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MATD1P301

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Advanced Mathematics - I

Time: 3 hrs.

Max. Marks:100

 Note: *Answer FIVE full questions.*

- 1 Express $\frac{(2+30^2)}{+}$ in the form of complex number $a + ib$. (06 Marks)
 - b. Prove that $(1 + + (1 - - = -8$. (07 Marks)
 - c. Find the cube root of -0 . (07 Marks)
- 2 a. Find n^{th} derivative of $\sin(ax + b)$. (06 Marks)
 - b. If $y = a \cos(\log x) + b \sin(\log x)$. Show that $+(2n + 1)xy,, + (n^2 + 1)y,, = 0$. (07 Marks)
 - c. Find n^{th} derivative of $\log\left(\frac{2x+3}{e^{2-3x}}\right)^{10}$ (07 Marks)
- 3 a. Find the angle between the curves. $r = a(\sin \theta + \cos \theta)$ and $r = 2a \cos \theta$ (06 Marks)
 - b. Find the pedal equation for the curve $r^2 = a^2 \sec(2\theta)$ (07 Marks)
 - c. Expand $y = \log(\cos x)$ using Maclaurin's series upto 4th degree term. (07 Marks)
- 4 a. If $u = \frac{x^3}{ax + by + ez}$ show that $xu,, + yu,, + zu,, = 2 \tan u$ (06 Marks)
 - b. If $u = Rf(s, t)$ where $r = \frac{x}{y}, s = \frac{y}{z}, t = \frac{z}{x}$. Find $\frac{\partial^2 u}{\partial x^2} + y \frac{\partial^2 u}{\partial y^2} + z \frac{\partial^2 u}{\partial z^2}$. (07 Marks)
 - c. If $u = x + y + z, v = y + z, w = z$ find $\frac{\partial(uvw)}{\partial(xyz)}$ (07 Marks)
- 5 a. Obtain reduction formula for $\int \sin^n x \, dx$ where n is a positive integer. (06 Marks)
 - b. Evaluate $\int_0^1 \int_0^2 x^9 \sqrt{1-x^2} \, dx \, dy$. (07 Marks)
 - c. Evaluate $\int_0^1 \int_0^2 (x + y) \, dx \, dy$ (07 Marks)
- 6 a. Evaluate $\int_0^1 \int_0^2 \int_0^2 dx \, dy \, dz$. (06 Marks)
 - b. Prove that $13(m, n) = r3(n, m)$ (07 Marks)
 - c. Evaluate $\int_0^{\sqrt{2}} \frac{dx}{\sqrt{2-x}}$. (07 Marks)

MATDIP301

- 7 a. Solve $\frac{d}{dx} \frac{1}{x} = e (ex + x^2)$. (06 Marks)
- b. Solve $(x^2 + y^2)dx = 2xy dy$ (07 Marks)
- c. Solve $\frac{d}{dy} \frac{1}{y} = \frac{1}{x} + 2y^2$. (07 Marks)
- 8 a. Solve $\frac{d^2 y}{dx^2} + 5 \frac{dy}{dx} + 6y = 0$. (06 Marks)
- b. Solve $\frac{d^2 y}{dx^2} + 4 \frac{dy}{dx} + 4y = \cos x$. (07 Marks)
- c. Solve $\frac{d^2 y}{dx^2} + 3 \frac{dy}{dx} + 2y = 12x^2$ (07 Marks)

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