BCA DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017
(2016 Admission - Regular & 2015 Admission - Supplementary / Improvement)
SEMESTER II - COMPLEMENTARY COURSE
(CLOUD TECHNOLOGY AND INFORMATION SECURITY MANAGEMENT)
CA2C05TB – FUNDAMENTALS OF MATHEMATICS

Time: Three Hours   **Maximum Marks: 80**

PART A

I.   Answer any six questions. Each question carries 1 mark.

1.   What is transpose of a matrix?
2.   What are elementary operations of matrices?
3.   What is limit of a function?
4.   Define: Laplace transformation.
5.   State Cramer's rule.
6.   How will you determine the degree of the partial differential equation?

                                                                              (6x1=6)

PART B

II.   Answer any seven questions. Each question carries 2 marks

7.   What is row and column matrix?
8.   Differentiate $\tan^{-1}\frac{2x}{1-x^2}$
9.   Differentiate x with respect to x^3.
10. Evaluate $\lim_{x\to 1}\frac{x^3-1}{x^2-1}$
11. Obtain the partial differential equations of all spheres whose centres lie on plane z=0 and whose radius is constant and equal to r.
12. What is the importance of convolution theorem in mathematical analysis?
13. Explain with example identity matrix.
14. What is Lagrange's linear differential equation?
15. Find the Laplace transform of: $\sin at \cos bt$
16. Find the inverse transform of the following: $\frac{s}{(s^2+4)^2}$

                                                                              (7x2=14)

PART C

III.   Answer any five questions. Each question carries 6 marks

17. If A= $\begin{pmatrix} \cos A & -\sin A \\ \sin A & \cos A \end{pmatrix}$, show that AA'= A'A = $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

18. Find x,y,z using any matrix method for following linear equation:
         x- y + 2z = 4
         3x + y + 4z = 6
         x + y + z = 1

19. If $y = \frac{1}{x}\sin x$, show that $\frac{d^2y}{dx^2} + \frac{2}{x}\frac{dy}{dx} + y = 0$

20. Find the Laplace transforms of: (i) $e^{-at}\sin bt$ (ii) $e^{at}t^n$ (iii) $e^t\sin t\cos t$
21. Find the inverse transform of $\dfrac{s}{(2s+3)(3s+5)}$
22. Find the inverse of the matrix $A = \begin{pmatrix} 1 & 3 & -2 \\ -3 & 0 & -5 \\ 2 & 5 & 0 \end{pmatrix}$
23. Solve using Gauss Elimination Method.

$x + 2y + 3z = 14$

$3x + y + 2z = 11$

$2x + 3y + z = 11$

24. Differentiate w.r.t x, (i) $(x + 1)(x + 2)(x-1)$ (ii) $\dfrac{x^{\sin x}}{\tan x}$

(5x6=30)

PART D

IV. Answer any two questions. Each question carries 15 marks

25. Eliminate the arbitrary function(s) from the following and form the partial differential equations:

$xy + yz + zx = f\left(\dfrac{z}{x+y}\right)$

26. State Rolle's theorem and examine its truth in the following case:

$f(x) = x(x-1)$ $a=0, b=1$.

27. (a) Form the partial differential equation of the family of spheres of radius r with centre at (a,a,b).

(b) solve $x(y-z)p + y(z-x)q = z(x-y)$

28. Find rank of the matrix.

$A = \begin{pmatrix} 5 & 3 & 14 & 4 \\ 0 & 1 & 2 & 1 \\ 1 & -1 & 2 & 0 \end{pmatrix}$

(2x15=30)