

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted from the academic year 2004-05 & thereafter)

SUBJECT CODE : MT/AC/MT43

B. Com. DEGREE EXAMINATION, APRIL 2007
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. If A and B are orthogonal, prove that AB is orthogonal.
2. Show that the matrix $\begin{pmatrix} 1 & i \\ \sqrt{2} & \sqrt{2} \\ -i & -1 \\ \sqrt{2} & \sqrt{2} \end{pmatrix}$ is unitary.
3. State Cayley Hamilton theorem.
4. Form the equation of the fourth degree with rational coefficients, two of whose roots are $2\sqrt{5}$ and $3\sqrt{-1}$.
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. If $u = x^y$, Find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$.
7. If $x = a(\theta - \sin \theta)$, $y = a(1 - \cos \theta)$, Find $\frac{dy}{dx}$.
8. Find $\frac{dy}{dx}$ if $x^3 + y^4 = 8$.
9. Integrate $\log x$ with respect to x .
10. Evaluate $\int \sqrt{x^2 + 6} x dx$

SECTION – B

ANSWER ANY FIVE QUESTIONS:

(5 X 8 = 40)

11. Examine the consistency of the equations
 $x + y + z = 1$
 $3x + 4y + 5z = 1$
 $2x + 3y + 4z = 1$

12. Determine the characteristic roots of the matrix

$$\begin{pmatrix} 0 & 1 & 2 \\ 1 & 0 & -1 \\ 2 & -1 & 0 \end{pmatrix}$$

13. Solve the equation $x^3 - 5x^2 + 2x + 8 = 0$, one of whose roots is double another of its roots.
14. Solve the equation $6x^4 - 13x^3 - 35x^2 - x + 3 = 0$, given that $2 - \sqrt{3}$ is a root of it.
15. Differentiate $(\tan^{-1} x)^{\log x}$ with respect to x .
16. If $u = (x - y)(y - z)(z - x)$, show that $\sum \frac{\partial u}{\partial x} = 0$.
17. Integrate $\frac{3x+1}{2x^2 - x + 5}$ with respect to x .
18. Evaluate $\int (3x-2)\sqrt{x^2 + x + 1} dx$.

SECTION - C

ANSWER ANY TWO QUESTIONS :

(2 X 20 = 40)

19. a) Find the rank of the matrix $\begin{pmatrix} 1 & -2 & 3 & 4 \\ -2 & 4 & -1 & -3 \\ -1 & 2 & 7 & 6 \end{pmatrix}$

- b) Find the characteristic equation of the matrix $\begin{pmatrix} 1 & -1 & 2 \\ -2 & 1 & 3 \\ 3 & 2 & -3 \end{pmatrix}$ and hence find the inverse of A. (8+12)

20. a) Solve $x^4 + 2x^3 - x^2 + 2x + 1 = 0$.

- b) If $y = \sec^{-1} x$, Find $\frac{dy}{dx}$.

- c) If $v = (x^2 + y^2 + z^2)^{-1/2}$, Find $\sum \frac{\partial^2 v}{\partial x^2}$. (8+5+7)

21. a) If $u = \sin^{-1} \left(\frac{x^3 + y^3}{\sqrt{x} + \sqrt{y}} \right)$ then, using Euler's theorem, show that

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{5}{2} \tan u .$$

- b) Evaluate $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$

- c) Evaluate $\int \frac{xe^x}{(1+x)^2} dx$. (6+8+6)



