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

Question Paper Code: 32002

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

Second Semester

Civil Engineering

01UMA202 - ENGINEERING MATHEMATICS - II

(Common to all branches)

(Regulation 2013)

Duration: 1:45 hour Maximum: 50 Marks

PART A - (10 x 2 = 20 Marks)

(Answer any ten of the following questions)

1. Find the particular integral of $(D^2 + 2D + 1)y = e^{-x}\cos x$.

2. Transform the equation $(2x+3)^2 \frac{d^2y}{dx^2} - 2(2x+3)\frac{dy}{dx} - 12y = 6x$.

3. Evaluate $\int_c (2x - y)dx + (x + y)dy$ where c is the boundary of the circle $x^2 + y^2 = 1$ in the XOY plane.

4. Find ‘a’ such that $\vec{F} = (x+3y)\vec{i} + (y-2z)\vec{j} + (x+az)\vec{k}$ is solenoidal.

5. Find the inverse Laplace transform of $\frac{1}{(s+1)(s+2)}$.

6. Find the Laplace transform of $e^{-t}t^2 sint$.

7. Show that $\frac{x}{x^2+y^2}$ is harmonic.

8. Find the invariant points of the transformation $= \frac{2z+6}{z+7}$.

9. Find the residues of $\frac{1-e^{2z}}{z^4}$ $at\ z = 0$.

10. Define singular point.

11. Find the particular integral of $(D^2 + 4)y = \pi$.

12. Transform $[(2x+3)^2 D^2 -2(2x+3)D -12]\ y = 0$ into an ordinary differential equation.

13. State Green's theorem.

14. Find 'a' such that $\vec{F} = (x+3y)\vec{i} + (y-2z)\vec{j} + (x+az)\vec{k}$ is solenoidal.

15. Test the analyticity of the function $f(z) = \bar{z}$.

PART – B (3 x 10= 30 Marks)

(Answer any three of the following questions)

16. Solve $(D^2 - 4D + 3)y = sin3x\ cos2x$. (10)

17. Verify Gauss divergence theorem for $\vec{F} = 4xz\vec{i} - y^2\,\vec{j} + yz\vec{k}$ taken over the cube bounded by the planes $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$. (10)

18. Find the bilinear mapping which maps the points $Z = 0, -1, 1$ of the Z-plane onto $W = i, 0, \infty$ of the W-plane. (10)

19. Find the value of $\int_0^{\pi} \frac{1 + 2cos\,\theta}{5 + 4\,cos\,\theta}\, d\theta$ using contour integration. (10)

20. Find the Laplace transform of a periodic function
$f(t) = \begin{cases} t & 0 < t < 1 \\ 2 - t & 1 < t < 2 \end{cases}$ and $f(t) = f(t+2)$. (10)