Reg. No. :

Question Paper Code: 53001

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

Third Semester

Civil Engineering

15UMA321- Transforms and Partial Differential Equations

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

(Regulation 2015)

Duration: One hour

Maximum: 30 Marks

PART A - $(6 \times 1 = 6 \text{ Marks})$

(Answer any Six of the following Questions)

1.	Identify b_n in the expansion of x^2 as a Fourier series in $(-\pi, \pi)$.				CO1- R
	(a) 0	(b)1	(a) 0	(b)1	
2.	The R.M.S value of $f(x) = x$ in $0 < x < 1$ is				CO1- R
	(a) $\frac{1}{\sqrt{2}}$	(b) $\frac{1}{\sqrt{3}}$	(c) $\frac{1}{\sqrt{4}}$	(d) $\frac{1}{\sqrt{5}}$	
3.	If $F(s) = F{f(x)}$, then $F{f(x-a)} = CO2-R$				
	(a) $e^{-isx} F(s)$	(b) s + a	(c) s – a	(d) $e^{isa} F(s)$	
4.	If $F{f(x)} = f(s)$, then $f(x)$ is said to be				
					CO2- R
	(a) self reciprocal	(b) multi reciprocal	(c) mono reciprocal	(d) nano rec	iprocal
5.	The Z- transform of $(3.4^n) =$				CO3- R
	(a) $\frac{3z}{z-4}$	(b) $\frac{3z}{z+4}$	(c) $\frac{z}{z-4}$	(d) $\frac{3}{z-4}$	
6.	Let				CO3- R
	$Y(z) = \frac{z}{(z-1)^2}$. Then $f(n) =$, where $Z\{f(n)\} = Y(z)$				
	(a) 1	(b) n	(c) n^2	(d) n^{3}	

7. Identify the complementary function of $(D^2 - 4DD' + 3D^{1^2})Z = 0.$ CO4- R(a) $\phi_1(y+x) + \phi_2(y+3x)$ (b) $\phi_1(y+x) - \phi_2(y+3x)$ (c) $\phi_2(y+2x) + \phi_1(y+x)$ (d) $\phi_1(y-x) - \phi_2(y+3x)$ 8. A solution that contains as many arbitrary constants as there are independent variables is called asCO4- R

(a) singular integral (b) general integral (c) complete integral (d) particular integral

- 9. Identify the partial differential equation of 3uxx+4uxy+3uy -2ux = 0. CO5- R
 (a) Elliptic
 (b) Parabolic
 (a) Elliptic
- 10. The ends A & B of a rod of length 10cm have their temperature kept at CO5- R 20°C and 70°C. Examine the steady state temperature distribution on the rod.

(a)
$$5x+20$$
 (b) $7x+10$ (c) $2x+20$ (d) $7x-10$

$$PART - B (3 \times 8 = 24 \text{ Marks})$$

(Answer any Three of the following Questions

11. Illustrate the Fourier Series ofCO1-App(8)

 $f(x) = \begin{cases} x, & 0 \le x \le \pi\\ 2\pi - x, & \pi \le x \le 2\pi \end{cases} \text{ and deduce}$ $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots + \infty = \frac{\pi^2}{8}.$

12. Find the sine and cosine transform of e^{-ax} , a > 0. Hence, Evaluate CO2 - App (8) $\int_{0}^{\infty} \frac{x^{2}}{(x^{2} + a^{2})^{2}} dx \quad \text{and} \quad \int_{0}^{\infty} \frac{dx}{(x^{2} + a^{2})(x^{2} + b^{2})}.$

13. Analyze inverse z transform ofCO3- App(8)

 $\frac{8z^2}{(2z-1)(4z-1)}$ using Convolution theorem.

- 14. Analyze $z = px + qy + p^2 q^2$. CO4-App (8)
- 15. A string is stretched and fastened to points x = 0 and x = l apart. CO5 -App (8) Motion is started by displacing the string into the form

 $y = k(lx - x^2)$ from which it is released at time t = 0. Interpret the displacement of any point on the string at a distance of x from one end at time t.