Roll No:_____ Section:_____

FAST – National University of Computer & Emerging Sciences

(Karachi Campus)

Computer Science Department

Midterm 1

Course Code: MT103	CALCULUS-II	Date: 18/02/2016
Time Allowed: 01 Hour	Spring 2016	Max. Marks: 45

NOTE: 1) Attempt ALL Questions.

2) Return the question paper along with answer sheet.

Q-1(a) Determine whether the sequence is strictly Increasing or decreasing. [5 marks]

1. $\left\{\frac{10^n}{(2\,n)!}\right\}_{n=1}^{+\infty}$ 2. $\{n-2^n\}_{n=1}^{+\infty}$

(b) Determine whether the series converges and if so find its sum (any one) [5 marks]

1. $\sum_{k=1}^{\infty}\frac{1}{(k+3)(k+2)}$ 2. $\sum_{k=1}^{\infty}(-1)^{k-1}\frac{7}{6^{k-1}}$

Q-2 Determine whether the series converges or diverges (any three) [15 marks]

1. $\sum_{k=1}^{\infty}\frac{1}{1+16k^2}$
2. $\sum_{k=1}^{\infty}\frac{k!10^k}{3^k}$
3. $\sum_{k=1}^{\infty}k^2 sin^2\left(\frac{1}{k}\right)$
4. $\sum_{n=2}^{\infty}\frac{1}{nln^2 n}$

Q-3(a) Find the Taylor polynomial of order n = 0,1,2 for the $f(x)=\frac{1}{x+2}$ about $x_0=3$

and then write nth degree polynomial of function in sigma notation. [5 marks]

Q-4 (a) Find the directional derivative of $f(x,y)=y^2 ln\,x$ at P(1,4) in the [8 Marks]

direction of vector $a=-3i+3j$

(b) Use appropriate form of chain rule to find $\frac{\partial w}{\partial x}$, $if\ w=\frac{u}{v}$, $u=x^2-y^2$, $v=4xy^3$

Q-5(a) Let $R=e^{2s-t^2};\ s=3\emptyset$, $t=\sqrt{\emptyset}$ Find $\frac{dR}{d\emptyset}$ [3+4=7 Marks]

(b) Calculate 2nd order partial derivative f_{xx}, f_{xy} for $f(x,y)=\ tan^{-1}\left(\frac{x}{y}\right)$