

Registration Number:

Date & session:



ST. JOSEPH'S UNIVERSITY, BENGALURU -27
BCA (DATA ANALYTICS)– I SEMESTER
SEMESTER EXAMINATION: OCTOBER 2022
(Examination conducted in December 2022)

BCADA1321 – DISCRETE MATHEMATICS

Time: 2 Hours

Max Marks: 50

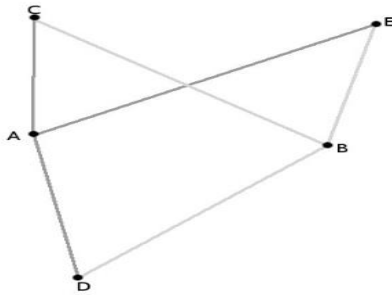
This paper contains THREE printed pages and THREE Parts.

PART- A

Answer ALL Questions

(5×1=5)

1. Which of the following are propositions?
(a) A cow has four legs.
(b) Do not stand on the flowers.
2. If $X = \{1,2,3,4\}$ and $Y = \{7,8,9,11,12\}$, defined by $f(x) = 2x + 3$. Represent 'f' as ordered pairs.
3. Find the vertical asymptotes of the function $f(x) = \frac{x+4}{x-3}$.
4. Find the degree of the vertex B.



5. What is a formal Language?

PART B

Answer any FIVE of the following

(5×3=15)

6. Prove that $\sim(p \wedge q) = \sim p \vee \sim q$.
7. Verify whether the following function $f: R \rightarrow R$ defined by $f(x) = x^3$ is Bijective or not.

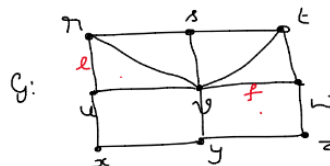
8. Evaluate $\lim_{x \rightarrow 4} \frac{4 - \sqrt{x+12}}{x-4}$.
9. Find the Oblique Asymptote of the given function $f(x) = \frac{x^2-3}{2x-4}$.
10. If $g(x) = kf(x)$ is a differentiable function where k is a constant, then prove that $g'(x) = kf'(x)$.
11. Define cycle, connected and disconnected graphs with example?
12. Define graph. Explain the types of Graphs.

PART C

Answer any THREE of the following

(3x10=30)

13. a. Show that $p \leftrightarrow q = (p \wedge q) \vee (\sim p \wedge \sim q)$ using truth table.
 b. In a group of 200 children, it was found that 120 children like cricket, 90 like tennis and 70 football, 40 like cricket and tennis, 30 like tennis and football, 50 like football and cricket and 20 like none of these games. Find the number of children who like all three games. (4+6)
14. a. Let $X = \{1,2,3,4,5\}$ and $Y = \{1,2,3\}$. Graph the relation $R = \{(x,y) | x > y\}$ from a subset of X into Y . Give the domain and the range of the relation.
 b. If $f(x) = 2x^3 - 15x^2 + 23x - 5$, then find the tangents at the point where the slope of the curve is -1. (4+6)
15. a. Find the derivative of $f(x) = 5x^2 - 3x + 2$, using the definition.
 b. Find the relative extreme values of the function and also check the concavity of $f(x) = x^2 - 4x + 9$. (4+6)
16. a. Let G be a graph. Let $X = \{e, f\}$ where $e = ru$ and $f = vw$ and let $U = \{u, w\}$.



- i. Draw the subgraphs $G - X$ & $G - U$.
- ii. Any x-y walk of length 6.

- b. Find the shortest path from the source vertex to the vertices of the graph using Dijkstra's algorithm. **(4+6)**

