Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **M.Sc.I**

FMCE307

3rd Semester Back Examination 2019-20

MATH –III

BRANCH : M.Sc.I(AP)

Time : 3 Hours

Max Marks : 70

Q.CODE : HB698

Answer Question No.1 which is compulsory and any FIVE from the rest.

The figures in the right hand margin indicate marks.

Q1 **Answer the following questions :** **(2 x 10)**

a) Determine the parallel asymptotes to the curve $= \frac{x}{(x^2-1)}$

b) Find the curvature of a circle if it's radius is 4 unit.

c) Find radius of curvature of a curve $r = a\cos(2\theta)$.

d) Find the center and radius of the sphere
$x^2 + y^2 + z^2 - 3x + 2y + z - 12 = 0.$

e) Define multiple points. What is the necessary and sufficient condition for any point (x, y) on$f(x, y) = 0$ to be a multiple point?

f) What is the guiding curve and generator of cone.

g) Find the asymptote of $r = \frac{a\theta}{\theta-1}$.

h) Determine the radius of curvature at the origin for the curve.
$$x^2 + y^2 - 2x + 6y = 0$$

i) Find the domain and range of sin xy.

j) Evaluate $\lim_{(x,y)\to(1,1)}(x^2 + 3y)$

Q2 a) Find the asymptote of the curve **(5)**
$$(3x + y)(x - 4y)(2x - y) - 4x(x - 3y) + 5y = 0$$

b) Find the asymptote of the curve **(5)**
$4(x^4 + y^4) - 17x^2y^2 - 4x(4y^2 - x^2) + 2(x^2 - 2) = 0$ and show that they pass through the points of intersection of the curve with the ellipse $x^2 + 4y^2=4$.

Q3 a) Prove that the radius of curvature at any point (-2a,2a) on the curve **(5)**
$x^2y=a(x^2+y^2)$ is -2a.

b) Find the radius of curvature at the origin of the curve **(5)**
$$x^4 - y^4 + x^3 - y^3 + x^2 - y^2 + y = 0$$

Q4 Trace the following curves :

a) $y=(x^2 – x – 6)(x – 7)$. **(5)**

b) $y^2(2x- 1)= x(x-1)$. **(5)**

Q5 a) Find the equation of the tangent at (2,1) to the curve $(x - 2)^2 = y(y - 1)^2$ and show that this point is a node. **(5)**

b) Locate the double points of the curve $y^2 = (x - 1)(x - 2)^2$ and ascertain there nature. **(5)**

Q6 **a)** Prove that a sphere which cuts the two spheres $S_1=0$, $S_2=0$ at right angles will cut $S_1+\lambda S_2=0$ at right angles for all values of λ. **(5)**

b) Find the equation of cone whose vertex is (0,0,0) and whose guiding curve is the circle $x^2+y^2=9, z=3$. **(5)**

Q7 **a)** Find the equation of the sphere which passes through the points (1,0,0), (0,1,0), (0,0,1) and has the radius as small as possible. **(5)**

b) Find the equation of the right circular cone passing through the coordinate axes. Obtain the semi vertical angle and the equation of the cone. **(5)**

Q8 **Write short Notes on any TWO :** **(5 x 2)**

a) Curvature & Circle of curvature.

b) Multiple points and classifications.

c) Right circular cone & cylinder.