National University of Computer and Emerging Sciences, Lahore Campus

Course:	Calculus-1	Course Code:	MT101
Program:	BS(Computer Science)	Semester:	Fall 2016
Duration:	~~03 Hours~~ 150 Min	Total Marks:	55
Paper Date:	19-Dec-16	Total Weight:	50
Section:	ALL	Page(s):	2
Exam:	Final	Roll No:	

Instruction/Notes:
I. Attempt all Questions & use of programmable calculator is not allowed.
II. Show all work in detail in order to qualify for full credit.

Q.1

a) For what value of b is

$$g(x) = \begin{cases} \frac{x-b}{b+1}, & x < 0 \\ x^2 + b, & x > 0 \end{cases}$$

b=0
b=-2

(5)

Continuous at every x.

b) Find $\frac{dy}{dx}$

if $y = -\sec u$ and $u = \frac{1}{x} + 7x$

$\frac{1-7u^2}{7} \sec\left(\frac{1}{u}+7u\right)\tan\left(\frac{1}{u}+7u\right)$

(5)

Q.2

a) Use partial fraction to evaluate

(10)

$$\int \frac{-2x+4}{(x^2+1)(x-1)^2}\,dx$$

b) Evaluate $\int_0^{\pi} e^{-y}\cos y\,dy$ $\frac{1}{2}$

(5)

Q.3 The shape of a section of the track of a rollercoaster is determined by the function (10)

$$f(x) = x^3 - 3x + 3$$

Sketch the curve for the track. Include the coordinates of any local extreme points and inflection points.

1 local maxima $(-\infty, 0)$ down $(0, \infty)$ up
1 local minima

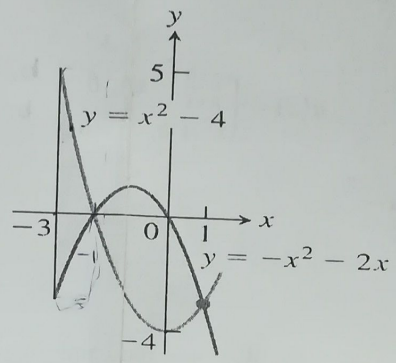
1/2

Q. 4 Find volume of a solid generated by revolving the regions bounded by the curves about the line $x = -1$

$y = x + 2, y = x^2$ $\frac{27}{2}\pi$ (10)

Q.5 Find the total area of the shaded region (10)

$\frac{38}{3}$



Good Luck

$-\text{secu}\tan u\left(-\frac{1}{u^2}+7\right)$

$-\left(\frac{7u^2-1}{x^2}\right)\text{secu}\tan u$

$\frac{7u^2-1}{x^2}\sec\left(\frac{1}{x}+7u\right)\tan\left(\frac{1}{x}+7u\right)$

$\frac{d}{du}\left(\frac{x}{2}\right)$

$\frac{1}{1+\left(\frac{x}{2}\right)^2}\ \frac{1}{2}$

$\ln|x^2+1|$

$\tan^{-1}u.$

$\left(\frac{7u^2+1}{u}\right)$

$\tan^{-1}\frac{x}{2}$

$\frac{1}{1+x^2/4}$

$(x-1)^{-2}$

$\frac{(x-1)^{-2+1}}{-2+1}$

$\frac{-1}{(x-1)}$

$\frac{2x+1}{x^2+1}$

$x^2=u$

$2x\,dx.$

$\frac{2u}{u^2+1}+\frac{1}{x^2+1}$

$-2\ln\left|\frac{x-1}{x^2+1}\right|$

$\frac{2}{4+x^2}\ \frac{1}{x}$

$\frac{1+e^{\pi}}{e^{\pi}}\cdot\frac{1}{2}$

$\left(e^{-\pi}\sin\pi-e^{-\pi}\cos\pi\right)-\left(e^{0}\sin 0-e^{-0}\cos 0\right)$

$\left(\frac{1}{e^{\pi}}0-\frac{1}{e^{\pi}}(-1)\right)-(0-1)$