

Reg. No. :

--	--	--	--	--	--	--	--	--	--

Question Paper Code: 53021

B.E./B.Tech. DEGREE EXAMINATION, AUGUST 2021

Third Semester

Civil Engineering

15UMA321- Transforms and Partial Differential Equations

(Common to MECH, ECE, EEE, CHEM, AGRI, BME)

(Regulation 2015)

Duration: 1:45 hour

Maximum: 50 Marks

PART A - (10 x 2 = 20 Marks)

(Answer any ten of the following questions)

1. List the Dirichlet's conditions on Fourier series. CO1- R
2. If $F(s)$ is the Fourier Transform of $f(x)$. Identify $F[f(x-a)] = e^{ias} F(s)$. CO2- R
3. Identify $z(n) = \frac{z}{(z-1)^2}$, $|z| > 1$. CO3- R
4. Identify the difference equation by eliminating arbitrary constants for,
 $y = A2^n + Bn$. CO4- R
5. List the three possible solutions for Two dimensional heat equation. CO5- R
6. State Dirichlet's condition for a given function to expand in Fourier series. CO1- U
7. State the Fourier Integral theorem. CO2- U
8. Find $Z\left(\frac{1}{n}\right)$. CO3- App
9. Form the PDE by eliminating the constants a and b from
 $z = (x^2 + a^2)(y^2 + b^2)$. CO4- R
10. Write all possible solutions for one dimensional wave equation. CO5- U
11. What are the constants a_0 & a_n in the Fourier series expansion of
 $f(x) = x - x^3, (-\pi, \pi)$. CO1- R

12. Find the Fourier sine transform of $f(x) = \frac{1}{x}$ CO2- R
13. Find the value of $Z\left(\frac{1}{n(n+1)}\right)$. CO3- R
14. Form the PDE by eliminating the arbitrary constants 'a' and 'b' from $z=(x+a)^2 + (y-b)^2$. CO4- R
15. A rod 30 cm long has its ends A and B kept at 20 and 80 degree Celsius respectively. Find the steady state temperature distribution in the rod. CO5- R

PART – B (3 x 10= 30 Marks)

(Answer any three of the following questions)

16. Determine the first two harmonic of the Fourier series for the following values. CO1-App (8)

X:	0	$\frac{\pi}{3}$	$\frac{2\pi}{3}$	π	$\frac{4\pi}{3}$	$\frac{5\pi}{3}$
Y:	1.98	1.30	1.05	1.30	-0.88	-0.25

17. Find the Fourier transform of $f(x) = \begin{cases} 1 - |x|, & |x| \leq 1 \\ 0, & |x| > 1 \end{cases}$ Hence deduce CO2 -App (8)

$$\text{that } \int_0^{\infty} \left(\frac{\sin t}{t}\right)^2 dt = \frac{\pi}{3}.$$

18. Solve

$$y_{n+2} + 6y_{n+1} + 9y_n = 2^n \text{ with } y_0 = y_1 = 0, \text{ using Z - transform.}$$

19. Solve $z = px + qy + \sqrt{1 + p^2 + q^2}$ CO3- App (8)

20. A rod of length l has its end A & B kept at 0°C and 10°C respectively until steady state condition prevails. If the temperature at B is reduced to 0°C and kept so, while that of A is maintained, find the temperature $u(x,t)$ CO4-App (8)