Reg. No. : | | | | | | | | | | |

Question Paper Code: 93025

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

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: One hour Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The term $(a_1 \cos x + b_1 \sin x)$ in fourier series is called ---------- CO1- U

   (a) First harmonic (b) Second harmonic

   (c) Third harmonic (d) Fourier Coefficients

2. If a function f(x) is even, its Fourier expansion contains only ------- terms CO1- U

   (a) Sine (b) Cosine (c) tan (d) None of these

3. Convolution theorem on Fourier Transform CO2- U

   (a) F(s).G(s) (b) f(s).g(s) (c) F(s)*G(s) (d) f(s)*g(s)

4. $F[xf(x)]$ = ____ CO2- U

   (a) $-F_c[f(x)]$ (b) $-^{d}\{F[f(x)]\}$ (c) $-F_s[f(x)]$ (d) $-^{d}\{F[f(x)]\}$

5. If $Z\{f(t)\} = F(Z)$, then $Z\{e^{-at}f(t)\}$ = ____ CO2- U

   a)$F[e^{aT}]$ b)$F[Ze^{aT}]$ c)$F[Ze^{-aT}]$ d)$F[e^{-aT}]$

6. The difference equation of $y_n = a2^n + b(-2)^n$ is __ CO3- U

   a) $y_{n+2} - 4y_n = 0$ b)$y_{n+2} + 4y_n = 0$ c)$y_{n+2} - y_n = 0$ d)$y_{n+2} + y_n = 0$

7. The PDE obtained from z = (x+a)(y+b) is_. CO4- U

(a) 3z = px + qy (b) py - qx = 0 (a) 3z = px + qy (b) py - qx = 0

8. The PDE of all planes through the origin is__. CO4- R

(a) $z= px+qy^2$ (b) $z= px- qy^2$ (a) $z= px+qy^2$ (b) $z= px- qy^2$

9. Classify the equation y2uxx+uyy = 0 is _ CO5-R

(a) parabolic (b) hyperbolic (c) elliptic (d) cyclic

10. In a one dimensional wave equation, c^2=____. CO5-R

(a) T^2/m^2 (b) T/m (c) T/m^2 (d) T^2/m

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Find the Fourier series of $f(x) = x^2$ *i*n $0 < x < 2\pi$. CO1- App (8)

12. Show that the Fourier transform of CO2- App (8)

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

deduce $$\int_0^\infty \frac{\mathbf{sint-tcost}}{\mathbf{t^3}}\mathbf{dt}=\pi/4$$

13. Evaluate $Z[a^n \cos n\theta]$ *and* $Z[a^n \sin n\theta]$ CO3- Ana (8)

14. Solve $(D^2 - 5DD' + 6D'^2)z = e^{x+y}$ CO4- App (8)

15. A String is stretched and fastened to two points l apart .Motion is 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'. CO5- App (8)