Register Number:……..

KUMARAGURU
college of technology
character is life

B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Third Semester

AE/AUE/CE/MECH/MCE/EEE

U17MAT3101**:** Partial Differential Equations and Transforms

COURSE OUTCOMES

CO1: Form partial differential equations and solve certain types of partial differential equations.
CO2: Know how to find the Fourier Series and half range Fourier series of a function.
CO3: To know how to solve one dimensional wave equation, one dimensional heat equation in steady state using Fourier Series.
CO4: Apply Fourier series to solve the steady state equation of two dimensional heat equation in Cartesian coordinates.
CO5: Apply the Fourier Transform, Fourier Sine and Cosine transform to certain functions and use Parseval's identity to evaluate integrals.
CO6: Evaluate Z-transform for certain functions. Estimate Inverse Z-transform of certain functions and to solve difference equations using them.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Form the PDE by eliminating the arbitrary constants from $z = ax^n + by^n$	CO1	[K_2]
2.	Find the complete solution of $z = p^2 + q^2$	CO1	[K_2]
3.	State Dirichlet's Conditions on Fourier Series.	CO2	[K_1]
4.	Define the root mean square value of the function.	CO2	[K_3]
5.	Write the three possible solutions of one-dimensional wave equation	CO3	[K_1]
6.	Write two-dimensional heat equation.	CO4	[K_1]
7.	Write the Fourier transform pair.	CO5	[K_1]
8.	State Convolution theorem on Fourier Transforms.	CO5	[K_1]
9.	Find the Z-transform of 'n'.	CO6	[K_3]
10.	State Initial and Final Value theorem on Z-Transforms.	CO6	[K_1]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Solve $(y-z)\,p+(z-x)\,q=x-y$.	(8)	CO1	[K3]
	b)	Solve $z = px + qy + \sqrt{16 + p^2 + q^2}$.	(8)	CO1	[K3]
12.	a)	Find the Fourier series for $f(x) = x^2$ in $(0, \pi)$	(8)	CO2	[K3]
	b)	Compute the two harmonics of the Fourier series of f (x) given by the following table	(8)	CO2	[K4]

x	0	$\frac{\pi}{3}$	$\frac{2\pi}{3}$	π	$\frac{4\pi}{3}$	$\frac{5\pi}{3}$	2π
$f(x)$	1.21	1.05	0.98	0.62	0.87	1.1	1.21

13.	a)	A tightly stretched string with fixed ends points x = 0 & x = *l* is initially at rest in its equilibrium position. If it is set vibrating giving each points a velocity *kx(l - x).* Find the displacement.	(16)	CO3	[K3]
14.	a)	A square plate is bounded by the lines x=0, y=0, x=l and y=l. Its faces are insulated. The temperature along the upper horizontal edge is given by $u(x,l) = x(l-x), 0 < x < l$ while the other three edges are kept at 0 degree centigrade. Write the boundary conditions.	(16)	CO4	[K3]
15.	a)	Find the Fourier transform of $f(x) = \begin{cases} 1-x^2, \lvert x\rvert \le 1 \\ 0, \lvert x\rvert > 1 \end{cases}$.	(8)	CO5	[K3]
	b)	Evaluate $\int_0^\infty \frac{1}{(x^2+a^2)^2}\,dx$ using Parseval's identity.	(8)	CO5	[K3]
16.	a)	Find $z^{-1}\left(\frac{10z}{z^2-3z+2}\right)$ using partial fraction method.	(8)	CO6	[K3]
	b)	Find $z\left(\frac{1}{n(n+1)}\right)$	(8)	CO6	[K3]

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