Group A

1. What do you mean by asymptotes? Discuss the different types of asymptotes with suitable examples.
Find the required asymptotes of the functions:
$f(x) = (x^2-2) / (|x|^3+1)$

2. How can you define the slope of tangent at a point?
a) Show hat the point (7, 0) lies on the curve $y(x-2)(x-3)-x+7=0$. Then find the equation of tangent and normal to the curve at thatpoint.
b) Find dy/dx of the following implicit function:
i) $x^2(x - y)^2 = x^2-y^2$

Group B

3. Find the area of region bounded by the curve $y=x e^{-x}$ and the x - axis from x = 0 to x=4.

4. Define limit of a function. Find the value of Delta algebraically for given value of €.
a) $f(x)=\sqrt{(19-x)}$, L=3, C=10, € = 1

5. The positions S = f(t) of a body moving on a Co-ordinate line with S in meters and t in seconds. Then $S=6t-t^2$, t € [0,6].
a) Find the body's displacement and average velocity for the given time interval.
b) Find the acceleration at the end points of the interval.

6. Integrate the following:
   a) $\int (dx) / (x-1)(x-2)$
   b) $\int \tan^4 x \, dx$

7. Define gradient vector. Find the derivatives of $f(x) = xe^y + COSxy$ at the point (2, 0) in the direction of V=3i-4j.

8. Find f^x and f^y as a function if.
$f(x,y) = (2y) / (y + COS\ x)$

9. Test for convergence of $\int_0^\infty (dx) / (x^2+9)$.