



# COMSATS Institute of Information Technology (CIIT)

Islamabad Campus

Department of Computer Science

2nd Sessional Exam Fall 2015

Program : BSE-II(B)  
Semester : II  
Subject : Multivariable Calculus (MTH105)

Total Marks : 30  
Time Allowed: 1hrs  
Date 24-11-2015  
Instructor: Dr. M. Yousaf

Attempt all questions

Q.1 The surface given in the figure



is the graph of the equation

- a)  $y^2 = x^2 + z^2$       b)  $y^2 = x^2 - z^2$       c)  $y = x^2 + z^2$       d) None of the above

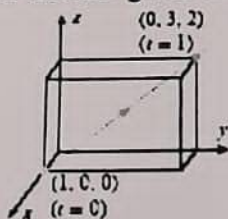
Q.2 The surface

$$3x^2 - 4y^2 + 12z^2 + 12 = 0$$

is

- a) an ellipsoid      b) a cone      c) hyperboloid of two sheets      d) None of the above

Q.3 The vector valued function for the line given in the figure



is

- a)  $r(t) = 2i + 3tj + (1-t)k$       b)  $r(t) = (1-t)i + 3tj + 2tk$       c)  $r(t) = (1-t)i + 2tj$       d) None of the above

Q.4 The

$$\lim_{t \rightarrow 1} \left( \frac{1}{t^2} i + \frac{\ln t}{t^2 - 1} j \right)$$

- is a)  $i + j$       b)  $i + \frac{1}{2}j$       c)  $3i + 0j$       d) None of the above

Q.5 Find the points where the curve

$$r(t) = ti + t^2j - 3tk$$

intersects the plane  $2x - y + z = -2$ .

Q.6 Let  $T = x^2y - xy^3 + 2$ ;  $x = r \cos \theta$ ,  $y = r \sin \theta$ . Find  $\frac{\partial T}{\partial r}$  and  $\frac{\partial T}{\partial \theta}$ .

Q.7 The volume  $V$  of a right circular cylinder is given by the formula  $V = \pi r^2 h$ , where  $r$  is the radius and  $h$  is the height. Find a formula for the instantaneous rate of change of  $V$  with respect to  $r$  if  $r$  changes and  $h$  remains constant.

Q.8 Evaluate the limit by converting to polar coordinates  $\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 y^2}{\sqrt{x^2 + y^2}}$ .