Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Lab-Final Examination, Fall 2023
Course Code: SE334; Course Title: Artificial Intelligence Lab
Sections: A, Teachers: NF

Time: 1 Hour **Marks: 40**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	**Analyze** the following code snippet to identify the logical, conceptual, and syntactical errors, if any. Then, rewrite the correct version of the code.
	
	`class Space():`
	
	`    def __init__(self, height, width, num_hospitals):`
	`        """Create a new state space with given dimensions."""`
	`        self.height = height`
	`        self.width = width`
	`        self.num_hospitals = num_hospitals`
	`        self.houses = set()`
	`        self.hospitals = set()`
	
	`    def add_house(self, row, col):`
	`        """Add a house at a particular location in state space."""`
	`        self.houses.add((row, col))`
	
	`    def available_spaces(self):`
	`        """Returns all cells not currently used by a house or hospital."""`
	
	`        # Consider all possible cells`
	`        candidates = set(`
	`            (row, col)`
	`            for row in range(self.height)`
	`            for col in range(self.width)`
	`        )`
		[Marks-10]	**CLO-1**
			Level-4

	`# Remove all houses and hospitals`
	`for house in self.houses:`
	`  candidates.remove(house)`
	`for hospital in self.hospitals:`
	`  candidates.remove(hospital)`
	`return candidates`		

2.	**Demonstrate** the application of Object-Oriented Programming (OOP) by constructing a class of 'node,' defined as a data structure in the search algorithm within the domain of Artificial Intelligence (AI).	**[Marks-10]**	**CLO-2** ***Level-3***
3.	**Design** a Bayesian network where strikes on the road, availability of public transportation, and traffic conditions are related to the probability of Mr. John's on-time arrival for an examination. You have to draw the network and write the complete code.	**[Marks-10]**	**CLO-3** ***Level-6***

4.	**Construct** an accurate and logical explanation of the code snippet given below. Make your explanation brief. Remember, a proper explanation is more effective than a lengthy explanation.
	
	`import csv`
	`import tensorflow as tf`
	
	`from sklearn.model_selection import train_test_split`
	
	`# Read data in from file`
	`with open("banknotes.csv") as f:`
	`  reader = csv.reader(f)`
	`  next(reader)`
	
	`  data = []`
	`  for row in reader:`
	`  data.append({`
	`  "evidence": [float(cell) for cell in row[:4]],`
	`  "label": 1 if row[4] == "0" else 0`
	`  })`
	
	`# Separate data into training and testing groups`
	`evidence = [row["evidence"] for row in data]`
	`labels = [row["label"] for row in data]`
	`X_training, X_testing, y_training, y_testing = train_test_split(`
	`  evidence, labels, test_size=0.4`
		[Marks-10]	**CLO-4**
			Level-6

```
)

# Create a neural network
model = tf.keras.models.Sequential()

# Add a hidden layer with 8 units, with
ReLU activation
model.add(tf.keras.layers.Dense(8,
input_shape=(4,), activation="relu"))

# Add output layer with 1 unit, with
sigmoid activation
model.add(tf.keras.layers.Dense(1,
activation="sigmoid"))

# Train neural network
model.compile(
    optimizer="adam",
    loss="binary_crossentropy",
    metrics=["accuracy"]
)
model.fit(X_training, y_training,
epochs=20)

# Evaluate how well model performs
model.evaluate(X_testing, y_testing, verbose=2)
```