**Question Bank**
**Subject- Applied Maths –I**

Q.1 If $z(x+y) = x - y$ , find $(\frac{\partial z}{\partial x} - \frac{\partial z}{\partial y})^2$

Q.2 Find the stationary values of $x^3 + y^3 - 3axy, a > 0$

Q.3 Find the stationary values of SinxSinysin(x+y)

Q.4 Reduce the matrix to echelon form

$$\begin{bmatrix} 1 & 2 & 1 & 3 \\ 3 & 4 & -3 & -1 \\ -1 & 0 & 5 & 7 \end{bmatrix}$$

Q.5 Find the rank of the matrices by reducing it to normal form :

i ) $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & -1 \\ 3 & 1 & 1 \end{bmatrix}$ ii) $A = \begin{bmatrix} 2 & 1 & -3 & -6 \\ 3 & -3 & 1 & 2 \\ 1 & 1 & 1 & 2 \end{bmatrix}$

Q.6 Show that

If $= cosec^{-1}\sqrt{\frac{x^{\frac{1}{2}} + y^{\frac{1}{2}}}{x^{\frac{1}{3}} + y^{\frac{1}{3}}}}$ , prove that

$$x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x \partial y} + y^2\frac{\partial^2 u}{\partial y^2} = \frac{tanu}{144}(13 + tan^2 u)$$

Q.7 If y = cos($msin^{-1}x$) [or $y = sin(msin^{-1}x)$], prove that

$$(1-x^2)y_{n+2} - (2n+1)\,xy_{n+1} + (m^2 - n^2)\,y_n = 0$$

Q.8 If $y = acos(logx) + bsin(logx)$ , then show that

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

Q.9 For what value of $\lambda$ the given equations have a solution and solve them completely in each case

$$x + y + z = 1\ ,\ \ x + 2y + 4z = \lambda\ ,\ x + 4y + 10z = \lambda^2$$

Q.10 Investigate for what values of $\lambda$ and $\mu$ the given equations have

i) No Solution ii) Unique Solution iii) Infinite Solutions

$$x + y + z = 6\ ,\quad x + 2y + 3z = 10\ ,\quad x + 2y + \lambda z = \mu$$

Q.11 If $y^{\frac{1}{m}} + y^{\frac{-1}{m}} = 2x$ , Prove that ( $x^2 - 1)y_{n+2} + (2n+1)xy_{n+1} + (n^2 - m^{2)}y_n$ = 0

Q.12 If U = f( x-y, y-z, z-x), prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$