B are such that A has 25 members B has 26 members and $A \cup B$ has 35 members. Find the number of members $A \cap B$.

4. Let A, B, C be any three subset of a universal set U , then $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

5. let $R = \{(x,y): x,y \in R, y = 2x + 8\}$, if $(a,-2) (4,b^2) \in R$ find values of a and b.

6. Determine the domain and range of the following relations.

i. $\{(x,y): x \in N, x < 5, y = 4\}$

ii. $B = \{(x,y): y = |x - 1|, x \in Z \text{ and } |x| \leq 3\}$.

7. If $f(x) = 2^x$, show that $f(x+3) - f(x-1) = \frac{15}{2} f(x)$.

8. convert the following real decimal numbers into binary numbers.

$$(1200.625)_{10} = (?)_2$$

9. Plot the graph of $y = x^2$.

10. Find $\frac{dy}{dx}$, when $y = \log(x^3 + 3x^2)$.

11. Evaluate the derivative of $x^3 + 3x^2 - 5x + 6$. When $x = 2$.

12. Find the derivative of $(4x^3 - 2x + 1)(3 - 5x^2)$ with respect to x.

13. Find $\frac{dy}{dx}$ if $y = \frac{x^2 - x + 1}{x^2 + x + 1}$.

14. Find derivative $\frac{\sqrt{5}+\sqrt{x}}{\sqrt{5}-\sqrt{x}}$.

15. differentiate the following with respect to x.

$$Y = \frac{1}{\sqrt{2x-3}}$$

16. Find implicit differentiation.

$$2x^2 + 3xy = 7\alpha$$

17. The demand curve is shown as $q = 30 - 4P - P^2$ compute .

i. Ed when $p=3$

ii. MR when $p=3$ and $q=9$

18. when demand function is $x = 50 - 5p - p^2$ find elasticity of demand at $p = 2$.

19. Prove that $ed = \frac{AR}{AR-MR}$.

20. Find the maximum and minimum values of the following functions.

$$2x^3 - 9x^2 + 12x + 6$$

21. If the cost function is $C = \frac{1}{10}Q^2 + 5Q + 200$ where Q is output.

22. Given production function $Q = A^\alpha k^{1-\alpha}$ show that $L \frac{dQ}{dL} + K \frac{dQ}{dK} = Q$.

23 find $3A-B$ if $A = \begin{bmatrix} 0 & 3 & 2 \\ 2 & 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 5 & 3 \\ 1 & 4 & 5 \end{bmatrix}$

24. solve that following set of equation by crammers rule .

$$2x - 3y + 5z = 11$$

$$3x + 5y - 2z = 7$$

$$x+2y-3z = -9$$



