National Institute of Technology, Tiruchirappalli – 15
Department of Computer Science & Engineering

Cycle Test - I

CSPE73 – Natural Language Processing (Program Elective)

Class / Semester : IV CSE / VII **Time** : 11.00 AM to 12.00 PM
Date : 21.08.2025 **Marks** : 20 **Section** : A

Answer all questions

1. Write the Regular Expressions for the following patterns. **[CO2] (5)**

a. a string that starts with a vowel followed by zero or more copies of c and end with a digit.
b. a string that starts with abc followed by 3 upto 7 copies of d.
c. a string that starts with m followed by one or more copies of the sequence 'xyz'.
d. a pattern that matches the strings – sorry and lorry, gray and grey.
e. a pattern that matches a word that starts with an Uppercase letter followed by alleast one lower case letter and 2 to 4 digits.

2. Match the following misspelt words with their corresponding Confusion matrices in Statistical Spell Checking. **[CO1] (5)**

a. immitate b. exced c. cauhgt
d. calender e. dilema

3. Construct the Finite State Transducers for the following words. **[CO2] (5)**

a. Flower b. Monkeys c. Mangoes
d. Geese e. Appendices

4. Consider a scenario such that Mr. X is happy someday and angry on other days. We can only observe when he smiles, frowns, laughs, or yells but not his actual emotional state. Let us start on day 1 in the happy state. There can be only one state transition per day. It can be either to happy state or angry state. Let us consider the following transition probabilities : { Happy → Happy (0.8), Happy → Angry (0.2), Angry → Angry (0.2), Angry → Happy (0.2) }. Let the Emission probabilities be defined as follows : { Happy → (Smile, Frown, Laugh, Yell) = {0.5,0.1,0.2,0.2} } respectively and { Angry → (Smile, Frown, Laugh, Yell) = {0.1,0.5,0.2,0.2} } respectively. Construct the transition diagram using Hidden Markov Model for the above scenario. Assume that q_t is the state on day t and O_t is the observation on day t. What is the probability of observation ***frown*** on day 2 - $P(o_2 = frown)$? **[CO3] (5)**