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18CS71

Seventh Semester B.E. Degree Examination, June/July 2024 Artificial Intelligence and Machine Learning

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Solve the water jug problem using production rule system. (10 Marks)
 b. Develop AO* algorithm for AI applications. (10 Marks)

OR

- 2 a. Explain the problem characteristics with respect to heuristic search. (10 Marks)
 b. Write an algorithm for
 i) Steepest-Ascent hill climbing with an example. (10 Marks)
 ii) Best first search with an example. (10 Marks)

Module-2

- 3 a. Write the candidate elimination algorithm. Explain its working, taking the enjoy sport concept and training instances given below.

| Day | Sky | Air Temp | Humidity | Wind | Water | Forecast | Enjoy sport |
|-----|-------|----------|----------|--------|-------|----------|-------------|
| 1 | Sunny | Warm | Normal | Strong | Warm | Same | Yes |
| 2 | Sunny | Warm | High | Strong | Warm | Same | Yes |
| 3 | Rainy | Cold | High | Strong | Warm | Change | No |
| 4 | Sunny | Warm | High | Strong | Cool | Change | Yes |

- (10 Marks)
- b. Explain the Find-S algorithm and List-then-Eliminate algorithm with an example. (10 Marks)

OR

- 4 a. Explain the different approaches used for knowledge representation and list the issues in knowledge representation. (10 Marks)
 b. Differentiate between forward and backward reasoning and list the factors that influences the choices between them. (10 Marks)

Module-3

- 5 a. Explain the concept of decision tree learning and discuss the necessary measures required to select the attributes for building a decision tree using ID3 algorithm. (10 Marks)
 b. Construct the decision tree to represent the following Boolean functions:
 i) $A \wedge \neg B$ ii) $A \vee [B \wedge C]$ iii) $A \text{ XOR } B$. (06 Marks)
 c. Mention the appropriate problems for decision tree learning. (04 Marks)

OR

- 6 a. Explain the back propagation algorithm. (10 Marks)
 b. Explain the perceptron network with the notation. Derive an equation of gradient descent rule to minimize the error. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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Module-4

- 7 a. Explain the Naïve Bayes classifier and Bayesian belief networks. (10 Marks)
b. Explain the MDL principle and Gibbs algorithm. (10 Marks)

OR

- 8 a. Explain the Bayes theorem and concept learning. (10 Marks)
b. Prove that how maximum likelihood (Bayesian learning) can be used in any learning algorithms that are used to minimize the squared error between the actual output hypothesis and predicted output hypothesis. (10 Marks)

Module-5

- 9 a. Explain the K-nearest neighbor learning algorithm with an example. (10 Marks)
b. Explain the locally weighted linear regression. (10 Marks)

OR

- 10 Write a short note on:
a. Q-learning
b. Radial basis function
c. Case based reasoning
d. The learning task. (20 Marks)

CBCS SCHEME

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18CS744

Seventh Semester B.E. Degree Examination, June/July 2024 Cryptography

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What are the three independent dimensions of cryptography? Explain. (06 Marks)
b. Explain unconditionally secure and computationally secure encryption schemes. (04 Marks)
c. If intruder has an access to part of plaintext and corresponding cipher text generated using Hill Cipher. Part plaintext is TECH and corresponding Cipher text is NQUZ. Estimate key and decrypt the message NQUZ TQTE. (10 Marks)

OR

- 2 a. Compare stream Cipher and block Cipher. (06 Marks)
b. Illustrate one round of Feistel Cipher. Assume that the data received from previous round is 1A2B3C4D and key used is 123ABC. (04 Marks)
c. Explain DES algorithm and its strength. (10 Marks)

Module-2

- 3 a. Illustrate the application of public-key cryptosystem for
i) Authentication
ii) Secrecy
iii) Authentication and secrecy application. (10 Marks)
b. Encrypt plaintext 9 using the RSA public-key encryption algorithm. Use prime numbers $p = 7$ and $q = 11$ to generate the public and private keys. Demonstrate Chinese remainder theorem in RSA while decrypting. (10 Marks)

OR

- 4 a. Illustrate Man-in-the-Middle attack in Diffie-Hellman key exchange algorithm. (05 Marks)
b. Compute public-key and secret key of two users using Diffie-Hellman key exchange algorithm. Use $q = 353$, $X_A = 97$ and $X_B = 233$. (10 Marks)
c. Explain Elgamal cryptographic algorithm. (05 Marks)

Module-3

- 5 a. Summarize Abelian group and Elliptic curves over real numbers. (06 Marks)
b. List the two families of elliptic curves used in cryptography applications and explain them. (08 Marks)
c. Consider the group $E_{23}(1, 1)$ compute 3G left base point $G = (3, 10)$. (06 Marks)

OR

- 6 a. Explain the public-key authority technique and public-key certification technique of public-key distribution. How they are more secure than public announcements and publicly available directory technique? (10 Marks)
b. Explain simple key distribution mechanism and illustrate man-in-the-middle attack for the scheme. Explain any one scheme to overcome the attack. (10 Marks)

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Module-4

- 7 a. What requirements are not satisfied by X509 version 2? Explain each extension of version 3. (10 Marks)
- b. Illustrate the working of Kerberos and explain the Kerberos exchanges among the parties in a network. (10 Marks)

OR

- 8 a. Write about the following with respect to S/MIME:
- i) S/MIME functionalities. (10 Marks)
 - ii) Cryptography algorithm used. (10 Marks)
- b. What is Domain keys identified mail? Summarize internet mail architecture. (10 Marks)

Module-5

- 9 a. What is IPsec? List its applications. Illustrate how IPsec is used in an organization. (08 Marks)
- b. Compare transport mode and tunnel mode with respect to functionalities supported by security services of IPsec. Taking an example explain how tunnel mode IPsec operates. (06 Marks)
- c. Recall the services of ESP. With a neat diagram, explain ESP packet format. (06 Marks)

OR

- 10 a. Illustrate using ESP with IPV4 and IPV6. Summarize the transport mode operation. (10 Marks)
- b. What is the use of Tunnel Mode ESP? Explain the steps that occur when an external host wishes to communicate with a host on an internal network protected by a firewall, and in which ESP is implemented in the external host and the firewalls. (10 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2024 Python Application Programming

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. List the features of python programming language. (06 Marks)
- b. Differentiate compiler and interpreter. (04 Marks)
- c. Describe arithmetic operators, assignment operators, comparison operators, logical operators and Bitwise operators in detail with examples. (10 Marks)

OR

- 2 a. List and give syntax of all python supported conditional statements and explain its usage with an example. Write a program to check whether the given number is positive or negative or zero. (08 Marks)
- b. Write a short note on:
 - i) ** and // operators
 - ii) Types of errors
 - iii) Built-in function. (06 Marks)
- c. Write python programs to
 - i) Find largest of 3 numbers
 - ii) Check whether the given year is leap year or not with a function. (06 Marks)

Module-2

- 3 a. With syntax and example code, explain the working of definite loop in python. (06 Marks)
- b. Write a python program to demonstrate counting, summing and average of elements using loops. (06 Marks)
- c. Explain the concept of string slicing and predict the output for the following code (consider the string str = "Hello World")
 - i) print("str[:] is", str[:])
 - ii) print("str[0:5] is", str[0:5])
 - iii) print("str[4:4] is", str[4:4])
 - iv) print("str[3:8:2] is", str[3:8:2])
 - v) print(str[-1:]). (08 Marks)

OR

- 4 a. Explain the concepts of infinite loops. Differentiate 'break' and 'continue' statements with an example. (06 Marks)
- b. What is a string? Write a python program to demonstrate traversal through a string with a loop. Also explain the concept of string slicing. (07 Marks)
- c. Explain file open, file close, file read and file write concepts in python with example. (07 Marks)

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Module-3

- 5 a. What is list? Explain the following methods with an example:
i) append() ii) sort() iii) Reverse(). (10 Marks)
- b. What is dictionary? How is it different from list? Write a python program to count the occurrence of characters in a string and print the count. (06 Marks)
- c. What is tuples? Compare and contrast lists and tuples. (04 Marks)

OR

- 6 a. Discuss the lists handling functions in python with example. (08 Marks)
- b. Explain 'DSU' pattern with respect to tuples. Write a python code to determine tuples by sorting a list of words from longest to shortest using loops. (08 Marks)
- c. Explain the need of regular expression in python language. (04 Marks)

Module-4

- 7 a. Define class and object. Explain the working of init method with suitable code. (06 Marks)
- b. Define attribute. With the help of python code explain how functions return instance values. (06 Marks)
- c. Explain the concept of modifier with python code. (08 Marks)

OR

- 8 a. What is the difference between method and function? Also explain programmer defined types with an example. (10 Marks)
- b. Illustrate the concepts of pure function with python code. (10 Marks)

Module-5

- 9 a. Write a python code to read the file from web using urllib and retrieve the data of the file. (10 Marks)
- b. What is XML? How is it used in python? Explain parsing of XML with example. (10 Marks)

OR

- 10 a. Define cursor. Explain connect, execute and close command of databases with suitable example. (10 Marks)
- b. Write a python code for creating employee database, inserting records and selecting the employees working in the company. (10 Marks)

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