Reg. No. :

Question Paper Code: 93025

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

Third Semester

Chemical Engineering

19UMA326 - Transform Techniques and Partial Differential Equations

(Regulation 2019)

(Statistical tables are may be permitted)

Common to Biomedical and Agriculture Engineering

Duration: 1:45 hour   Maximum: 50 Marks

PART A - (10 x 2 = 20 Marks)

(Answer any ten of the following questions)

1. State Dirichlet's conditions — CO1 R

2. Explain why tan x cannot be expanded in Fourier series — CO1 U

3. Find b_n in the Fourier series of $f(x) = |\cos x|$ in $(0,2\pi)$ — CO1 Ap

4. Find $F_c\left[e^{-ax}\right]$ — CO2 U

5. Find the Fourier sine transform of $\frac{1}{x}$ — CO2 Ap

6. Write Fourier sine Transform pair. — CO2 R

7. Find $Z[a^n]$ — CO3 Ap

8. Find $Z\left[\frac{1}{(n+1)!}\right]$ — CO3- Ap

9. Find $Z[n]$ — CO3- Ap

10. Form a PDE by eliminating arbitrary constants from $z = (x + a)^2 + (y + b)^2$. — CO4 U

11. Find the complete integral of $p - q = 0$ — CO4 U

12. Solve the PDE $pq = x$. — CO4 AP

13. Classify $4u_{xx} + 4u_{xy} + u_{yy} - 6u_x - 8u_y - 16u = 0$ — CO5- R

14. In the one dimensional wave equation $u_{tt} = a^2 u_{xx}$, what does a^2 stands for? — CO5 U

15. State any two laws assumed to drive the one dimensional wave equation — CO5- R

PART – B (3 x 10= 30 Marks)

(Answer any three of the following questions)

16. Find the Fourier series of $f(x) = x^2$ *in* $0 < x < 2\pi$.   CO1- App   (10)

17. Show that the Fourier transform of   CO2- App   (10)

$$f(x) = \begin{cases} a^2 - x^2 & |x| < a \\ 0 & |x| > a \end{cases} \quad \text{is } 2\sqrt{\frac{2}{\pi}}\left[\frac{\sin sa - sa\cos sa}{s^3}\right] \quad \text{Hence}$$

deduce $\displaystyle\int_0^\infty \frac{\sin t - t\cos t}{t^3}\,dt = \frac{\pi}{4}$

18. Evaluate $Z[a^n \cos n\theta]$ *and* $Z[a^n \sin n\theta]$ CO3- Ana   (10)

19. Solve $(D^2 - 5DD' + 6D'^2)z = e^{x+y}$ CO4- App   (10)

20. A String is stretched and fastened to two points l apart .Motion is   CO5- App   (10)
started by displacing the string into the form y=K(lx-x^2) from which
it is released at t=0.Find the displacement of any point at a distance
'x' at any time 't'.

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