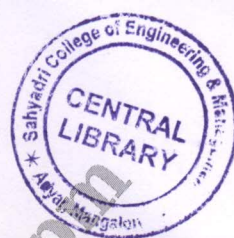


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MATDIP301

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 a. Express $\frac{(2+3i)^2}{(1+i)^2}$ in the form of complex number $a + ib$. (06 Marks)
- b. Prove that $(1+i)^4 + (1-i)^4 = -8$. (07 Marks)
- c. Find the cube root of $(\sqrt{3}-i)$. (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 $x^2 y_{n+2} + (2n+1)xy_{n+1} + (n^2+1)y_n = 0$. (07 Marks)
- c. Find n^{th} derivative of $\log\left(\frac{2x+3}{2-3x}\right)^{\frac{1}{10}}$. (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 $y = \text{Log}(\cos x)$ using Maclaurin's series upto 4th degree term. (07 Marks)
- 4 a. If $u = \sin^{-1}\left[\frac{x^3+y^3+z^3}{ax+by+cz}\right]$ show that $xu_x + yu_y + zu_z = 2 \tan u$. (06 Marks)
- b. If $u = f(r, s, t)$ where $r = \frac{x}{y}$, $s = \frac{y}{z}$, $t = \frac{z}{x}$. Find $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$. (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: $\int_0^1 x^9 \sqrt{1-x^2} \, dx$. (07 Marks)
- c. Evaluate: $\int_0^1 \int_0^2 (x^2 + y^2) \, dx \, dy$. (07 Marks)
- 6 a. Evaluate: $\int_0^1 \int_0^2 \int_0^2 x^2 yz \, dx \, dy \, dz$. (06 Marks)
- b. Prove that $\beta(m, n) = \beta(n, m)$. (07 Marks)
- c. Evaluate: $\int_0^2 \frac{x^2}{\sqrt{2-x}} \, dx$. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



MATDIP301

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