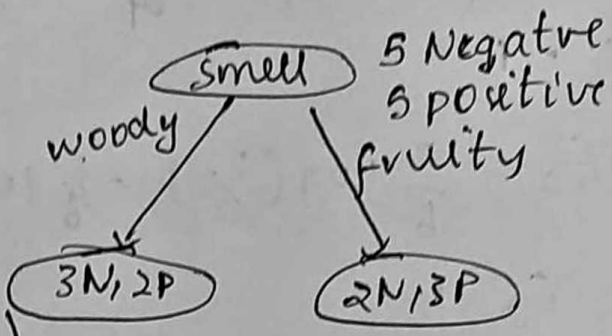
2019101087, Decision trees and Random forests

5) a) smell



$E_1 = -\frac{2}{5}\log(\frac{2}{5}) - \frac{3}{5}\log(\frac{3}{5})$

$= 0.967$

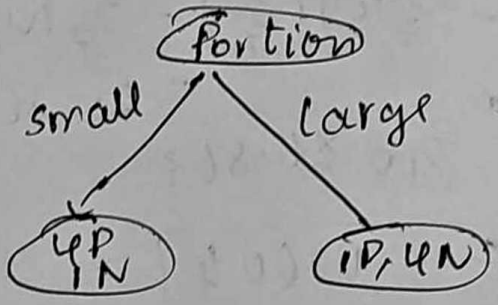
$E_2 = -\frac{3}{5}\log(\frac{2}{5}) - \frac{3}{5}\log(\frac{3}{5})$

$= 0.967$

$\Rightarrow$ Entropy(E) = 0.967

$E = \frac{5}{10}(0.967 + 0.967) = \frac{10}{10}(0.967)$

- Portion



$E_1 = -\frac{1}{5}\log(\frac{1}{5}) - \frac{4}{5}\log(\frac{4}{5})$

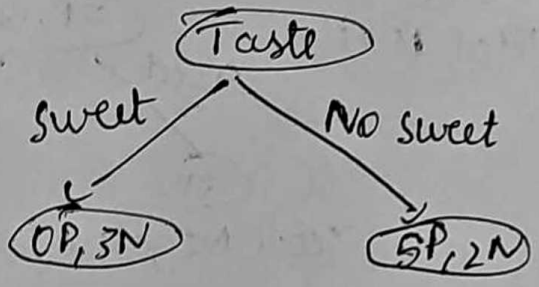
$= 0.722$

$E_2 = -\frac{4}{5}\log(\frac{4}{5}) - \frac{1}{5}\log(\frac{1}{5})$

$= 0.722$

$E = 0.722$

- Taste



$E_1 = -\frac{0}{3}\log(\frac{0}{3}) - \frac{3}{3}\log(\frac{3}{3})$

$E_1 = 0$

$E_2 = -\frac{5}{7}\log(\frac{5}{7}) - \frac{2}{7}\log(\frac{2}{7})$

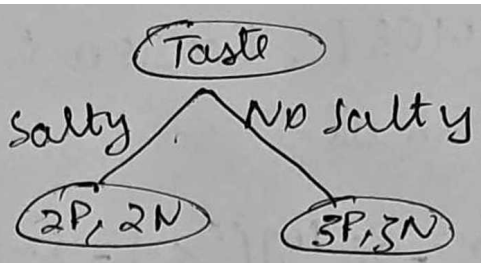
$= 0.863$

$E = \frac{7}{10} \times 0.863$

$\Rightarrow E = 0.604$

$E_1 = -\frac{2}{4}\log(\frac{2}{4}) - \frac{2}{4}\log(\frac{2}{4})$

$E_1 = 1$



$E_2 = -\frac{3}{6}\log(\frac{3}{6}) - \frac{3}{6}\log\frac{3}{6}$

$E_2 = 1$

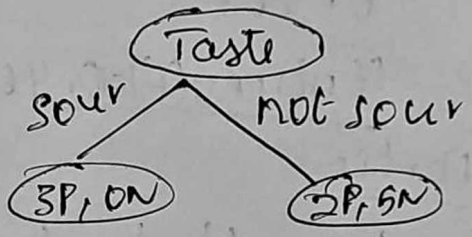
$\boxed{E = 1}$

$E_1 = 0$

$E_2 = -\frac{2}{7}\log(\frac{2}{7}) - \frac{5}{7}\log(\frac{5}{7})$

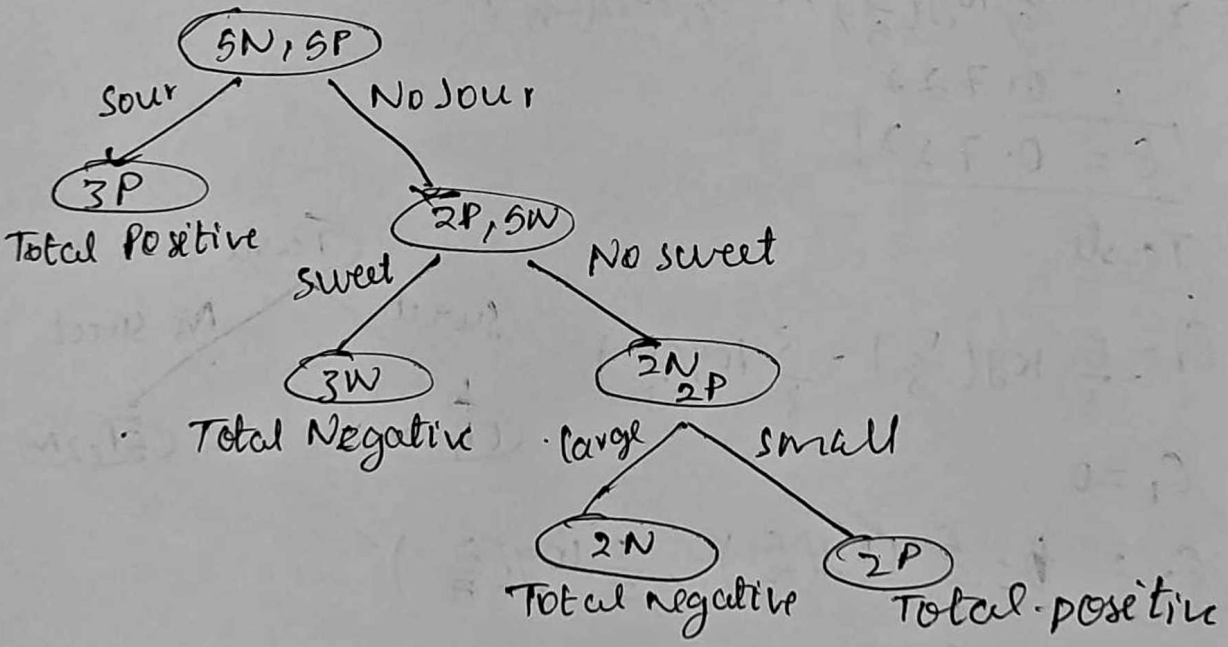
$= 0.863$

$E = \frac{7}{10} \times 0.863$



$\boxed{E = 0.604}$

(b)



First split sour/not sour is of the lowe entropy and next splits are sweet/No sweet, large/small all the splits give a pure node in above tree.