**Logo, company name

Description automatically generated****COMSATS University Islamabad, Lahore** **Campus**

**Spring 2025– Mid Exam**

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| Course Title: | Artificial Neural Networks | | | | Course Code: | | AIC380 | Credit Hours: | 3(2,1) |
| Course Instructor/s: |  | | | | Programme Name: | | BCS | | |
| Semester: | SP23 | Batch: | SP23-BCS-AI | Room #: |  | | Date: | 11-2024 (4-5:30 pm) | |
| Time Allowed: | 90 Minutes | | | | Maximum Marks: | | | 30 | |
| **Student’s Name:** |  | | | | **Reg. No.** |  | | | |
| **Important Instructions:** Give to-the-point answers. Adding irrelevant details does not carry any credits. | | | | | | | | | |

**Question no1 <CLO-4 > Develop deep learning-based solutions to solve real-world problems in diverse domains. <Creating> [Marks :30]**

You are required to implement and train an Artificial Neural Network (ANN) using the dataset provided in CSV format. The dataset contains features and a target column for a binary classification task. Your objective is to preprocess the data, build and train a neural network model to classify the target class accurately.

**a)** Data Loading and Preprocessing [5 Marks]

* Read the provided dataset from a CSV file using pandas.
* Display the total number of records and features.
* Show the class distribution for the binary target column using a bar chart or print.
* Normalize or scale the features if needed.

**b) Define a feedforward neural network for binary classification using TensorFlow/Keras.**

* Include: At least 1 hidden layer
* b)ReLU activation for hidden layers
* c)Sigmoid activation for the output layer
  + Print a summary of the model.

**c) : Model Compilation and Training [5 Marks]**

* Compile the model using:
* binary\_crossentropy as the loss
* An appropriate optimizer (e.g., adam)
* Accuracy as the metric
* Train the model using train/test split or validation split
* Plot the loss and accuracy curves

d: Model Evaluation and Prediction [5 Marks]

* Evaluate the model on the test set
* Print: Accuracy,Precision,Recall,F1-Score
* Show a confusion matrix

**e: Result Discussion and Interpretation [5 Marks]**

* Comment on:
  + The training behavior (overfitting/underfitting?)
  + Class imbalance issues (if any)
  + Performance based on confusion matrix