Roll No. 2064425

Paper Code:TMA-101

Mid Semester Back Examination, 2018

Course Name: B.Tech. I Sem

Paper Name: Engineering Mathematics-I

MM: 50

Time: 1.30 Hours

Note:

(i) This question paper contains two sections.

(ii) Both sections are compulsory.

Section - A

Q1. Fill in the blanks/True-False **(1x5=5 Marks)**

a) The curve is continues for differentiable function (True-False)

b) Jacobian is functionally determinant . (True-False)

c) $J.J' = 1$ where $J = \frac{\partial(x, y)}{\partial(u, v)}$ (True-False)

d) State Leibnitz theorem.

e) State Euler's theorem

Q2. Attempt any five **(3 x 5= 15 Marks)**

a) Find the nth order derivative of $y = e^{3x} Sin(ax + b)$

b) Evaluate the limit of $\lim\limits_{x \to 10} \frac{x^2 - 100}{x - 10}$

c) Define Homogenous function

d) Find the nth order derivative of $\log(ax + b)$

e) State Euler's First Deduction

f) State Euler's second Deduction

Section – B

Each question contains three parts a, b & c. Attempt any two parts of choice from each question.

(5 x 2 = 10 marks)

Q3.

a) Find the nth order derivative of $e^{ax} Sin(ax + b)$

b) If $y = x \log\left(\frac{x-1}{x+1}\right)$ show that $y_n = (-1)^{n-2}.(n-2)!\left[\frac{x-n}{(x-1)^n} - \frac{x+n}{(x+1)^n}\right]$

c) If $y = Sin(mSin^{-1}x)$ prove that $(1 - x^2) y_{n+2} - (2n+1) x.y_{n+1} + (m^2 - n^2) y_n = 0$

Q4.

(5 x 2 = 10 marks)

a) Find y_n If $y = \frac{1}{1+x+x^2+x^3}$

b) Find $\frac{\partial(x,y,z)}{\partial(u,v,w)}$ If $u = x+y+z;\ \ uv = y+z;\ \ uvw = z$

c) If $x = u(1-v),\ \ y = uv$ prove that $J.J' = 1$ where $J = \frac{\partial(x,y)}{\partial(u,v)}$

Q5.

(5 x 2 = 10 marks)

a) Verify Euler's theorem for $u = x^2 \tan^{-1}\left(\frac{y}{x}\right) - y^2 \tan^{-1}\left(\frac{x}{y}\right)$

b) If $u = e^{xyz}$ prove $\frac{\partial^3 u}{\partial x \partial y \partial z} = \frac{\partial^3 u}{\partial z \partial y \partial x}$

c) If u is homogeneous function in the variables x and y of degree n then prove $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = nu$