

FIRST SEMESTER B.C.A. DEGREE EXAMINATION, JANUARY 2013

(CCSS)

CA 1C 01—MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATIONS

Time : Three Hours

Maximum : 30 Weightage

Part A (Objective Type Questions)

Answer all twelve questions.

- Which of the following is an example of null set ?
 (a) Set of even prime numbers, (b) : x is a natural number, $x > 5$ and $x \leq 1$.
 (c) The set of months of year. (d) The set of prime numbers less than 99.
- If A and B are two sets such that $A \subset B$, then what is $A \cup B$?
 (a) A . (b) B .
 (c) AB . (d) $A \cap B$
- $\lim_{x \rightarrow 0} x + 3$ is:
 (a) 0. (b) 3.
 (c) not defined. (d) ∞ .
- Derivative of e^x w.r.t. x is :
 (a) e^x . (b) x .
 (c) 1. (d) 0.
- The solutions of set of equations $x^2 + x - 2$ is _____
- If set A has p elements and B has q elements then the total number of relations are _____
- If $f: X \rightarrow Y$ is onto if the range of f is _____
- If $A = \{1, 2, 3\}$ and $B = \{2, 4, 5\}$, then $A \cap B$ is _____
- Is the function defined by $f(x) = 2$ a constant function ?
- Let A be a set of novels written by the writer Munshi Prem Chand. Is A a set ?
- The length of the interval $(2, 4)$ is 4. True or False ?
- Let $A = \{1, 2, 3\}$ and $X = \{1, 2, 3, 4, 5\}$. Is $A^c = \{2\}$?

(12 x $\frac{1}{4}$ = 3 weightage)

Turn over

Part B (Short Answer Questions)

Answer all questions.

13. Show that an one to one function $F: \{1, 2, 3\} \rightarrow \{1, 2, 3\}$ must be onto ?
14. Define equal set and give an example for it.
15. If $A = \{2, 4, 6, 8\}$ and $B = \{1, 2, 3, 4, 5\}$. Find $A \cap B$, $A \cup B$ and $A - B$?
16. Find the derivative of $F(x) = x^2$ w.r.t. x ?
17. Let $S = \{1, 2, 3\}$. Determine whether the function $F: S \rightarrow S$ defined below have inverses.
 - (a) $F = \{(1, 1), (2, 2), (3, 3)\}$.
 - (b) $F = \{(1, 2), (2, 1), (3, 1)\}$
18. Show that the function $F: \mathbb{N} \rightarrow \mathbb{N}$ given by $F(x) = 2x$ is one-one but not onto.
19. Find $\lim_{x \rightarrow 4} (2x - 4)$.
20. Let $A = \{1, 2, 3, 4\}$, $B = \{1\}$ and $C = \{1, 2\}$. Find $(A \times B) \cap A \times C$?
21. Find the domain and range of the function $F(x) = |x|$.

 $\times 1 = 10$ weightage)

Part C (Short Essay Questions)

Answer any five questions.

22. Find $g \circ f$ and $f \circ g$ if $f: \mathbb{R} \rightarrow \mathbb{R}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ are given by $f(x) = \cos x$ and $g(x) = 3x^2$.
23. In a class of 35 students, 24 like to play cricket and 16 like to play football. Also, each student likes to play at least one of the two games. How many students like to play both cricket and football ?-
24. Find the derivative of $f(x) = \tan x$ by the first principle.
25. Define equivalence relation.
26. Find $\lim_{x \rightarrow 2} \frac{x}{x^2 - 4x^2 + 4x}$.
27. Find the derivative of the function $F(x) = x^2 + 3x - 5$ at $x = -1$. Also prove that $F'(0) = F'(-1) = 0$.
28. Let $X = \{1, 2, 3, 4, 5, 6\}$, $A = \{2, 3\}$ and $B = \{3, 4, 5\}$. Find A' , B' , $A \cup B$ and hence show that $(A \cup B)' = A' \cap B'$.

 $(5 \times 2 = 10$ weightage)

Part D**Answer any two questions.**

29. Find the derivative of $\frac{2x+3}{x-2}$ w.r.t x .

30. Find $\lim_{x \rightarrow 0} \frac{\sin 4x}{\sin 2x}$

31. For any sets A and B, show that $P(A \cap B) = P(A) \cap P(B)$.

(2 x 4 = 8 weightage)