Bangladesh University

Department of CSE
Final Examination, Summer 2026 Semester
Course Title: Pattern Recognition
Course Code: CSE-3301
Batch: 69th B (Evening)

Time: 2 hours Total Marks: 4×10 = 40

Instructions: *1. Answer any 4(total) out of the 5 questions.*
2. Read the questions carefully and answer accordingly.
3. If you have problem in understanding any question, ask your teacher; not your Classmates.

1. a). Explain the working procedure of the Random Forest Classifier. Describe how multiple decision trees are constructed and how their predictions are combined to make the final classification decision. (6)

   b). Describe the performance evaluation metrics used to assess the effectiveness of a Random Forest classifier. Explain any four commonly used metrics (4)

2.

Weather	Humidity	Wind	Play
Sunny	High	Weak	No
Sunny	Normal	Weak	No
Sunny	Normal	Strong	No
Cloudy	High	Weak	No
Cloudy	High	Strong	No
Cloudy	Normal	Strong	Yes
Cloudy	Normal	Weak	Yes
Rainy	High	Weak	Yes
Rainy	Normal	Strong	Yes
Rainy	Normal	Weak	Yes

Table I: Dataset

   a). Generate the Decision tree based on the above dataset in Table I. (7)

   b). Compare the algorithm used to generate a Decision Tree with the Random Forest algorithm. (3)

3. a) Explain the concept of Ensemble Learning in machine learning and classify it. (5)

   b) Describe the basic architecture of a stacked model, including base learners and meta-learner. how does it differ from single-model approaches? (5)

4.

Day	Outlook	Play
1	Rainy	Yes
2	Sunny	Yes
3	Overcast	Yes
4	Overcast	Yes
5	Sunny	No
6	Rainy	Yes
7	Sunny	Yes
8	Overcast	Yes
9	Rainy	No
10	Sunny	No

Table II

a). Discuss Bayes' Theorem and explain the equation. (3)

b) Based on the given table, determine whether to play the game or not using Bayes' Theorem. (7)

5.

Brightness	Saturation	Color
40	20	Red
50	50	Blue
60	90	Blue
10	25	Red
70	70	Blue
60	10	Red
25	80	Blue

Table III

a). Explain the working procedure of KNN classifier. (4)

b). Calculate the class for the below data using KNN algorithm based on Table III. (6)

Brightness: 20, Saturation: 35, Class: ?.