Roll No :.................................

B.A.-6(Maths), B.Sc.(PCM)-2
DECEMBER 2019
1st Year
Mathematics-II (Geometry & Calculus)

Time : 3 Hours]　　　　　　　　　　　　　　　　　　　　　[Max. Marks : 100

Note. Attempt any Five questions. All questions carry equal marks.

Q.1　State Leibnitz theorem. If $y = a\cos(\log x) + b\sin(\log x)$, show that $x^2 y_2 + xy_1 + y = 0$ and

$x^2 y_{n+2} + (2n+1)xy_{n+1} + (n^2+1)y_n = 0$.

Q.2　Prove that the functions $1, x, x2$ are linearly independent. Hence form the differential equation whose roots are $1, x, x2$.

Q.3　Find the area of the region bounded by the line $x = 2$ and the parabola $y2 = 8x$.

Q.4　Solve $y = apx + bp3$

Q.5　Find the shortest distance between the lines $\dfrac{x-1}{2} = \dfrac{y-2}{3} = \dfrac{z-3}{4}; \dfrac{x-2}{3} = \dfrac{y-4}{4} = \dfrac{z-5}{5}$.

Q.6　Show that the following equation represents a pair of lines. Find, also the angle between them:
$6x^2 + 13xy + 6y^2 + 8x + 7y + 2 = 0$.

Q.7　Define differential equation, order & degree of differential equation. Determine the order and degree of the differential equation $[1 + y_1^2]^{1/2} = y_2^{1/3}$. Show that $y = Ae^t + Be^{-t}$ is the solution of the differential equation $y_2 - y = 0$.

Q.8　Find the equation to the cone whose vertex is the point (a,b,c) and whose generating lines intersects the conic $px2 + qy2 = 1, z = 0$.