Name: Deep Salunkhe.
Roll No: 21102A0014
Subject: NLP

Assignment 6 (THT)

Q1] Based on the given state transitions and emission probability matrix, assign POS to the statement:

(S) Times flies like an arrow (S)

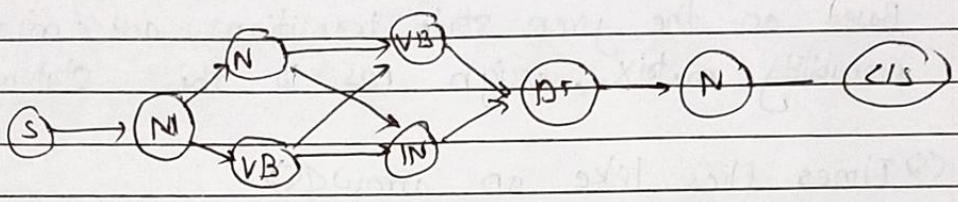
⇒ Emission probability matrix.

	VB	NN	IN
Time	0.1	0.1	0
flies	0.2	0.1	0
like	0.2	0	0.25
an	0	0	0
arrow	0	0.1	0

State transition Matrix.

	VB	NN	IN	DT	</S>
<S>	0.2	0.8	0	0	0
VB	0	0.3	0.2	0.5	0
NN	0.4	0.5	0.1	0	0
IN	0	0.75	0	0.25	0
DT	0	1	0	0	0

⇒



Calculations :

① Time

→ as a Noun.

$$P(N \mid Time, <s>) = 0.1 \times 0.8$$
$$= 0.08$$

∴ Time ⇒ Noun.

② flies

→ as Noun.

$$P(N \mid flies, N) = 0.1 \times 0.5 \times 0.08$$
$$= 0.05 \times 0.08$$
$$= 0.0040$$

→ as Verb.

$$P(V \mid flies, N) = 0.2 \times 0.4 \times 0.08$$
$$= 0.08 \times 0.08$$
$$= 0.0064$$

0.0064 > 0.0040

∴ flies ⇒ V

③ like

① as verb

$$P(V|like, V) = 0.2 \times \left(\frac{0*0.1}{1000}\right) \times 0.0064$$

$$= 0.00128 \times 10^{-3}$$

② as a preposition

$$P(IN|like, V) = 0.25 \times 0.2 \times 0.0064$$

$$= 0.050 \times 0.0064$$

$$= 0.0320 \times 10^{-3}$$

∴ 0.0320 > 0.00128

∴ **like ⇒ IN**

④ an.

$$P(DT|an, IN) = 1 \times 0.25 \times \frac{0.32 \times 10^{-6}}{4 \times 10^{-6}}$$

an ⇒ DT

(5) Arrow

(i) as a Noun

$$P(N|\text{Arrow}, DT) = 0.1 \times 1 \times 4 \times 0^{-6}$$
$$= 4 \times 10^{-5}.$$

$\therefore$ arrow $\Rightarrow$ N

Time	flies	like	an	arrow
NN	VB	IN	DT	NN