Reg. No. :

Question Paper Code: 91002

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

First Semester

Civil Engineering

19UMA102- ENGINEERING MATHEMATICS I

(Common to ALL branches)

(Regulation 2019)

Duration: 1.45 hrs   Maximum: 50 Marks

PART A - (10 x 2 = 20 Marks)

(Answer any ten of the following questions)

1. The product of the Eigen values of   CO1- R

    $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is _____.

    (a) $abcd$ (b) $ad - bc$ (c) a (d) 0

2. State Cayley Hamilton Theorem?   CO1 R

3. The nth derivative of y =f(x) at x=a is denoted by   CO2- R

    (a) $(y_n)_a$ (b) (y_n) (c) y_a (d) $(y_a)^n$

4. If $ax^2 + 2hxy + by^2 = 1$ Prove that $\frac{d^2y}{dx^2} = \frac{h^2-ab}{(hx+by)^3}$ CO2 R

5. The degree of the homogeneous function   CO3- R

    $u = \frac{x^2+y^2}{\sqrt{x}+\sqrt{y}}$ is _____

    (a) 2   (b)1   (c) 3/2   (d) 0

6. State Euler's theorem.   CO3 R

7. $\int (ax + b)^n \, dx$ CO4- R

    (a)$\frac{(ax+b)^{n+1}}{a(n+1)}$ (b)$\frac{(ax+b)^{n-1}}{a(n-1)}$ (c) $(ax + b)^n$ (d) $\frac{(ax+b)^n}{an}$

8. Evaluate $\int_0^{\frac{\pi}{2}} \sin^6 x \, dx$ CO4 R

9. The value of $\int_2^4 \int_1^2 \frac{dxdy}{xy}$ is _____   CO5- R

     (a) log2   (b) log 2/log2   (c) 2log 2   (d) 2

10. Evaluate: $\int_0^a \int_0^b \int_0^c dxdydz$.   CO5 R

11. Write any two properties of Eigen values.   CO1 R

12. Differentiate $x^3 e^{2x} \cos x$ CO2 R

13. Define a saddle point.   CO3 R

14. Show that $\Gamma(n+1) = n$ CO4 R

15. Change the order of integration $\int_0^1 \int_0^x f(x,y)dxdy$ CO5 R

PART – B (3 x 10= 30 Marks)

(Answer any three of the following questions)

11. Use orthogonal transformation to reduce the quadratic form into canonical form   CO1- App   (10)
$$Q = 2x_1^2 + x_2^2 + x_3^2 + 2x_1x_2 - 2x_1x_3 - 4x_3x_2$$

12. Find the nth derivative of   CO2- App   (10)
$$\frac{1}{x^2+a^2}$$

13. The temperature $u(x,y,z)$ at any point in space is $u = 400xyz^2$. Find the highest temperature on surface of the sphere $x^2 + y^2 + z^2 = 1$.   CO3- Ana   (10)

14. Find the relation between Beta and Gamma function.   CO4- App   (10)

15. Find the volume of the ellipsoid   CO5- App   (10)

$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ using integration.

91002