STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted from the academic year 2008-09 & thereafter)

SUBJECT CODE : MT/AC/MP24

B. Sc. DEGREE EXAMINATION, APRIL 2010
BRANCH III – PHYSICS
SECOND SEMESTER

COURSE : ALLIED CORE
PAPER : MATHEMATICS FOR PHYSICS - II
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION – A

ANSWER ALL QUESTIONS: **(10X2=20)**

1. Obtain a partial differential equation by eliminating the arbitrary function from $z = f\left(y/x\right)$.
2. Find the complete integral of $z = px + qy + p^2 + q^2$.
3. Find $L[Sinhat]$.
4. Find $L[Cos^2 6t]$.
5. Find $L[t.\sin 3t]$.
6. If $f(x) = \dfrac{\pi - x}{2}$, $0 < x < 2\pi$ find a_0 in the Fourier expansion of $f(x)$.
7. If $f(x)$ is an odd function find a_0, a_n, b_n.
8. Define an analytic function with an example.
9. Show that $w = x^2 + y^2 - 2ixy$ is analytic.
10. State Cauchy integral theorem.

SECTION-B

ANSWER ANY FIVE QUESTIONS **(5x8=40)**

11. (a) Solve: $\sqrt{p} + \sqrt{q} = 1$.
    (b) Solve: $p^3 + q^3 = 27z$.
12. (a) Solve: $p^2 + q^2 = x + y$
    (b) Solve $z = px + qy + p^2 + q^2$.
13. (a) Find $L[te^{-t}\sin t]$.
    (b) Find $L\left[\dfrac{1 - e^{-t}}{t}\right]$.
14. Find $L^{-1}\left[\dfrac{s+1}{s(s-2)(s-4)}\right]$.

…2.

15. Find the Fourier expansion of $f(x) = x^2 - \pi \le x \le \pi$.

16. Evaluate $\oint_C \frac{3z-1}{z^3-z}dz$ where C is $|z| = 2$.

17. State Taylor's theorem. Expand $\frac{1}{z}$ by Taylor's series about the point $z = 1$.

SECTION-C

ANSWER ANY TWO QUESTIONS **(2x20=40)**

18. (a) Solve $\frac{\partial^2 u}{\partial x \partial t} = e^{-t}\cos x$, given that $u = 0$ when $t = 0$ and $\frac{\partial u}{\partial t} = 0$ when $x = 0$.

(b) Solve $x(y-z) + y(z-x) = z(x-y)$.

19. (a) Solve $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 4y = \sin t$ if $\frac{dy}{dt} = 0, y = 2$ when $t = 0$.

(b) Obtain a Fourier expansion for the function $f(x) = \pi^2 - x^2 \quad -\pi < x < \pi$.

20. (a) Find an analytic function whose imaginary part is $3x^2y - y^3$.

(b) Obtain Laurent's expansion for $f(z) = \frac{1}{(z-1)(z-2)}$ valid in the region $|z-1| < 1$.

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