**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**
**(MID SEMESTER EXAMINATIONSP/2025)**

**CLASS: B.TECH** **SEMESTER : VI**
**BRANCH: EEE** **SESSION : SP/2025**

**SUBJECT: EE519 COMPUTATIONAL TECHNIQUES IN ELECTRICAL ENGINEERING**
**TIME: 02 Hours** **FULL MARKS: 25**

**INSTRUCTIONS:**
**1. The question paper contains 5 questions each of 5 marks and total 25 marks.**
**2. Attempt all questions.**
**3. The missing data, if any, may be assumed suitably.**
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

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| | | | CO | BL |
|---|---|---|---|---|
| Q.1(a) | Define soft computing and explain its significance in real-world applications. | [2] | CO1 | BL1 |
| Q.1(b) | A neural network has an input layer with 3 neurons, one hidden layer with 4 neurons, and an output layer with 2 neurons. Calculate the total number of weights and biases in this network. | [3] | CO3 | BL3 |
| Q.2(a) | What are activation functions in Artificial Neural Network (ANN)? Explain any two with their mathematical expressions. | [2] | CO3 | BL2 |
| Q.2(b) | A simple neural network has one parameter $\theta$. The loss function is given by: $L(\theta)=(\theta-5)^2$. Using gradient descent with a learning rate of 0.1, update $\theta$ for one iteration, assuming an initial value of $\theta$ as 0. | [3] | CO3 | BL3 |
| Q.3(a) | What is a Support Vector Machine (SVM)? Explain its importance in classification problems. | [2] | CO3 | BL2 |
| Q.3(b) | Explain the concept of Swarm intelligence with an example. | [3] | CO2 | BL2 |
| Q.4(a) | Compare soft computing with hard computing. Provide suitable examples. | [2] | CO1 | BL2 |
| Q.4(b) | Define an Artificial Neural Network (ANN) and its basic structure. | [3] | CO3 | BL1 |
| Q.5(a) | Describe the biological neural network. Also, compare the human brain with a computer in terms of processing, memory, and learning. | [2] | CO3 | BL2 |
| Q.5(b) | A function is given as $f(x)=x^2-4x+4$. Find the optimal value of x using the gradient descent method for one iteration with an initial guess of $x=0$ and learning rate $\eta=0.1$. | [3] | CO2 | BL3 |

**::::::28/02/2025::::::E**