

B. Com. DEGREE EXAMINATION, APRIL 2009
COMMERCE
FOURTH SEMESTER

COURSE : ALLIED CORE
PAPER : MATHEMATICS FOR COMMERCE
TIME : 3 HOURS

MAX. MARKS : 100

SECTION – A

ANSWER ALL QUESTIONS:

(10 X 2 = 20)

1. Define symmetric matrix and give an example.
2. Prove that $\begin{pmatrix} \frac{1+i}{2} & \frac{-1+i}{2} \\ \frac{1+i}{2} & \frac{1-i}{2} \end{pmatrix}$ is unitary.
3. State Cayley Hamilton theorem.
4. Form the quadratic equation one of whose root is $\sqrt{5} + 3$.
5. If α, β, γ are the roots of the equation $x^3 - 7x + 6 = 0$, find the value of $\sum \frac{1}{\alpha}$.
6. Differentiate $x(\sqrt{1+x^2})$ with respect to x .
7. Find $\frac{dy}{dx}$ if $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$.
8. If $x = a \cos \theta$, $y = b \sin \theta$ find $\frac{dy}{dx}$.
9. Integrate $\frac{1}{1 + \cos x}$ with respect to x .
10. Evaluate $\int \frac{dx}{x \cdot \log x}$.

SECTION – B

ANSWER ANY FIVE QUESTIONS:

(5 X 8 = 40)

11. Examine whether the following system of equations are consistent or not.
$$x + 2y + z = 3$$
$$x + 2y + 2z = 0$$
$$x + 5y + 3z = 9$$
12. Verify Cayley Hamilton theorem for the matrix $\begin{pmatrix} 1 & 2 \\ -1 & 3 \end{pmatrix}$.
13. Solve the equation $x^4 + 2x^3 - 4x^2 - 22x + 4 = 0$ given that its roots are in A.P.

14. Solve the equation $x^4 + 2x^3 - 5x^2 + 6x + 2 = 0$ given that $1 + \sqrt{-1}$ is a root of it.
15. If $y = -x^3 \log x$, prove that $x \frac{d^2y}{dx^2} - 2 \frac{dy}{dx} + 3x^2 = 0$.
16. If $u = x^3 + y^3 + z^3 + 3xyz$, show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} = 3u$.
17. Evaluate $\int \frac{5x+3}{x^2+4x+10} dx$.
18. Evaluate $\int (2x+4)\sqrt{2x^2+3x+1} dx$

SECTION – C

ANSWER ANY TWO QUESTIONS:

(2 X 20 = 40)

19. a) Find the rank of the matrix $\begin{pmatrix} -1 & 2 & 3 & -2 \\ 2 & -5 & 1 & 2 \\ 3 & -8 & 5 & 2 \\ 5 & -12 & -1 & 6 \end{pmatrix}$
- b) Find the characteristic roots and the associated characteristic vectors of the matrix $\begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$ (7+13)
20. a) Solve the equation $x^4 + 2x^3 - 25x^2 - 26x + 120 = 0$ given that the product of two of its roots is 8.
- b) If $z = \tan(y + ax) + (y - ax)^{3/2}$, show that $\frac{\partial^2 z}{\partial x^2} = a^2 \cdot \frac{\partial^2 z}{\partial y^2}$. (10+10)
21. a) Verify Euler's theorem for $\frac{x(x^3 - y^3)}{x^3 + y^3}$
- b) Evaluate $\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$
- c) Evaluate $\int x^2 e^{ax} dx$

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