

**BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT**

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN

Course Code

22AI632

Sixth Semester B.E. Degree Examinations, May/June 2026

**NATURAL LANGUAGE PROCESSING**

(AIML)

Duration: 3 hrs

Max. Marks: 100

**Note:** 1. Answer any FIVE full questions choosing ONE full Question from each Module.

2. Missing data, if any, may be suitably assumed

| <u>Q. No</u>           | <u>Question</u>                                                                                                                                                                                                                                                 | <u>Marks</u> | <u>(RBT:CO:PI)</u> |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------|
| <b><u>Module-1</u></b> |                                                                                                                                                                                                                                                                 |              |                    |
| 1.                     | a. Define Natural Language Processing (NLP)? Why is NLP important in Artificial Intelligence?                                                                                                                                                                   | 04           | (1:1: 1.1.1)       |
|                        | b. Describe the applications of NLP.                                                                                                                                                                                                                            | 06           | (1:1:1.1.2)        |
|                        | c. Explain the Deep Learning approaches used to solve the NLP Problems.                                                                                                                                                                                         | 10           | (2:1:1.3.3)        |
| <b>(OR)</b>            |                                                                                                                                                                                                                                                                 |              |                    |
| 2.                     | a. Explain the various NLP tasks. Draw the diagram to represent the relative difficulty among these tasks.                                                                                                                                                      | 06           | (2:1:1.1.3)        |
|                        | b. Discuss what makes NLP a challenging or difficult problem domain?                                                                                                                                                                                            | 04           | (2:1:1.1.4)        |
|                        | b. Use phrase structure grammar rules to draw a parse tree for the below sentences:<br>S → NP + VP<br>NP → det + (adj*) + N<br>VP → V + (NP*) + (PP*)<br>PP → prep + NP<br>det → article (e.g. a, the, an)                                                      | 10           | (3:1:1.2.3)        |
|                        | (i) The big mango fell on the table.<br>(ii) The tired pirate hugged the dog.<br>(iii) A fox caught the mouse.<br>(iv) The horse galloped to the barn.<br>(v) The ancient moon gazed upon a lake.                                                               |              |                    |
| <b><u>Module-2</u></b> |                                                                                                                                                                                                                                                                 |              |                    |
| 3.                     | a. Describe what Text Cleaning is, list and explain the Text Cleaning steps with code and example.                                                                                                                                                              | 10           | (2:2:2.1.1)        |
|                        | b. Apply N-grams (Bigram) and TF-IDF to convert the given text documents into numerical vector representations and show each step clearly.<br>Document 1: Cricket game exciting<br>Document 2: Chess match Thrilling<br>Document 3: Football game very Exciting | 10           | (3:2:2.3.3)        |
| <b>(OR)</b>            |                                                                                                                                                                                                                                                                 |              |                    |

**Note: (RBT - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

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|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-------------|
| 4. | a. | Describe what word embedding is. With a neat diagram, explain the working model of the Continuous Bag of Words (CBOW), Skip-Gram Model with example.                                                                                                             | 10 | (2:2:2.4.2) |
|    | b. | Apply one-hot encoding and Bag of Words (Bow) to convert the given text documents into numerical vector representations, showing each step clearly.<br>Document 1: comedy film hero<br>Document 2: comedy thriller movie good<br>Document 3: thriller movie good | 10 | (3:2:2.3.2) |

### **Module-3**

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|----|----|--------------------------------------------------------------------------------------------------------------|----|-------------|
| 5. | a. | Explain what Text Classification is, and the pipeline for building Text Classification and its applications. | 10 | (2:3:3.1.2) |
|    | b. | With a code snippet, explain the classification modelling using a Support Vector Machine (SVM).              | 10 | (3:3:3.2.3) |

**(OR)**

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|----|----|----------------------------------------------------------------------------------------|----|-------------|
| 6. | a. | With a code snippet, explain the classification modelling using LSTM.                  | 10 | (2:3:3.3.2) |
|    | b. | With a code snippet, explain the classification modelling using a Logistic Regression. | 10 | (2:3:3.2.2) |

### **Module-4**

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|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-------------|
| 7. | a. | Describe what Information Extraction is. List and explain the Tasks of Information Extraction.                                                                                           | 10 | (2:4:4.1.3) |
|    | b. | Describe what KeyPhrase Extraction (KPE) is, explain the different methods used to solve the KeyPhrase Extraction (KPE), and write code for implementing the KeyPhrase Extraction (KPE). | 10 | (2:4:4.2.1) |

**(OR)**

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|----|----|-----------------------------------------------------------------------------------------------------------------------------------|----|-------------|
| 8. | a. | With a clear diagram illustrating the General Pipeline of Information Extraction (IE), explain each task depicted in the diagram. | 10 | (2:4:4.1.4) |
|    | b. | Describe what Named Entity Disambiguity and Linking is, and give an example.                                                      | 05 | (2:4:4.2.3) |
|    | c. | Briefly explain the Information Extraction (IE) applications.                                                                     | 05 | (2:4:4.1.2) |

### **Module-5**

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|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------|----|-------------|
| 9. | a. | What are chatbots? Explain What are its benefits and applications?                                                                                   | 10 | (2:5:5.1.2) |
|    | b. | Discuss and explain the taxonomy of chatbots based on interaction with the user with examples. Discuss a simple FAQ chatbot in detail with examples. | 10 | (2:5:5.1.3) |

**(OR)**

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|-----|----|-------------------------------------------------------------------------------------------------------------------------|----|-------------|
| 10. | a. | List and explain the components of the Dialog system in detail with an example.                                         | 10 | (2:5:5.2.1) |
|     | b. | With near diagram explain in detail the pipeline for building dialogue systems and the components of the dialog system. | 10 | (2:5:5.1.4) |

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