Q.1 : 5 marks.

Why ? Issues ? } (2)

Standard Scaler Example } (3)

Q.2

(1)

	N	P
N	3	2
P	2	3

(2) Precision = 60%.
(3) Recall = 60%.
(4) Accuracy = 60%.
(5) F1 = 60%.

One marks each.

Q.3 $P(S) = 0.5$ (1) $P(H) = 0.5$

$P(W=1|S) = (2+1)/5 = 0.6$
$P(F=1|S) = (2+1)/5 = 0.6$
$P(H=1|S) = (0+1)/5 = 0.2$ (2)

$P(H=0|H) = (1+1)/5 = 0.4$
$P(F=0|H) = (0+1)/5 = 0.2$
$P(H=0|H) = (3+1)/5 = 0.8$ (2)

So, $P(H=0|S) = 1 - 0.2 = 0.8$
So $P(H=0|H) = 1 - 0.8 = 0.2$

$P(Spam, S) = P(S) \cdot P(W=1|S) \cdot P(F=1|S) \cdot P(H=0|S)$
$= 0.5 \times 0.6 \times 0.6 \times 0.8 = 0.144$

$P(Ham, S) = 0.5 \times 0.4 \times 0.2 \times 0.2 = 0.008$ (2+2)

Normalized values. $P(Spam|S) = 94.74\%$, $P(Ham|S) = 5.26\%$ } ⇒ Spam (1)

Q.4 Equation for Cosine Similarity. : (02 marks)

Sample 1 : (2,4) $(5\times2 + 4\times4)/(\sqrt{20}\times\sqrt{41}) = 0.9807959$ (0) → (2 marks)
$= 0.972802$ (1) → (2)

Sample 2 : (4,2) ⇒

Sample 3 (4,4) = 0.993884 (1) (2) → (2)
Sample 4 (6,2) = 0.938343 (0) → (2)
Sample 5 (6,4) = 0.996241 (1) (1) → (2)
Sample 6 (5,3) = 0.990992 (0) (3) → (2)

Class is (1) → (1)

Q.5

Epoch 1 [0.5, 0.5, 1] (3)
Epoch 2 [0.85, 1.2, 1.35] (3)
Epoch 3 [1.365, 2.745, 3.41] (3)
Epoch 4 [0.5025, −0.6850, 0.8375] (3)
Epoch 5 [2.3805, 8.6800, 10.2025] (3)

Epoch 1: $\theta_0 = 1 - 0.1(5) = 0.5$
$\theta_1 = 1 - 0.1(-5) = 0.5$
$\theta_2 = 1 - 0.1(-10) = 1$

Epoch 2: $\theta_0 = 0.5 - 0.1(-3.5) = 0.85$
$\theta_1 = 0.5 - 0.1(-7.0) = 1.2$
$\theta_2 = 1 - 0.1(-3.5) = 1.35$

Epoch 3: $0.85 - 0.1(-5.15) = 1.365 = \theta_0$
$1.2 - 0.1(-15.45) = 2.745 = \theta_1$
$\theta_2 = 4.35 - 0.1(-20.6) = 3.41$ ...