



Mahavir Education Trust's
Shah & Anchor Kutchhi Engineering College, Chembur

TERM TEST - II

F.E.SEMESTER-I

SUB: - APPLIED MATHEMATICS-I

Date: 26th October, 2015

Time: 10.30 am– 11.30 am

Marks: 20

Q.1 Attempt any FIVE

[10]

(a) If $u = \frac{x}{y} + \frac{y}{z} + \frac{z}{x}$ then find the value of $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$.

(b) If $x = r \cos \theta$, $y = r \sin \theta$, Find $\frac{\partial(x, y)}{\partial(r, \theta)}$.

(c) Expand e^x in the ascending power of $(x-1)$.

(d) If $u = \frac{x^2 y + xy^2}{x^2 + y^2}$, Prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = 0$

(e) If $u = \sin^{-1} \left(\frac{x^2 + y^2}{x + y} \right)$, Prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$.

(f) If $z = \log x + \log y$, Find the value of $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y}$.

Q.2 Prove that the matrix $\begin{pmatrix} \frac{1+i}{2} & \frac{-1+i}{2} \\ \frac{1+i}{2} & \frac{1-i}{2} \end{pmatrix}$ is unitary.

[05]

OR

Find the rank of the matrix by reducing it to normal form $\begin{pmatrix} 2 & -1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \\ 2 & 5 & 11 & 6 \end{pmatrix}$

Q.3 Fit a straight line to the following data:

[05]

x	1	2	3	4	5	6
y	49	54	60	73	80	86

OR

Fit a second degree parabolic curve to the following data.