

**SCHOOL OF PLANNING AND ARCHITECTURE, VIJAYAWADA**  
**B. ARCH, I YEAR - I SEMESTER EXAMINATION (REG), DECEMBER - 2014**  
**MATHEMATICS (XM - 1)**

**Maximum Marks - 50**

**Time - 2.00 Hours**

- a) Answer any Three questions;*  
*b) Question NO. 5 is compulsory.*

Q1. Trace the curve  $y = \frac{x^2 + 1}{x^2 - 1}$  to identify the stationary points, (15)  
asymptotes and intercepts. Also sketch the curve.

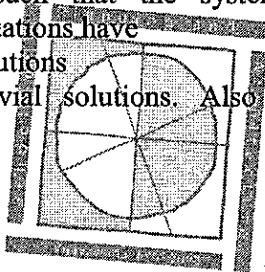
Q2. Find the maximum and minimum distance from the origin to (15)  
the curve  $3x^2 + 4xy + by^2 = 140$

Q3. Determine 'b' such that the system of the following (15)  
homogeneous equations have  
case (i) trivial solutions  
case (ii) non-trivial solutions. Also find the non-trivial  
solutions

$$2x + y + 2z = 0$$

$$x + y + 3z = 0$$

$$4x + 3y + 6z = 0$$



- Q4. a) 55 liters of water added to a cylindrical aquarium of (15)  
diameter 40cm and height 50cm. How far from the top  
does the water rise?  
b) Glass marbles of diameter 12mm are carefully added to  
the aquarium mentioned above. How many marbles can  
be added without causing the water to over flow?

**(PTO)**

Q5. Answer any *four* of the following: (20)

i) Prove by vector method that  $\cos(A-B) = \cos A \cos B - \sin A \sin B$  05

ii) Find the shortest distance from the origin to the curve  $xyz^2 = 2$  05

iii) A rigid body is rotating at 5 radians per second about an axis OM where M is the point  $3\vec{i} - 4\vec{j} + 2\vec{k}$  relative to O. Find the magnitude of the linear velocity of the particle of the body at the point  $5\vec{i} + 2\vec{j} + 3\vec{k}$  05

iv) Solve the following equations by adjoint method: 05

$$x_1 + x_2 + x_3 + x_4 = 0$$

$$x_1 + x_2 + x_3 - x_4 = 4$$

$$x_1 + x_2 - x_3 + x_4 = -4$$

$$x_1 - x_2 + x_3 + x_4 = 2$$

v) Find the surface area of a pyramid resting on a cube of side 12m and height of the pyramidal portion is 4.5m 05

vi) A metal door handle is formed with three pieces of cylinder. The handles are 4cm deep and have radius 3cm. The shaft in the middle has length 12cm and radius 1.5cm. Find the volume. 05

