Roll No: | | | | | | | | | | |

B.E(FULL TIME)/ END SEMESTER EXAMINATIONS- NOV/DEC 2024

Computer Science and Engineering-RUSA

Semester-I

MA6151 Mathematics I

(Regulation 2018-RUSA)

Time: 3 Hours | Answer ALL Questions | Max.Marks:100

Part-A($10 \times 2 = 20$ Marks)

1) Determine the domain and sketch the graph of $f(x) = \sqrt{x}$.

2) State rolle's theorem.

3) Find $\frac{du}{dt}$, when $u = x^2 + y^2, x = at^2, y = 2at$.

4) Find the Stationary points of $f(x, y) = x^3 + y^3 - 12x - 3y + 20$.

5) Evaluate $\int_0^2 x(x^2 + 1)^3$.

6) Test the convergence of $\int_0^1 \frac{dx}{1-x}$.

7) Evaluate $\int_0^a \int_0^b e^{x+y} dxdy$.

8) Integrate $\int_0^1 \int_0^2 \int_0^3 xyzdzdydx$.

9) When the method of undetermined coefficient will fail?

10) Solve $(x^2D^2 + xD + 1)y = 0$.

Part-B($8 \times 8 = 64$ Marks)
Answer any EIGHT questions

11) Determine the values of a and b when

$$f(x) = \begin{cases} \frac{x^2-4}{x-2}, & x < 2 \\ ax^2 - bx + 3, & 2 \leq x < 3 \\ 2x - a + b, & x \geq 3. \end{cases}$$

is continious for all real x.

12) Find the intervals of increasing or decreasing for the function $f(x) = x^4 - 4x^3$,also find the local maximum and minimum values, intervals of concavity and inflection points.

13) Find y' and y'' for $x^4 + y^4 = 16$.

14) Prove that $\frac{\partial(x, y, z)}{\partial(\rho, \phi, z)} = \rho$,where $x = \rho cos\phi$,$y = \rho sin\phi$ and $z = z$

15) A rectangular box open at the top is to have a volume of $32cc$. Find the dimensions of the box which requires least amount of material for its construction.

16) Expand $f(x,y) = e^x siny$ at $(0,0)$ as a taylor series upto second degree terms.

17) Evaluate $\int \frac{1}{\sqrt{a^2 - x^2}} dx$ using trigonometric substitution.

18) Evaluate by changing the order of integration $\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} dydx$.

19) Find the area bounded by the curves $y = x^2$ and $x + y - 2 = 0$.

20) Evaluate $\int_0^2 \int_0^{\sqrt{2x-x^2}} (x^2 + y^2) dydx$ by changing into polar coordinates.

21) Solve $[(x+1)^2 D^2 + (x+1)D + 1]y = 4\, cos[log(x+1)]$.

22) Solve $\frac{dx}{dt} + y = sint$ and $\frac{dy}{dt} + x = cost$.

Part-C($2 \times 8 = 16$ Marks)
(Compulsary)

23) Find the Volume of sphere $x^2 + y^2 + z^2 = a^2$ using triple integrals.

24) Apply the method of variation of parameters to solve $(D^2 + 1)y = secx$.