

SE comp

SE IT III

Applied Mathematics - III 31 May 2014

(CBGS)

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QP Code : NP-18619

(3 Hours)

[Total Marks : 80

- N.B. : (1) Question No.1 is compulsory.
(2) Attempt any three questions from Question No.2 to Question No.6.
(3) Non-programmable calculator is allowed.

1. (a) Find $L^{-1}\left[\frac{Se^{-\pi s}}{S^2+2S+2}\right]$ 5

(b) State true or false with proper justification "There does not exist an analytic function whose real part is $x^3 - 3x^2y - y^3$ ". 5

(c) Prove that $f_1(x) = 1$, $f_2(x) = x$, $f_3(x) = \frac{(3x^2-1)}{2}$ are orthogonal over $(-1, 1)$. 5

(d) Using Green's theorem in the plane, evaluate $\int_C (x^2 - y)dx + (2y^2 + x)dy$ around the boundary of the region defined by $y = x^2$ and $y = 4$. 5

2. (a) Find the fourier cosine integral representation of the function $f(x) = e^{-ax}$, $x > 0$ 6

and hence show that $\int_0^{\infty} \frac{\cos ws}{1+w^2} dw = \frac{\pi}{2} e^{-x}$, $x \geq 0$.

(b) Verify laplaces equation for $U = \left(r + \frac{a^2}{r}\right) \cos \theta$ Also find V and $f(z)$. 6

(c) Solve the following eqn. by using laplace transform. $\frac{dy}{dt} + 2y + \int_0^t y dt = \sin t$ given that $y(0) = 1$. 8