1) obtain a complete integral of $xp^2 - ypq + y^3q - y^2z = 0$.

Soln By charpits method.

$$\frac{dp}{F_x + pF_z} = \frac{dq}{F_y + qF_z} = \frac{dz}{-pF_p - qF_q} = \frac{dx}{-F_p} = \frac{dy}{-F_q} = \frac{df}{0}$$

$F_x = \frac{df}{dx}$

$$F_x = p^2 ;\quad F_y = 3y^2q - pq - 2yz ;\quad F_z = -y^2$$

$$F_p = 2xp - yq ;\quad F_q = y^3 - yp.$$

The auxillary equation are.

$$\frac{dp}{p^2 - py^2} = \frac{dq}{3y^2q - pq - 2yz - qy^2} = \frac{dz}{-p[2xp - yq] - q[y^3 - yp]}$$

$$= \frac{dx}{-[2xp - yq]} = \frac{dy}{-[y^3 - yp]} = \frac{df}{0}$$

$$\frac{dp}{p^2 - py^2} = \frac{dy}{-[y^3 - yp]}$$

$$\frac{dp}{p[\cancel{p - y^2}]} = \frac{dy}{y[\cancel{p - y^2}]}$$

$$\frac{dp}{p} = \frac{dy}{y}.$$

$$\log p = \log y + \log a$$

$$\log p = \log ay$$

$$\boxed{p = ay}$$

$$xy^2a^2 - y^2aq + y^3q - y^2z = 0.$$

$$y^2[xa^2 - aq + yq - z] = 0.$$

$$xa^2 + yq - aq - z = 0.$$

$$yq - aq = z - xa^2$$

$$q[y-a] = z - xa^2$$

$$\boxed{q = \frac{z - xa^2}{y-a}}$$

$$dz = pdx + q\,dy.$$

$$dz = ay\,dx + \frac{z - xa^2}{y-a}dy. \quad \ldots (1).$$

Total Differentration we neglect dy. &

integrating we get

$$z = axy + f(y) \quad \ldots (2).$$

Now from equ (1) differentiation totaly we get

$$\frac{z - xa^2}{y-a}dy = df$$

$$\frac{z - xa^2}{y-a} = \frac{df}{dy}$$

$$\frac{f}{y-a} = \frac{df}{dy}$$

$$\frac{df}{f} = \frac{dy}{y-a}$$

$$\log f = \log(y-a) + \log b$$

$$\log f = \log(y-a)b$$

$$f = b(y-a)$$

in equ (2) we get

$$z = axy + b(y-a)$$

The complete integral is $\boxed{z = axy + b(y-a)}$