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

Question Paper Code: 52002

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

Second Semester

Civil Engineering

01UMA202 - ENGINEERING MATHEMATICS - II

(Common to all branches)

(Regulation 2013)

Duration: One hour Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. The complete solution of $(D^3 - D)y = 0$ is
   (a) $y = A + Bx + Cx^2$ (b) $y = A + B\cos x + C\sin x$
   (c) $y = A + Be^x + Ce^{-x}$ (d) $y = Ax + Be^{-x} + Ce^x$

2. The roots of $(D^2+2)y$ are
   (a) ± 2 (b) $\pm 2i$ (c) $\pm i\sqrt{2}$ (d) $\sqrt{2}$

3. If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$, the value of ∇r is
   (a) $\frac{\vec{r}}{r}$ (b) $\frac{r}{\vec{r}}$ (c) $\frac{1}{r}$ (d) $\frac{1}{\vec{r}}$

4. By stokes theorem, $\int_c \vec{r}\, \overrightarrow{dr} =$ _____
   (a) π (b) 1 (c) 0 (d) None of these

5. The derivative of f(z) at z_0 is
   (a) l (b) f(z) (c) $f(z_0)$ (d) $f'(z_0)$

6. The bilinear transformation that maps the points $\infty, i, 0$ onto $0, i, \infty$ is

(a) $-\frac{1}{z}$ (b) $-\frac{i}{z}$ (c) $\frac{i}{z}$ (d) None of these

7. Which of the following is not an analytic function?

(a) $\sin z$ (b) z (c) $\sinh z$ (d) $\bar{z}$

8. Conformal mapping is a mapping which preserves angle

(a) in magnitude (b) in sense

(c) both in magnitude and sense (d) Eithen in magnitude or in sense

9. $L^{-1}\left[\frac{1}{s^2+a^2}\right]=$

(a) $\frac{\sinh at}{a}$ (b) $\frac{\sin at}{a}$ (c) $\sinh at$ (d) $\sin at$

10. Laplace transforms is an _____ transform.

(a) Discrete (b) Discrete time

(c) Data independent (d) Integral

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Solve $(D^2 - 4D + 3)y = sin3x\ cos2x$. (8)

12. Verify Gauss divergence theorem for $\vec{F} = 4xz\vec{\imath} - y^2\,\vec{\jmath} + yz\vec{k}$ taken over the cube bounded by the planes $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$. (8)

13. 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. (8)

14. Find the value of $\int_0^{\pi} \frac{1 + 2cos\,\theta}{5 + 4\,cos\,\theta}\, d\theta$ using contour integration. (8)

15. Find the Laplace transform of a periodic function

$f(t) = \begin{cases} t & 0 < t < 1 \\ 2 - t & 1 < t < 2 \end{cases}$ and $f(t) = f(t + 2)$. (8)