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**SNS College of Technology, Coimbatore-35.**  
**(An Autonomous Institution)**  
**Internal Assessment -III**  
**Academic Year 2022-2023(Odd)**  
**Third Semester**  
**Department of Mathematics**  
**19MAT201- Transforms And Partial Differential Equations**

<b>B</b>
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Time: 1.30 Hours

Maximum Marks: 50

**PART – A (5 x 2 = 10 MARKS)**  
**ANSWER ALL QUESTIONS**

BLOOMS

- |    |   |     |       |
|----|---|-----|-------|
| 1. | Classify the PDE $4u_{xx}+4u_{xy} + u_{yy}+2u_{xy} - u_y = 0$   | CO4 | (Rem) |
| 2. | What are the various possible solutions of one dimensional wave equations?  | CO4 | (Und) |
| 3. | A rod 20 cm long has its ends A and B kept at $10^{\circ}\text{C}$ and $20^{\circ}\text{C}$ respectively until steady state conditions prevail. Find the steady temperature in the rod. | CO4 | (Ana) |
| 4. | State the initial and final value theorem of Z transform  | CO5 | (App) |
| 5. | Form the difference equation by using Z transform $y = A3^n$  | CO5 | (App) |

**PART –B (13+13+14 = 40 MARKS)**

**ANSWER ALL QUESTIONS**

- |    |    |   |     |               |
|----|----|---|-----|---------------|
| 6. | a) | If a string of length 'l' is initially rest in its equilibrium position and each of its points is given by the velocity $\left(\frac{\partial y}{\partial t}\right)_{t=0} = y_0 \sin^3 \frac{\pi x}{l}$ | CO4 | (App)<br>(13) |
|----|----|---|-----|---------------|

Determine the displacement  $y(x,t)$

(or)

- |  |    |   |     |               |
|--|----|---|-----|---------------|
|  | b) | A rod of length 'l' has its ends A and B kept at $0^{\circ}\text{C}$ and $100^{\circ}\text{C}$ until steady state conditions prevail. If the temperature at B is suddenly reduced to $0^{\circ}\text{C}$ and kept so while that of A is maintained ,find the temperature $u(x,t)$ at a distance x from A and at time t. | CO4 | (App)<br>(13) |
|--|----|---|-----|---------------|

(or)

	b) i)	Find $z(\cos n\theta)$ and $z(\sin n\theta)$	CO5	(App) (7)
	ii)	Using convolution theorem find $z^{-1}\left[\frac{z^2}{(z-1)(z-3)}\right]$	CO5	(App) (6)
8.	a) i)	A string is stretched and fastened at two points $x=0$ and $x=1$ apart. Motion is started by displacing the string into the form $y = k(lx - x^2)$ from which it is released at time $t = 0$ . Find the displacement of any point on the string at a distance of $x$ from one end at a time $t$ .	CO4	(App) 14
		(or)		
	b) i)	Compute $z^{-1}\left[\frac{10z}{z^2-3z+2}\right]$ using Partial fraction method	CO5	(App) (7)
	ii)	Elaborate the applications of Z Transform in real life, Engineering and Industry.	CO5	(App) (7)

**Rem/Und:** Remember/ Understand    **App:** Apply    **Ana:**Analyze    **Eva:** Evaluate    **Cre:** Create