D 73739 (Pages : 3) **Name..............................**

Reg. No...........................

FIRST SEMESTER B.C.A. DEGREE (SUPPLEMENTARY/IMPROVEMENT) EXAMINATION, NOVEMBER 2014

(UG-CCSS)

Complementary Course

CA1C01—MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

Time : Three Hours Maximum : 30 Weightage

Part A (Objective Type Questions)

Answer **all** *questions.*
Each questions carries ¼ weightage.

1. Give an example of a finite set.
2. When we can say that two sets A and B are disjoint ?
3. Define a subset with an example.
4. Give an example of an even functions.
5. If $A = \begin{bmatrix} 3 & 4 & -2 \\ 1 & 6 & 7 \end{bmatrix}$. Find the transpose of A.
6. Let A be a square matrix of order n. When we can say that the matrix B is an inverse of A.

Fill in the blanks :

7. Two sets A and B are said to be ________ if and only if every element of A is an element of B and consequently every element of B is an element of A.
8. A non-empty set of which all the sets under consideration are subsets is called the ________ set.
9. Let A and B be two sets. Then the set (a $\in$ **A (a,** *b)* $\in$ **R, for some** *b* $\in$ **B)** is called the ________ of R.
10. A relation Ron a set A is   if (a, a) $\in$ **R for every a** $\in$ **A.**
11. Suppose *f (x)* and *g (x)* are two functions such that $\frac{\quad}{dx}$ *(x)* = *g (x).* Then we say that *f (x) is* an ________ of *g (x).*
12. **A set which has only one element is called a ________ set.**

(12 x = 3 weightage)

Part B (Short Answer Questions)

Answer **all** *nine questions.*
Each question carries 1 weightage.

13. Write all the subsets of the set A = (a, *b,* c}.
14. Let A = (1, 2, 3, 4}, **B = (0, 1,** 3, **5, 7) and C** = (2, 4, 6, 8}. Then find (a) A u B ; (b) A *n* **B** (c) A – B ; (d) B u C.

Turn over

15. Let A = {2, 3, 5} and B = {6, 8, 10}. Define a binary relation R from A to B as follows. For all (x, y) E A x B, (x, y) E R $\Leftrightarrow$ x divides y. Write R and R^{-1}.

16. When we can say that a function is a real function.

17. Differentiate $\dfrac{(x^2+1)(x+3)}{x}$

18. Differentiate $3x^2 - 7\sin x + 10ex$.

19. Integrate $\dfrac{3x^3 - 5x^2 + 6x}{x}$

20. If $\int_0 3x^{\hat{}}\,dx = 8$, find the value of a.

21. Let $A = \begin{bmatrix} 3 & \cap \\ 7 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & \cap \\ -7 & 3 \end{bmatrix}$. Show that B is the inverse of A.

(9 x 1 = 9 weightage)

Part C (Short Essay Questions)

Answer any **five** *questions.*
Each question carries 2 *weightage.*

22. Find the total number of distinct relations from a set A of n elements to a set B of m elements.

23. Which of the following functions are odd or even :

(a) $f(x) = \tan x + 3\operatorname{cosec} x + x$.

(b) $f(x) = I x I + 1$.

(c) $f(x) = x^2 + \cos x$.

24. Differentiate $(x^2 + 7)(3x^2 - 5)$ using Product rule. Differentiate the same after expanding as a polynomial. Verify that the two answers are the same.

25. If $y = 2\sin x + 3\cos x$. Prove that $\dfrac{d^{\hat{}}y}{dx^2} + y = 0$.

26. Evaluate $\int_{-\pi/4}^{\pi/4} \sin^e x\, dx$.

27. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \end{bmatrix}$ and $B = \begin{vmatrix} 1 & 0 \\ 2 & 1 \\ 3 & 2 \end{vmatrix}$ find AB.

28. If $A = \begin{bmatrix} 2 & 5 \\ 3 & 1 \end{bmatrix}$, then find $A^2 - 3A - 131$.

(5 x 2 = 10 weightage)

Part D (Essay Questions)

Answer any **two** *questions.*
Each question carries **4** *weightage.*

29. (a) Find the derivatives of the following function from first principle $f(x) = 3x^2 + 5x - 1$.

    (b) Using the method of first principle show that $\frac{\;}{dx} x \;\; = nx$.

30. (a) Differentiate $x^3 \sin x$.

    (b) Using Quoient rule find the derivatives of (i) Cot x ; (ii) cosec x.

    (c) Find the derivative of $\tan^{-1} x$ using function of a function rule.

31. (a) Find x, y, z and t if $2 \begin{bmatrix} x & z \\ y & t \end{bmatrix} \; \begin{bmatrix} 1 & 11 \\ 0 & 0 \end{bmatrix} \; \begin{bmatrix} 3 & 5 \\ 4 & 6 \end{bmatrix}$.

    (b) Find A and B if A+ B= $\begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$ and A-B = $\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$

    (c) Integrate :

    (i) $x \log x$.

    (ii) $\dfrac{4x}{(x-2)(x-1)}$.

(2 x 4 = 8 weightage)