Ganpat University

U.V. Patel College of Engineering

2BS101-Mathematics-I

Sem-I

Tutorial-1

Topic-Successive Differentiation Date-4-Dec-2020

Q-1 Solve the following Questions.

a) If $y = \sin(msin^{-1}x)$, prove that $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + m^2y = 0$

b) Find $\frac{d^2y}{dx^2}$, when $x = acos^3\theta, y = bsin^3\theta$

c) If $x = a\left\{cost + \log\left(\tan\left(\frac{t}{2}\right)\right)\right\}, y = asint$, find $\frac{d^2y}{dx^2}$

d) If $x^3 + y^3 = 3axy$, prove that $\frac{d^2y}{dx^2} = -\frac{2a^3xy}{(y^2-ax)^3}$

Q-2 Find the n^{th} Derivative of following Questions.

a) $y = \frac{x}{(x^2-16)}$

b) $y = e^{3x}cos5x\ cos2x$

c) $y = \log\left\{\frac{(2x-1)}{(7x+1)}\right\}$

d) If $y = (2-3x)^{10}$, find y_9

Q-3 Find the n^{th} Derivative of following Questions.

a) x^2log3x

b) $x^3\ e^{-2x}\ sinx$

c) If $y^{1/m} + y^{-1/m} = 2x$,
Prove that; $(x^2-1)y_{n+2} + (2n+1)xy_{n+1} + (n^2-m^2)y_n = 0$

b) If $y = e^{m\cos^{-1}x}$, prove that

i) $(1-x^2)y_2 - xy_1 = m^2y$

ii) $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2+m^2)y_n = 0$

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