Roll No. | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (Artificial Intelligence & Machine Learning) (Sem–1)

PROGRAMMING IN PYTHON

Subject Code : UGCA-1914

M.Code : 79005

Date of Examination : 23-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. **Write briefly :**

   a) IDE

   b) Class

   c) Data types

   d) Exception Handling.

   e) Indexing of String

   f) Types of conversion.

   g) Keyword

   h) Tuple

   i) Boolean Expression

   j) Garbage Collection

SECTION-B

2. Write a python program to print Fibonacci series up to *n* terms.

3. Explain different loops available in python with suitable examples.

4. Provide an example of how you would use a try and except block to handle a Zero Division Error when dividing two numbers.

5. Illustrate the use of module overriding. Explain with example.

6. Write a python program to read contents of first.txt file and write same content in second.txt file.

7. a) Design a python program which will throw exception if the age entered by user is less than 18.

   b) Explain concepts of object oriented programming.

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Roll No. | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (Artificial Intelligence & Machine Learning) (Sem–1)

PROGRAMMING IN PYTHON

Subject Code : UGCA1914

M.Code : S79005

Date of Examination : 24-01-2025

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. **Write briefly :**

   a) Dictionary

   b) Keywords

   c) Tuple

   d) Sets

   e) Module

   f) Purpose of loops.

   g) Non Associative Operators

   h) Garbage collection

   i) tell()

   j) Directories in python.

SECTION-B

2. Explain in detail features and Major Applications of Python programming Language.

3. **Write a note on :**

   a) Python Input and Output Functions.

   b) User defined Functions.

4. Explain in detail different Operators and Expressions used in Python.

5. Explain different Control Structures used in Python with suitable examples.

6. How Pass by value is different from Pass by Reference used in Python? Explain by taking suitable example.

7. How Exception handling is performed in Python? Explain in detail.

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Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI&ML) (Sem.–1)

MATHEMATICS

Subject Code : UGCA-1901

M.Code : 79003

Date of examination : 02-01-2025

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. **Solve the following :**

a) Give the truth table for the statement : $(p \wedge q) \rightarrow (p \vee q)$.

b) Find the matrix X such that A + 2B + X = 0 where $A = \begin{bmatrix} 2 & -1 \\ 3 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 1 \\ 0 & 2 \end{bmatrix}$.

c) Find the sum of the series 82 + 80 + 78 +..... + 40.

d) Difference between A.P. and G.P. series.

e) If a set A is of rational numbers and B = $\{x : x^2 - 4x + 2 = 0\}$ then find $A \cap B$, $A - B$ and $B - A$.

f) Show that $(p \vee q) \wedge (\sim p \wedge \sim q)$ is a contradiction.

g) If $\begin{bmatrix} x+3 & 4 \\ y-4 & = y \end{bmatrix} = \begin{bmatrix} 5 & 4 \\ 3 & 9 \end{bmatrix}$ find the value of x and y.

h) For what value of x the numbers $\frac{-2}{7}$, x, $\frac{-7}{2}$ are in G.P.

i) Insert the three G.M. between numbers 1 and 256.

j) Which of the following sets are null sets : – $A = \{x : x < 1$ and $x > 3\}$ and $B = \{x : x^2 = 9$ and $3x = 7\}$

SECTION-B

2. a) Verify (AB)C= A(BC). For $A = \begin{bmatrix} 1 & 2 \\ -2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 2 & 3 \end{bmatrix}$ and $C = \begin{bmatrix} -3 & 1 \\ 2 & 0 \end{bmatrix}$.

b) If $\begin{bmatrix} a+b & 2 \\ 5 & b \end{bmatrix} = \begin{bmatrix} 6 & 5 \\ 2 & 2 \end{bmatrix}'$. Then find a.

3. a) Prove that $A \cap (A \cup B) = A \cap B$.

b) In a group of 50 persons, 14 drink tea but not coffee and 30 drink tea. Find the number of the persons who drink tea and coffee both and also the number of persons who drink coffee but not tea.

4. a) If $A = \begin{bmatrix} 2 \\ -4 \\ 1 \end{bmatrix}$ and $B = [6 \quad 3 \quad -1]$ then verify that $(AB)' = B'A'$.

b) Find the matrix A such that $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} A = \begin{bmatrix} 2 & 3 & 5 \\ 1 & 0 & 1 \end{bmatrix}$.

5. a) Find the sum of the first n terms and the sum of the first five terms of the geometric series $1 + \frac{1}{3} + \frac{1}{9} + \ldots\ldots\ldots\ldots + \frac{1}{3^{n-1}} + \ldots\ldots$

b) If $x = 1 + a + a^2 + \ldots\ldots \infty$ $y = 1 + b + b^2 + \ldots\ldots\ldots\ldots \infty$

Prove that $1 + ab + (ab)^2 + \ldots\ldots\ldots\ldots \infty = \frac{xy}{x + y - 1}$.

6. a) Test the validity of the argument: If he works hard then he will be successful. If he is successful the he will be happy. Therefore hard work leads to happiness.

b) Show that $p \rightarrow (p \vee q)$ is a tautology.

7. a) Prove that $p \rightarrow (\sim q \vee r) \equiv (p \wedge q) \rightarrow r$.

b) Find the values x, y, z if the matrix $A = \begin{bmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{bmatrix}$ obey the law $A'A = 1$.

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Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI & ML) (Sem–2)

DATA STRUCTURES

Subject Code : UGCA1915

M.Code : 79858

Date of Examination : 13-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. **Write short notes on :**

   a) Define the terms "element", "node", and "key" in the context of data structures.

   b) How do data structures differ from algorithms?

   c) What is an array index and its significance in accessing elements.

   d) What are the advantages and disadvantages of arrays in terms of storage and access?

   e) How is a linked list implemented in memory, and why might it be preferred over an array in certain scenarios?

   f) How does a queue data structure differ from a stack, and what are common applications of queues?

   g) How is a tree traversal algorithm different from a tree search algorithm, and what are their respective uses?

   h) What is a graph's adjacency matrix, and how does it represent relationships between nodes?

   i) Explain the concept of hashing and its role in data retrieval.

   j) What is the significance of a hash function and its impact on data storage and retrieval efficiency?

SECTION-B

2. What are the advantages and disadvantages of using arrays versus linked lists for dynamic data storage? Provide examples of scenarios where each is more suitable.

3. Describe how a stack data structure can be used to implement function calls and recursion. Provide an example that illustrates this.

4. Define a Binary Search Tree (BST) and discuss its main properties. Explain how BSTs can be utilized for searching and sorting.

5. Differentiate between a Depth-First Search (DFS) and a Breadth-First Search (BFS) algorithm for graph traversal. Provide use cases where each is more appropriate.

6. Describe the collision resolution methods used in hash tables, such as open addressing and chaining. What are the advantages and disadvantages of each?

7. Compare the time and space complexities of common sorting algorithms like quick sort and merge sort. Under what conditions would you choose one over the other?

Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI and ML) (Sem.–2)

OPERATING SYSTEM

Subject Code : UGCA1923

M.Code : 79857

Date of Examination: 09-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. **Answer briefly:**

a) What is a Command Line Interface (CLI) in an operating system?

b) Define the concept of user accounts and permissions.

c) What is the role of the task manager in operating systems?

d) What is multiprogramming?

e) What is a device driver?

f) What do you understand by multiprocessing system?

g) What is logical address space?

h) Name three popular operating systems for personal computers.

i) What is the kernel in an operating system?

j) What is a shell in the context of operating systems?

SECTION-B

2. Describe the differences between short term, medium term and long term scheduling.

3. What are the various functions of operating system?

4. What are the various characteristics of files? Explain.

5. What is round robin scheduling? Explain taking any example. Can it be useful for a single user system? If yes, then explain. If no, then why not?

6. Explain difference between internal and external fragmentation.

7. What are the various free space management techniques? Discuss with example.

DEC 2024

Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc.(AI &ML)(Sem–2)

FUNDAMENTALS OF STATISTICS

Subject Code : UGCA1907

M.Code : 79856

Date of Examination : 11-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. Write briefly :

a) Distrust of Statistics.

b) Median

c) Statistical Errors

d) Classification of Data.

e) Geometric Mean

f) Standard Deviation

g) Coefficient of variation

h) Harmonic Mean

i) Types of Tables.

j) Objectives of tabulation.

SECTION-B

2. Calculate the mean from following data

x	1	2	3	4	5	6	7
f	8	28	54	80	50	7	8

3. What is statistics? Discuss its functions and scope.

4. **Determine the value of Mode for following series:**

x	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
f	4	8	18	30	20	10	5	2

5. What are the different sources to collect primary and secondary data? Explain each of them by listing their merits.

6. **Calculate coefficient of quartile deviation from the following data:**

Marks	No. of Students
Below 20	8
Below 40	20
Below 60	50
Below 80	70
Below 100	80

7. Following are the data about the market share of 4 brands of Mobile sold in 2021 and 2022. Present the data by a pie diagram.

Mobile Brand	Units sold in 2021	Limits sold in 2023
Apple	4800	6250
Oppo	3600	5000
Samsung	2400	4380
MI	1200	3120

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DEC 2024

Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

Bachelor of Science (AI & ML) (Sem.–2)

ENVIRONMENTAL SCIENCE

Subject Code : EVS102-18

M.Code : 79862

Date of Examination : 12-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Write briefly :**

a) Define the term "species biodiversity". Give one example.

b) What are the functions of an eco system??

c) What do you understand by term biodiversity and write is it significance?

d) Brief explain about food chain.

e) Why thermal pollution is harmful?

f) Name the indicator species. Give example.

g) Write land filling method for solid waste.

h) Illustrate the sustainable development.

i) Define acid rain.

j) Briefly writely about e-waste.

SECTION-B

2. What is rain water harvesting? Explain its needs in current scenario.
3. Describe the measures to conserve water.
4. Give an account of conservation of biodiversity.
5. Differentiate between water logging and salinity. Explain it.
6. Define ecological succession. Give an account of general process of succession in nature.

SECTION-C

7. Explain renewable and non-renewable resources with example.
8. Explain the adverse environmental impacts of modern agriculture.
9. Explain the flow of energy through the various components of ecosystem and the concept of ecological pyramid.

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Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (Artificial Intelligence & Machine Learning) (Sem.–3)

DESIGN AND ANALYSIS OF ALGORITHMS

Subject Code : UGCA1979

M.Code : 90350

Date of Examination : 02-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1) **Answer briefly :**

a) Differentiate P *vs* NP.

b) What is bin packing problem?

c) What is the importance of recursion tree?

d) Write different computability classes.

e) Differentiate tractable and intractable problems.

f) What is the average successful search time taken by binary search on a sorted array of 10 items?

g) What is time space trade-off?

h) What is brute force technique?

i) What is transitive closure?

j) Why the concept of order (Big O) is important?

SECTION-B

2) Illustrate the process of solving travelling salesperson problem by taking a sample graph as an example.

3) Look at the following recurrence when n is a power of 2:

$$T(n) = \begin{cases} T(1) & n = 1 \\ T(\frac{n}{2}) + c & n > 1 \end{cases}$$

Solve the above recurrence relation for the following choices of a, b and $f(n)$ (c being a constant) a=1, b=2 and $f(n)$= cn

4) What are the different elements of greedy strategy?

5) Explain heuristic algorithms by taking a suitable example. What are the applications of heuristic algorithms.

6) Bring out the differences between Prim's algorithm and Kruskal's algorithm. Also compare with respect to efficiency analysis.

7) Write short notes on :

a) Network Flow Algorithm.

b) Branch and bound methodology.

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Roll No. | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI & ML) (Sem.–3)

ARTIFICIAL INTELLIGENCE

Subject Code : UGCA1973

M.Code : 90349

Date of Examination : 05-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. **Write briefly :**

   a. What do you mean by intelligent agents?

   b. Define term utility-driven.

   c. What do you mean by problem reduction?

   d. Define state-space.

   e. What is the scope of AI?

   f. Define predicate logic.

   g. What do you mean by representing objects?

   h. Define stochastic.

   i. Role of expert system in today's era.

   j. What do you mean by sampling?

SECTION-B

2. Define term approach and explain approaches of AI in detail.

3. Explain A* and AO* in detail.

4. Explain sequential decision problems in detail with suitable examples.

5. Explain applications of expert systems in detail.

6. Explain knowledge representation in the field of AI.

7. Explain languages for AI problem solving with examples in detail.

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Roll No. | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 07

Bachelor of Science (AI & ML) (Sem.–3)

INTERNET TOOLS AND APPLICATIONS

Subject Code : UGCA1959

M.Code : 90355

Date of Examination : 25-11-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. **Write short notes on:**

   a. Define www.

   b. What is FTP?

   c. Write basic structure of HTML document.

   d. What is Server-Side validation?

   e. List few web browsers popular in market.

   f. How can you include audio in webpage?

   g. What is the role of meta tag in HTML?

   h. What is image map?

   i. What is email privacy?

   j. What is semantic html?

SECTION-B

2. Discuss the different application of Internet in the field of healthcare and entertainment sector.

3. Discuss the importance of HTML and its role in web accessibility and search engine optimization.

4. Discuss the structure of URL? What is the difference between absolute URLs and relative URLS.

5. Discuss the purpose of HTML hyperlink elements (<a>) and their attributes, including "href," "target," and "rel." How can hyperlinks be used for navigation, linking to external resources, and creating anchor' links within a page?

6. Create an HTML table to display the following information about fruits: Fruit Name, Color, and Quantity. Include at least three different types of fruits. Also show the use of Rowspan and Colspan in table.

7. **Write a short note on :**

   a. DNS and its working

   b. TELNET and HTTP.

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Roll No. | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (Artificial Intelligence & Machine Learning) (Sem.–3)

DATABASE MANAGEMENT SYSTEMS

Subject Code : UGCA1922

M.Code : 90351

Date of Examination : 28-11-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1) **Write briefly :**

a) What does DBMS stand for?

b) What is the main objective of normalization?

c) Name the components of a DBMS.

d) What is the purpose of Relational Algebra and Relational Calculus?

e) Briefly describe what a stored procedure is?

f) What does Multi-valued Dependency refer to in data normalization?

g) Define a distributed database.

h) Describe the role of database security, integrity and control.

i) What is candidate key?

j) State two limitations of database management system.

SECTION-B

2) Discuss the importance of data modeling in database design. How does data modeling aid in organizing and representing real-world data?

3) Explain the difference between DDL (Data Definition Language) and DML (Data Manipulation Language) in SQL. Provide examples of all DML statements.

4) Construct E-R diagram for a Library Management System. Convert E-R diagram to schema.

5) Define a distributed database and explain how it differs from a centralized database. What are the benefits and challenges of using a distributed database system?

6) Discuss the role of database security, integrity, and control in ensuring the reliability and protection of sensitive data.

7) List the five significant differences between file processing system and database management system.

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DEC 2024

Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI and ML) (Sem.–4)

DATA SCIENCE

Subject Code : UGCA-1978

M.Code : 91707

Date of Examination : 13-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. **Write briefly :**

   a) What is data segmentation?

   b) Write difference between prediction and decision making.

   c) What is the need of retinal variables?

   d) Write difference between over-fitting and under-fitting.

   e) Define model selection.

   f) Explain parsing.

   g) How to draw decision plot?

   h) Write basic components of data science project.

   i) Define mapping variables to encodings.

   j) Explain residual plot.

SECTION-B

2. What is data science, and how does it differ from data analysis and statistics? What are the data security issues?

3. Describe the difference between supervised and unsupervised learning in data science. Explain with the help of an example.

4. Explain polynomial regression. Explain the concept of feature engineering and its importance in data science.

5. Explain cross validation. Describe the ROC curve and AUC in the context of classification evaluation. When are they used?

6. What is consistency checking? What is the purpose of data transformation techniques like log transformation and Box-Cox transformation?

7. Explain data encodings. Why is data visualization important in data science, and what are some commonly used data visualization libraries in Python?

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Roll No. | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI&ML) (Sem–4)

ADVANCE PYTHON PROGRAMMING

Subject Code : UGCA-1983

M.Code : 91712

Date of Examination : 12-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. **Answer the following :**

   a) Write a Python program to print the largest element in an array.

   b) How to get frequency counts of unique items of a series?

   c) How missing data is handled?

   d) What is text data?

   e) What is descriptive statistics?

   f) How to swap two rows in a 2D numpy arrays?

   g) What is Numpy indexing and slicing?

   h) What is Scipy?

   i) What is Seaborn library?

   j) How can you create a histogram in matplotlib?

SECTION-B

2. Write a program to apply statistical functions and matrix operations on Numpy.

3. What algorithms are available in Scikit-learn library? Explain in detail.

4. Create the following table for student management system and insert the records as mentioned. Fetch all the rows from the table and display the information.

Student Id	Student Name	CGPA	Age
1	Mehak	5.0	22
2	Sonakshi	6.5	21
3	Sonali	8.0	23
4	Anamika	9.0	22
5	Payal	7.0	21

5. **Answer the following**

   a) How will you add column to a pandas data-frame? Explain.

   b) How do you fill missing data in pandas? Explain.

6. **Write a program for the following:**

   a) Convert 1D array to 3D array.

   b) To get the common items between two python numpy arrays.

7. What is the difference between join( ) and merge( ) in pandas? Explain with the help of a program.

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DEC 2024

Roll No. | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI and ML) (Sem.–4)

IMAGE PROCESSING

Subject Code : UGCA1974

M.Code : 91708

Date of Examination: 11-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. **Write briefly:**

a) Define Haar transform.

b) Define the term Inter-pixel Redundancy.

c) What is meant by mach-band effect?

d) Define shape numbers.

e) How cones and rods are distributed in retina?

f) What is Computer Graphics?

g) Define Brightness.

h) What is Hue and Saturation?

i) What are the types of noise models?

j) Define region growing.

SECTION-B

2. Discuss sampling and quantization of image.

3. How edge detection and linking is done in image segmentation? Explain.

4. Discuss one dimensional and two dimensional Fourier transform. Also discuss the correspondence between frequency domain and spatial domain. Explain various smoothening image enhancement techniques in spatial domain.

5. **Explain the following:**

a) Pattern classes.

b) Noise in colour images.

c) Lossy compression.

6. Give the significance of image restoration. Explain the model of image degradation and restoration process using suitable block diagram.

7. Difference between RGB, CMYK, HSV and YIQ Color Models.

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DEC 2024

Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (DA) (Sem.–4)

BIG DATA ANALYTICS

Subject Code : UGCA2006

M.Code : 93429

Date of Examination : 11-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. Answer the following questions:

i. Big Data Analytics

ii. YARN

iii. HDFS Blocks

iv. Hadoop Cluster

v. Hadoop fs command: df and du

vi. MapReduce

vii. Hadoop fs command: setrep and stat

viii. Grunt Shell

ix. NameNode and DataNode

x. Pig terms: Bag and tuple.

SECTION-B

2. What is the need and working of ZooKeeper and Oozie in Hadoop Ecosystem?

3. What do you understand by Big Data Analytics? What application areas of Big Data?

4. What are the components of Hadoop? Explain Hadoop Ecosystem in brief?

5. What is the function and working of HDFS and their advantages and disadvantages?

6. What is the purpose of HBase and Hive in Hadoop ecosystem? Compare both HBase and Hive in Hadoop ecosystem.

7. Explain the need and working of apache Pig also explains data type and operators of Pig?

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Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI & ML) (Sem.–4)

MACHINE LEARNING

Subject Code : UGCA-1977

M.Code : 91706

Date of Examination : 09-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. **Write briefly :**

a) Define a learning system? Identify its components and their function.

b) What is the full form of CART and where is it used?

c) What is difference between k-mean and k-median clustering algorithm?

d) Define a support vector. What is kernel trick used for in SVM?

e) Mathematically mention the Bayes theorem and its application in machine learning.

f) Which distance metrics are commonly used in machine learning algorithms?

g) State the assumptions to start linear and logistic regression analysis.

h) Why an activation function required in neural networks? Discuss any one.

i) Take a real life example to define and formulate a hypothesis and its state space.

j) Outline the models of evolution and learning in genetic programming.

SECTION-B

2. Enlist various issues of machine learning systems. Further, elaborate the key terms related to ML algorithms, namely, over fitting, under fitting, precision, recall and accuracy.

3. Discuss the working of univariate and multivariate decision trees with an example.

4. Take an example to explain the step-by-step execution of k-means clustering algorithm. Also, discuss the effect and ways to handle outliers in the execution of the algorithm.

5. Define a genetic algorithm? Further, describe the process of parallelizing the genetic algorithms and its benefits in learning systems.

6. Explain the pair wise separation and differentiate the features of linear and logistic discrimination concept in detail.

7. **Write short notes on the following:**

(a) Neural Network Representation.

(b) Back Propagation Algorithm.

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Roll No. | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI & ML) (Sem.–5)

R PROGRAMMING

Subject Code : UGCA 1946

M.Code : 92411

Date of Examination : 10-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. **Write briefly :**

   a) What are the different data types in R?

   b) Difference between data frame and a matrix in R?

   c) Demonstrate for loop in R.

   d) What are different types of recursion in R?

   e) What is the function to initialize the *seed* of the data-generating process?

   f) What is gregexpr() function?

   g) Demonstrate the simple 3×3 matrix.

   h) List down the methods to sort a data frame.

   i) Define R lists.

   j) Define Transpose of a matrix.

SECTION-B

2. Explain following debugging functions in R:

   a) Editor breakpoint

   b) traceback()

   c) browser()

   d) recover()

3. a) Write applications of recursion in R.

   b) Explain list data structure and its operations with examples.

4. Write a program in R using recursion to find the sum of squares of a given series of numbers.

5. Write R program to create a data frame using two given vectors and display the duplicated elements and unique rows of the data frame. Explain with the syntax.

6. a) What are different ways of concatenating two strings in R?

   b) Write program in R to show nested loops.

7. a) Explain scalar and vector with an example.

   b) Differentiate S3 Classes *vs* S4 Classes.

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(S2)-692

Roll No. | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 07

Bachelor of Science (AI & ML) (Sem.–5)

NEURAL NETWORKS

Subject Code : UGCA-1989

M.Code : 92424

Date of Examination : 14-12-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. **Write briefly :**

   a. State few activation functions which are used in single and multilayer networks to calculate the output.

   b. What is the significance of weights used in ANN?

   c. Exemplify the significance of sigmoid function.

   d. Why sigmoid function is also called as squashing function?

   e. How can you decide number of hidden layer neurons in ANN?

   f. What is the function of synaptic gap?

   g. What is an active contour model?

   h. Mention the merits and demerits of Back Propagation algorithm.

   i. What is the purpose of gradient descent?

   j. Which form of dimensionality reductions does PCA perform and how to do it?

SECTION-B

2. What is Single-layer Perceptron model? Explain the different learning algorithms used by a perceptron.

3. Explain the dimensionality reduction using PCA Hebbian based Principal Component Analysis.

4. With the help of a diagram explain the associative memory model. Also, tell the conditions for perfect recall in associative memory.

5. Describe the usage of Mexican Hat networks for self organizing maps.

6. Briefly explain any two learning mechanisms of Artificial neural networks.

7. **Explain briefly:**

   a. Separability limitations for unsupervised learning.

   b. Recall mode for Self organizing network.

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Roll No. [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI & ML) (Sem.–5)

WEB MINING & RECOMMENDER SYSTEM

Subject Code : UGCA 1991

M.Code :92417

Date of Examination : 25-11-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. **Write briefly :**

   a. What do you mean by pattern?

   b. Define Web Data Mining.

   c. Explain server logs.

   d. Explain recommender system in brief,

   e. What do you mean by term out-degree?

   f. What do you mean by web page analysis?

   g. What are least used links?

   h. Define TF-IDF.

   i. Define Recommender System

   j. What do you mean by word linking in terms of web structure mining?

SECTION-B

2. Describe the link structure of the web and also explain static and dynamic linking.

3. What are heat maps? Discuss in detail with an example by taking various parameters to show an implementation of Heat Maps.

4. What do you mean by PageRank algorithm? Explain in detail.

5. Explain web content mining in detail.

6. What do you mean by web structure mining, explain in detail with appropriate examples?

7. **Explain below terms :**

   a. Server side data. (3)

   b. Web as a graph. (3)

   c. Vector space model (4)

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Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (Artificial Intelligence & Machine Learning) (Sem.–5)

CLOUD COMPUTING

Subject Code : UGCA1936

M.Code : 92418

Date of Examination : 02-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. **Write briefly :**

   a. List essential characteristics of grid computing.

   b. What is private cloud?

   c. What are advantages of vertical scaling?

   d. What is the significance of virtualization in cloud computing?

   e. Define automatic scaling.

   f. What is storage virtualization?

   g. What is vendor accountability?

   h. What do you understand by lift and shift in cloud migration?

   i. Explain Shared Responsibility Model.

   j. What is the role of Azure Blob storage?

SECTION-B

2. What are the key benefits and challenges of adopting cloud computing for businesses?

3. What is Platform as a Service (PaaS) and how does it empower developers and businesses?

4. Explain the steps involved in typical cloud migration process.

5. What is virtualization? Discuss the difference between server, network, desktop and storage virtualization.

6. Discuss the importance of SLA in Cloud Computing. Mention key components typically included in Cloud SLA.

7. **Write a Short note on :**

   a. Microsoft Azure

   b. Cloud Security

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Roll No. | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (Artificial Intelligence & Machine Learning) (Sem.–5)

DEEP LEARNING

Subject Code : UGCA 1997

M.Code : 92423

Date of Examination : 28-11-2024

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. **Write briefly :**

a) Define the term 'deep learning'.

b) Differentiate between bias and variance.

c) Explain the concept of bagging.

d) What is multi-task learning?

e) What is dropout rate?

f) What is pooling? Discuss different types of pooling.

g) Differentiate between RNNs and Deep RNNs.

h) Write a short note on echo state networks.

i) Explain briefly about parameter penalties in feed forward networks,

j) Discuss in brief about basic convolution function.

SECTION-B

2. Explain how the backpropagation algorithm enables neural networks to learn and improve their performance over successive iterations? Also discuss in detail about forward propagation and error calculation while finding the optimized parameter values.

3. Explain how computational graphs represent mathematical expressions and the flow of data through operations, highlighting their role in automatic differentiation?

4. Describe the purpose of pooling in convolutional neural networks (CNNs) and explain how max pooling operates and discuss how max pooling reduces spatial dimensions and retains important features? Compare and contrast max pooling with average pooling.

5. What is an auto-encoder? Describe the working of different parts of an auto-encoder and its characteristics.

6. What is unsupervised learning? Explain different types of unsupervised learning. Discuss advantages and disadvantages of unsupervised learning.

7. Differentiate between underfitting and overfitting. Explain the trade-off between the two and how they affect model generalization. Describe various techniques to mitigate these issues.

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Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

Bachelor of Science (AI & ML) (Sem-6)

WEKA-OPEN SOURCE SOFTWARE TOOL

Subject Code : UGCA2014

M.Code : 93689

Date of Examination : 16-12-2024

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.**

SECTION-A

1. Write about

a) What is Recursive Feature Elimination (RFE) feature selection technique?

b) Name the neural network activation function available in Weka.

c) What is Min-max data normalization technique?

d) Name distance metrics used in k-Nearest Neighbors (k-NN) algorithm in Weka.

e) Is PCA a dimensionality reduction method?

f) How to apply GA-genetic algorithm on WEKA?

g) Differentiate between Classification and Clustering.

h) What are the two different sections of ARFF file format?

i) What are the different types of attributes in WEKA?

j) How to load data set into WEKA?

SECTION-B

2. What are the major steps to perform data preprocessing in WEKA?

3. What are the classification algorithms in machine learning in WEKA? Which classifier is best in WEKA?

4. What algorithm does WEKA use for association rules? Explain.

5. How to implement clustering in WEKA? Which is better K-means or hierarchical clustering?

6. What is regression? Describe the following regression algorithms used in WEKA:

   a) *weka.classifiers.rules.ZeroR*

   b) *weka.classifiers.trees.REPTree*

   c) *weka.classifiers.functions.SMOreg*

   d) *weka.claIssifiers.functions.Multilayer perceptron*

   e) *weka. classifiers.functions. GaussianProcesses*

7. What is J48 decision tree? How to use it in WEKA?

Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI & ML) (Sem.–6)

BUSINESS INTELLIGENCE

Subject Code : UGCA2016

M.Code : 93651

Date of Examination : 18-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. Write briefly :

(a) Business intelligence

(b) Information systems

(c) Data validation

(d) Clustering

(e) Supply chain optimization

(f) Data transformation

(g) Revenue management

(h) Expert system

(i) Efficiency measures

(j) Knowledge management.

SECTION-B

2. Write in detail about the development of decision support system.

3. Discuss the various classes of models.

4. Give details of data mining process.

5. Explain the optimization models for logistic planning.

6. Discuss the CCR model for data analysis.

7. Describe the various applications of expert systems.

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Roll No. | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc (Artificial Intelligence & Machine Learning) (Sem.–6)

INTELLIGENT SYSTEMS

Subject Code : UGCA2010

M.Code : 93652

Date of Examination :20-12-2024

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. **Write briefly :**

   (a) Intelligent system

   (b) Recurrent networks

   (c) Fuzzy logic

   (d) Heuristic search

   (e) Hill climbing search

   (f) Semantic networks

   (g) Blackboard architectures

   (h) Bayesian reasoning

   (i) Statistical learning

   (j) Frames

SECTION-B

2. Write a general genetic algorithm. Give suitable example.

3. Discuss the learning techniques on uncertainty reasoning.

4. Write the advantages and disadvantages of graphs.

5. Explain the Dempster-Shafer theory of evidential reasoning.

6. Differentiate between depth first search and breadth first search.

7. Discuss the importance of fuzzy neural networks.

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Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (AI & ML) (Sem.–6)

BIG DATA ANALYTICS

Subject Code : UGCA2006

M.Code : 93655

Date of Examination : 02-01-2025

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

1. **Write briefly :**

   (a) YARN

   (b) HBase

   (c) Balancer command

   (d) Distributed file system

   (e) Apache Pig

   (f) Store function

   (g) Tuple function

   (h) Chown command

   (i) Rereplication

   (j) Cluster

SECTION-B

2. Discuss the characteristics of Hadoop cluster.

3. Discuss the advantages and disadvantages of HDFS.

4. How Big Data plays important role in telecom industry?

5. Discuss the various execution modes Pig.

6. Give examples of group, distinct and limit operators.

7. How data stored in HDFS is analyzed using Pig?

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