Reg. No. :

Question Paper Code: 91002

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

First Semester

Civil Engineering

19UMA102- ENGINEERING MATHEMATICS I

(Common to ALL branches)

(Regulation 2019)

Duration: 1.15 hrs   Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six 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. The equation $|A - \lambda I| = 0$ is called the_____ of the matrix A.   CO1- R

    (a) Characteristic equation   (b) Characteristic polynomial

    (c) Eigen value   (d) None of the above

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. $\frac{d}{dx}\left(\frac{u}{v}\right)$ =   CO2- R

    (a) $\frac{v\frac{du}{dx}-u\frac{dv}{dx}}{v^2}$ (b) $\frac{v\frac{du}{dx}+u\frac{dv}{dx}}{v^2}$ (c) $\frac{v\frac{du}{dx}/u\frac{dv}{dx}}{v^2}$ (d) $\frac{v\frac{du}{dx}-u\frac{dv}{dx}}{v}$

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. A point at which $f(x, y)$ has neither maximum nor minimum is called CO3- R

    (a) Saddle point   (b) Stationary point   (c) Maximum point   (d) Minimum point

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. $\int \sin^2 x \, dx =$ CO4- R

    (a) $\frac{x}{2} - \frac{\sin 2x}{4}$ (b) $\cos^2 x$ (c) $x - \frac{\cos 2x}{2}$ (d) $\frac{x}{2} - \frac{\cos 2x}{4}$

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. Change the order of integration in $\int_0^\infty \int_x^\infty f(x, y) \, dxdy$ is_____ CO5- R

    (a) $\int_0^\infty \int_x^\infty f(x, y) \, dxdy$ (b) $\int_0^\infty \int_0^\infty f(x, y) \, dxdy$

    (c) $\int_0^\infty \int_0^x f(x, y) \, dxdy$ (d) None of the above

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PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

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11. Use orthogonal transformation to reduce the quadratic form into canonical form   CO1- App   (8)
$$Q = 2x_1^2 + x_2^2 + x_3^2 + 2x_1x_2 - 2x_1x_3 - 4x_3x_2$$

12. Find the nth derivative of   CO2- App   (8)
$$\frac{1}{x^2+a^2}$$

13. The temperature $u(x, y, z)$ at any point in space is CO3- Ana   (8)
$u = 400xyz^2$. Find the highest temperature on surface of the sphere
$x^2 + y^2 + z^2 = 1$.

14. Find the relation between Beta and Gamma function.   CO4- App   (8)

15. Find the volume of the ellipsoid   CO5- App   (8)

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

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