Shri G.S. Institute of Technology and Science, Indore

Department of Applied Mathematics and Computational Science

B.Tech. II Year:Computer Science Engineering (July.-Dec 2023),

ASSIGNMENT-I, MA-24003; MATHEMATICS-III

Last Date of Submission: 22/09/2023

1	(i) Find the Laplace Transform of $t^2e^{-2t}cost$ (ii) Find the Laplace Transform of the square wave function of period 2a defined as $f(t) = \begin{cases} K, & 0 \le t < a \\ -K, & a < t < 2a \end{cases}$	**CO3**
2	(i) State and prove convolution theorem and evaluate $L^{-1}\left\{\frac{p}{(p^2+a^2)^2}\right\}$ (ii) Find the Laplace Transform of $f(t) = \begin{cases} t^2, & 0 < t < 2 \\ t-1, & 2 < t < 3 \\ 7, & t > 3 \end{cases}$	**CO3**
3	Find the Laplace Transform of (i) $sin\sqrt{t}$ (ii) $\frac{cos\sqrt{t}}{\sqrt{t}}$ Find z transform of $\left[\frac{a^n}{n!}\right]$	**CO3**
4	(i) Find $L^{-1}\left\{\frac{p^2+2p-3}{p(p-3)(p+2)}\right\}$ (ii) Find the inverse Laplace Transform of $\frac{1}{p^3(p^2+a^2)}$	**CO3**
5	(i) Using Laplace Transform, solve the differential equation $\frac{d^2x}{dt^2} + 9x = cos2t, giventhatx(0) = 1,$ (ii) Using Laplace Transform, solve (i) $(D+5)x - 2y = t$, $(D+1)y + 2x$ =0, being given $x = y = 0\, whent = 0$.(ii) $4\frac{dy}{dt} + \frac{dx}{dt} + 3y = 0$, $3\frac{dx}{dt} + 2x + \frac{dy}{dt} = 1$, being given $x = y = 0\, whent = 0$.	**CO3**
6	Form the partial differential equation by eliminating the arbitrary functions from : (i) $f(x+y+z, x^2+y^2+z^2) = 0$ (ii) $z = y^2 + 2f(\frac{1}{x}$+ logy)	**CO3**
7	Solve the differential equation : $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$	**CO3**
8	Solve (i) $r + 2s + t = 2(y-x) + \sin(x-y)$ (ii) $(D^2 + 2DD' + D'^2)z = 2cosy - xsiny$	**CO3**
9	Use the method of separation of variables to solve the equation	**CO3**

	$\frac{\partial^2 v}{\partial x^2} = \frac{\partial v}{\partial t}$ $given\ that\ v = 0\ when\ t \to \infty as\ well\ as\ v = 0\ at\ x = 0\ and\ x = l$	
10	Show how the wave equation $c^2 \frac{d^2 y}{\partial x^2} = \frac{\partial^2 y}{\partial t^2}$ can be solved by the method of separation of variables. If the initial displacement and velocity of a string stretched between $x = 0\ and\ x = l\ are\ given\ by\ y = f(x) and$ $\frac{\partial y}{\partial t} = g(x),\ \ determine\ the\ constants\ in\ the\ series\ solution.$	**CO3**

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