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FT (ARREAR)

B.E., DEGREE END SEMESTER EXAMINATIONS – APRIL / MAY 2019

FIRST SEMESTER, COMPUTER SCIENCE AND ENGINEERING

MA 6151 – MATHEMATICS I

(REGULATIONS - RUSA 2018)

Time : 3 Hours Max . Marks : 100

Part - A (10 x 2 = 20)

Answer All Questions

1. Find the domain and range of $f(x) = 3x-2$.
2. Where is the given function discontinuous $f(x) = \dfrac{x^2-x-2}{x-2}$.
3. Find $\dfrac{du}{dt}$ *if* $u = x^3 y^4$ *where* $x = t^3$ *and* $y = t^2$.
4. If $u = \dfrac{y^2}{x}$ *and* $v = \dfrac{x^2}{y}$ *then find* $\dfrac{\partial(u,v)}{\partial(x,y)}$.
5. *It is known that* $\int_0^{10} f(x)\,dx = 17$ *and* $\int_0^{8} f(x)\,dx = 12$ *then find* $\int_8^{10} f(x)\,dx$
6. Evaluate $\int_1^e \dfrac{\log x}{x}\,dx$
7. Evaluate $\int_0^{\infty}\int_0^{y} \left(\dfrac{e^{-y}}{y}\right) dx\,dy$.
8. Express the region $x \geq 0$, $y \geq 0$, $z \geq 0$, $x^2+y^2+z^2 \leq 1$ by triple integration.
9. Write down the trial solution (Particular integral) for the given differential equation $\dfrac{d^2y}{dx^2} - 2\dfrac{dy}{dx} + 3y = x^3 + \cos x$.
10. Solve $x^2 y'' + 2xy' + 2y = 0$.

Part - B (8 x 8 = 64)

Answer any Eight Questions

11. Find an equation of the tangent line to the parabola $y = x^2 - 8x + 9$ *at the point* $(3, -6)$.

12. Discuss the curve $y = x^4 - 4x^3$ with respect to local maximum and minimum, concavity and the point of inflection.

13. If $u = f(x-y, y-z, z-x)$ *then find the value of* $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$.

14. Expand $e^x \sin y$ in terms of powers of x and y by using Taylor's series method up to the third degree.

15. Find the dimensions of the rectangular box without a top of maximum capacity, whose surface area is 108 sq.cm.

16. Evaluate $\int (\log x)^3 \, dx$ by using integration by parts.

17. Evaluate $\int (\tan^5 \theta \sec^7 \theta) \, d\theta$

18 Evaluate $\int \frac{dx}{\sqrt{3x - x^2 - 2}}$

19. Change the order of integration $\int_0^a \int_y^a \frac{x}{\sqrt{x^2 + y^2}} \, dx \, dy$ and hence evaluate the given integral.

20. Find the area enclosed between the curves $y = x^2$ *and* $x + y = 2$ by using double integration.

21. Solve $\frac{d^2y}{dx^2} + y = x \sin x$ by using the method of variation of parameters.

22. Solve $(2x-1)^2 \frac{d^2y}{dx^2} - 4(2x-1)\frac{dy}{dx} + 8y = 8x.$

Part - C

(2 x 8 = 16)

Answer All Questions

23. Find the volume of the sphere $x^2 + y^2 + z^2 = a^2$ by using triple integration .

24. Solve the following simultaneous differential equations

$\frac{dx}{dt} + 2y = 5e^t$ *and* $\frac{dy}{dt} - 2x = 5e^t$ *given that* $x=-1$ *and* $y=3$ *at* $t=0$.

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