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

Question Paper Code: 51002

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

First Semester

Civil Engineering

15UMA102- ENGINEERING MATHEMATICS-I

(Common to ALL branches)

(Regulation 2015)

Duration: One hour Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. $\lim_{x\to 1}\frac{x^2-1}{x-1}=$ CO1-R

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

2. Suppose $f(x)=\begin{cases}\frac{x^2-x}{2x} & if\ x\neq 0\\ k & if\ x=0\end{cases}$. If $f(x)$ is continuous at x=0, then the value of 'k' is CO1-R

(a) -1 (b) 1 (c) $-\frac{1}{2}$ (d) $\frac{1}{2}$

3. If $u=(x-y)(y-z)(z-x)$ then $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z}=$ CO2-R

(a) 1 (b) 0 (c) 3 (d) 6

4. If $x=r\cos\theta, y=r\sin\theta$ *find* $\frac{\partial(x,y)}{\partial(r,\theta)}$ CO2-R

(a) r (b) r^2 (c) 0 (d) 2

5. $\Gamma\left(\frac{1}{2}\right)=$ CO3-R

(a) 1 (b) $\frac{1}{2}$ (c) $\sqrt{\pi}$ (d) π

6. $\int_0^{\frac{\pi}{2}} \cos^8 x\,dx =$ CO3-R

(a) $\frac{35\pi}{256}$ (b) $\frac{256}{35\pi}$ (c) 35π (d) 256

7. Value of the double integral $\int_0^1 \int_0^y dydx$ is CO4-R

(a) 0 (b) $\frac{1}{2}$ (c) $\frac{3}{2}$ (d) $\frac{3}{4}$

8. $\int_0^{\frac{\pi}{2}} \int_0^{\sin\theta} rd\theta dr =$ CO4-R

(a) $\frac{1}{8}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{8}$ (d) π

9. The product of two eigen values of $A = \begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$ is 16 then the third eigen value is CO5-R

(a) 3 (b) 2 (c) 4 (d) 5

10. If the product of two eigenvalues of third order singular matrix A is 34, then the third eigenvalue of the matrix A is CO5-R

(a) 3 (b) -1 (c) 1 (d) 0

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. Find $\frac{dy}{dx}$ if $y = \tan^{-1}\sqrt{\frac{1-\sin x}{1+\sin x}}$ CO1-App (8)

12. Verify Euler's theorem for the function $u = \sin^{-1}\frac{x}{y} + \tan^{-1}\frac{y}{x}$ CO2-App (8)

13. Evaluate $\int \frac{1}{1+\cos x}dx$ CO3-App (8)

14. Change the order of integration $\int_0^1 \int_{y^2}^{2-y} xydydx$ and hence evaluate it CO4-App (8)

15. Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ CO5-App (8)