

Reg. No. :

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

Question Paper Code: 92005

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

Second Semester

19UMA205- Calculus and Transforms Techniques

Electrical and Electronics Engineering

(Regulation 2019)

Duration: 1.45 hrs

Maximum: 50 Marks

PART A (Answer Any Ten)

10*2 = 20 Marks

1. Compute the particular Integral $(D^2 + 16)y = \cos 4x$ CO1 – App
2. Compute the particular Integral $(D^2 + 1)y = x^2$ CO1 – App
3. Transform $[(x+2)^2 D^2 + 3(x+2)D + 5]y = 20$ into linear equation with constant coefficient CO1 – App
4. If $\vec{F} = (16x - 3y + z)\vec{i} + (x + 2ay - 2z)\vec{j} + (3x + 2y - 2z)\vec{k}$ is solenoid find the value of 'a'. CO2 – App
5. Find the unit vector normal to the surface $x^2 yz = 4$ at (1,1,0) CO2 – App
6. If $\vec{F} = 2y\vec{i} + z\vec{j} + x\vec{k}$ then find (i) $\nabla \circ \vec{F}$ (ii) $\nabla \times \vec{F}$ CO2 – App
7. Compute $L[(2t+1)^2]$ CO3 – App
8. Compute $L^{-1}\left[\log\left(\frac{s+1}{s-2}\right)\right]$ CO3 – App
9. Compute $L\left[\frac{1}{\sqrt{t}}\right]$ CO3 – App
10. Describe Dirichlet's Conditions CO6 – App
11. Calculate a_n in the Fourier series expansion of $f(x) = 3x^2$ in $(0, 2\pi)$. CO4 – App
12. Determine the root mean square value of the function $f(x) = 3x$ in $(0, 2)$ CO4 – App

- 13 Determine the Fourier transform of $f(x) = \begin{cases} \sqrt{\pi} & |x| \leq 1 \\ 0 & |x| > 1 \end{cases}$ CO5 – App
- 14 Determine the Fourier sine transform of e^{4x} CO5 – App
- 15 State and Prove Change of scale property of Fourier Transform. CO5 – App

PART B (Answer Any Three)

3*10 = 30 Marks

16. Solve the method of variation of parameters, $(D^2 + 1)y = \sec^2 x$ CO1-App (10)
- 17 Verify Divergence theorem for $\vec{F} = (x^2 - yz)\vec{i} + (y^2 - xz)\vec{j} + (z^2 - xy)\vec{k}$ over the rectangular parallelepiped $0 \leq x \leq 2, 0 \leq y \leq 3, 0 \leq z \leq 4$ CO2-App (10)
- 18 Solve by using L.T. $y'' - 8y' + 7y = e^{-2t}$ given that if $y(0) = 0, y'(0) = 0$ CO3- App (10)
- 19 Compute first two harmonics of the Fourier series for the following data. CO4- App (10)

x	0	2	4	6	8	10
y	9	18.2	24.4	27.8	27.5	22.0

- 20 Determine the Fourier Cosine transform of e^{-ax} and hence evaluate CO5- App (10)

$$\int_0^{\infty} \frac{dx}{(x^2 + 49)(x^2 + 36)}$$