CENTRAL UNIVERSITY OF HARYANA

First Semester Term End Examination March 2023

Programme: MASTER OF SCIENCE (Data Science) **Session: 2022-23**
Semester: First **Max. Time: 3 Hours**
Course Title: Programming for Data Science **Max. Marks: 70**
Course Code: SBS CS 030103C 3014

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) List the standard data types in python.

b) What is tuple? What is the difference between list and tuple?

c) List one similarity and one difference between List and Dictionary data type.

d) Explain operator overloading with the help of an example.

e) Describe key properties of NumPy library.

f) List the basic features of Pandas library.

g) Explain the importance of matplotlib.

Q 2. (2X7=14)

a) Discuss the strategies employed by python for memory allocation with suitable?

b) Write a program to display the fibonacci sequences up to nth term where n is provided by the user.

c) Explain the need for continue and break statements. Write a program to check whether a number is prime or not. Prompt the user for input.

Q3. (2X7=14)

a) Discuss inheritance in Python programming language. Write a Python program to demonstrate the use of super() function.

b) Write a Python code to multiply two matrices using nested loops and also perform transpose of the resultant matrix.

c) Describe the **"is"** and **"is not"** operators and type() function. Also, discuss why Python is called as dynamic and strongly typed language.

Q 4. (2X7=14)

a) Discuss three data structures available in Pandas.

b) Write a Pandas program to select the specified columns and rows from a given data frame.

c) Discuss six important attributes of a NumPy object.

Q 5. (2X7=14)

a) Illustrate the ways in which NumPy arrays are different from normal Python arrays.

b) Differentiate between Pandas and NumPy.

c) Explain reindexing in Pandas with suitable examples.

CENTRAL UNIVERSITY OF HARYANA

First Semester Term End Examinations March 2023

Programme: M.Sc. Data Science **Session:** 2022-23

Semester: 1st **Max. Time:** 3 Hours

Course Title: Fundamentals of Computer Science (Bridge Course) **Max. Marks:** 70

Course Code: SBS CS 030 120 C 3014

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student are required to answer any two parts each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) Describe how to convert octal to hexadecimal with example?

b) Write steps how to convert a number to another type of numbers?

c) Convert from binary number to decimal number.

$(11001)_2 = (?)_{10}$

d) Draw the block diagram of computer system and explain it.

e) Explain in the detail any four input devices.

f) What do you understand by data storage?

g) What are the types of Personal Computer?

Q 2. (2X7=14)

a) What are the Characteristics, capabilities and limitation of Computer.

b) What is Memory? Explain the various types of Memory.

c) Differentiate between Impact Printer and Non-Impact Printer?

Q3. (2X7=14)

a) Write the difference between Micro, Mini, and Mainframe Computers.

b) Explain in the detail Networks and internet. Differentiate between IPv4 and IPv6.

c) What is software? Explain the types of software.

Q 4. (2X7=14)

a) What is difference between number and digit? Explain types of numbers with suitable example.

b) What are the binary arithmetic operations. Explain with suitable example.

c) Convert the following numbers to their equivalent:

i) $(2AB)_{16} = (?)_2$ ii) $(10110101100)_2 = (?)_{16}$ iii) $(545)_6 = (?)_4$

Q 5. (2X7=14)

a) What is Mail Merge? Explain the Process of Mail Merge in MS- Word.

b) What is the difference between Animation and Transition? Explain wth example.

c) Write functions for the operations (a)-(e) based on the spreadsheet given below along with the relevant cell addresses:

	A	B	C	D	E	F	G
1	**S.NO.**	**NAME**	**Science**	**Maths**	**Compter**	**Total**	**Average**
2	**1**	Sumit	80	90	77	--	--
3	**2**	Shivani	90	98	89	--	--
4	**3**	Neeraj	90	90	98	--	--
5	**4**	Rohit	60	76	79	--	--
6	**5**	Asha	50	45	77	--	--
7	**Max**			--	--		
8	**Total**		--				

(I) To calculate the Total Marks as sum of Science, Maths and Computers for each student and display them in column F.

(ii) To Calculate the average marks for each student and display them in column G.

(iii) To calculate the highest marks in Computers and display it in cell E7.

(iv) To calculate the lowest marks in Maths and display it in cell D7.

(v) To calculate the total number of students appearing for the Science test and display it in cell C8.

CENTRAL UNIVERSITY OF HARYANA

Term End Examinations March 2023

Programme: MCA **Session: 2022-23**

Semester: First **Max. Time: 3 Hours**

Course Title: Data Structures **Max. Marks: 70**

Course Code: SBS CS 01 01 01 C 3104

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What are the basic operation in data structure?

b) What are the difference between array and the linked?

c) Represent the given polynomial through header linked list-

$2X^4 Y^3 + 7X^2Y - 3X + 1$

d) Define binary search tree. How do you insert an element into an emplty binary search tree?

e) Draw all possible BST for the with key values 1 , 2 , and 3.

f) Discuss how to represent graph storage using Adjacency matrix.

g) Explain how to sort the elements by using insertion sort.

Q 2. (2X7=14)

a) Define Data Structure. What are various classifications of data structures? Explain with examples.

b) Write an algorithm to insert a given element ITEM in to beginning of linear array A [i:j].

c) Write an algorithm to search a given element in linear array using binary search.

Q3. (2X7=14)

a) What is stack? Write algorithm for PUSH and POP operations of stack with examples.

b) What are the limitations of queue? Explain the various types of it with suitable examples.

c) What is linked list? Construct a Circular Linked List for the elements 11, 22, 33, 44, 55 and write procedure step-by step with the help of suitable diagram.

Q 4. (2X7=14)

a) What is a binary tree? The following binary tree has the following inorder and preorder traversal. Draw the tree and give the postorder traversal. Also write the algorithm for the same.

Inorder: ABCEDFJGIH

Preorder: JCBADEFIGH

b) Construct a B-tree of order 4 by inserting data in the sequence given below: 92, 24, 6, 7, 11, 8, 22, 4, 5, 16, 19, 20, 78

c) Explain BFS & DFS algorithm with suitable example.

Q 5. (2X7=14)

a) Write an algorithm for sorting elements using quick sort method. Explain the working of the routing with an example.

b) What is the hashing? Describe various type of Hashing techniques in detail.

c) Write Short note (any one):

(i) Bubble sort

(ii) Merge sort

(iii) Hash functions

CENTRAL UNIVERSITY OF HARYANA

First Semester Term End Examination March 2023

Programme: MASTER OF SCIENCE (Data Science) **Session: 2022-23**

Semester: First **Max. Time: 3 Hours**

Course Title: Linear Algebra and Statistical Techniques **Max. Marks: 70**

Course Code: SBS CS 030101C 3014

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) Consider two mutually exclusive events A and B, P(A)=0.7 and P(B)=0.5, find P(A ∩ B) and P(A/B).

b) Illustrate the minor of an element of the determinant of matrix.

c) Describe random sample and sample statistic.

d) Explain Linear independence and dependence of functions.

e) What do you understand by efficiency and stability of an algorithm?

f) Describe Vector space with suitable example.

g) Define sample mean and sample variance with suitable example.

Q 2. (2X7=14)

a) A box contains 6 red, 4 green and 3 white balls. Two balls are drawn at random, find the probability that, a) both are of same colour. b) no white ball is drawn. c) the balls are of different colour.

b) Explain singular value Decomposition in detail.

c) Illustrate various survey sampling methods with suitable examples.

Q3. (2X7=14)

a) Discuss about effect of condition number on accuracy.

b) Determine whether sin2x is in span (sinx, cosx)?

c) Differentiate between covariance and correlation with suitable example.

Q 4. (2X7=14)

a) One bag contains four white and two black balls and another bag contains three white and three black balls. A ball is drawn from each bag. What is the probability that one is white and another is black?

b) Find the eigenvalues and eigenvectors of $A=\begin{bmatrix}1 & 0\\ 0 & -1\end{bmatrix}$ geometrically.

c) Illustrate goodness-of-fit test. Discuss about Chi-square test of homogeneity and independence.

Q 5. (2X7=14)

a) Define computational error. Explain different types of computational errors in detail.

b) Describe a random variable and discuss the following terms associated with random variables by using suitable examples:

(i) Probability Mass Function (ii) Probability Density Function

c) Illustrate diagonalization algorithm with appropriate example.

CENTRAL UNIVERSITY OF HARYANA

First Semester Term End Examinations March 2023

Programme: M. Sc. Data Science **Session: 2022-23**

Semester: 1st **Max. Time: 3 Hours**

Course Title: Artificial Intelligence **Max. Marks: 70**

Course Code: SBS CS 030103 E 3014

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) Define problem representation in artificial Intelligence.

b) What are the goals of Artificial Intelligence.

c) Explain in detail State Space Search.

d) Explain the architecture of an Expert system.

e) What is the importance of Natural Language in AI?

f) Convert the following sentence according to Quantifiers.

" All man drink coffee" (use of Universal Quantifier)

"Some girl are intelligent" (use of Existential Quantifier)

g) Explain various approaches and properties of knowledge representation.

Q 2. (2X7=14)

a) Explain in the detail Depth First Search with suitable example.

b) Define the BAYE's Theorem. What is the probability that person has disease dengue with neck pain?

Given: 80 % of time dengue causes neck pain.

P(dengue) = 1/30,000.

P(neck pain) = .02

c) What are the stages of ES Development, and explain the ES Systems applications.

Q3. (2X7=14)

a) Explain the Branch and bound algorithm.

b) Explain the least privilege. Discuss advantages of least privileges.

c) Describe in detail problem reduction representation.

Q 4. (2X7=14)

a) Explain in detail Fuzzy Logic with suitable example.

b) Explain the First Order Logic (FOL) in AI.

c) Describe different type of knowledge required to build an expert system .

Q 5. (2X7=14)

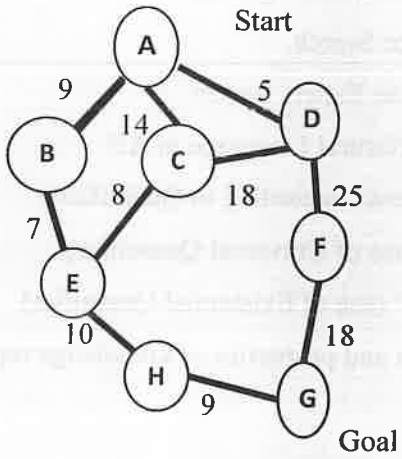
a) Write AO* algorithm? Use with suitable example how AO* algorithm is used for problem reduction?

b)Translate the Following into First Order Logic.

(i) Everyone who sames money earns interest.

(ii) If there is no interest, then nobody saves money.

c) Find the search steepest Best First Search for following graph.



Straight Line Distance

A	B	C	D	E	F	G	H
40	32	25	35	19	17	0	10

CENTRAL UNIVERSITY OF HARYANA, MAHENDERGARH (HR)

First Semester Term End Examinations March 2023

Programme: Master in Data Science **Session: 2022-23**

Semester: First **Max. Time:** 3 Hrs

Course Title: Data Structure and Algorithms **Max. Marks: 70**

Course Code: SBS CS 03 01 02 C 3014

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q1. (4X3.5=14)

a) Given an array arr [1.....10][1.....15] with a base value of 100 and the size of each element is 1 Byte in memory find the address of arr[8][6] with the help of column-major order.

b) What is the worst case time complexity of inserting a node in a doubly linked list?

O(nlogn) O(logn)

O(n) O(1)

c) Which of the following is not an application of binary search and why?

i. To find the lower/upper bound in an ordered sequence,

ii. Union of intervals,

iii. Debugging,

iv. To search in unordered list

d) Construct a binary search tree by inserting the following numbers in order :

60,25,72,15,30,68,101,13,18,47,70,34

e) Convert following infix expression to prefix:

(A+B)*C+(D-E)/F+G

f) Consider the graph M with 3 vertices. Its adjacency matrix is shown below. Which of the following is true?

$$M=\begin{bmatrix}0 & 1 & 1\\ 1 & 0 & 1\\ 1 & 1 & 0\end{bmatrix}$$

i. Graph M has no minimum spanning tree.

ii. Graph M has a unique minimum spanning trees of cost 2

iii. Graph M has 3 distinct minimum spanning trees, each of cost 2

iv. Graph M has 3 spanning trees of different costs

g) Discuss priority queue data structure?

Q 2. (2X7=14)

a) Explain the algorithm w.r.t. insertion operation into an array.

b) Explain all asymptotic notations with suitable example.

c) Discuss insertion sort algorithm, its time complexity.

Q3. (2X7=14)

a) Discuss the deletion algorithm when an element is deleted from a specific location in a linked list.

b) Demonstrate two basic operations that can be applied on a circular header linked list along with their algorithms.

c) Explain the insertion algorithm when an element is inserted at the beginning of a linked list.

Q 4. (2X7=14)

a) Define stack, its array implementation and applications.

b) Explain the algorithm how postfix expression is evaluated with example.

c) Discuss array and linked implementation of queue data structure.

Q 5. (2X7=14)

a) Discuss AVL tree. Explain with example how elements are inserted and deleted into an AVL tree.

b) Explain different collision resolution techniques with example.

c) Discuss any graph traversal method along with its algorithm.

CENTRAL UNIVERSITY OF HARYANA

First Semester Term End Examinations March 2023

Programme: M.Sc. Data Science **Session:** 2022-23

Semester: 1st **Max. Time:** 3 Hours

Course Title: Programming using C (Bridge Course) **Max. Marks:** 70

Course Code: SBS CS 030 121 C 3014

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student are required to answer any two parts each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) Write the guidelines to use printf() function in C language.

b) Write and explain the basic concepts of a C program.

c) Find the output of the following program.

```
#include <stdio.h>
void main()
{
   int x = 3;
   float y =3.0;
   if(x==y)
        printf("\n x and y are equal");
Else
        Printf("\n x and are not equal");
}
```

d) Explain a general structure of C program with an example.

e) Explain formatted input and output statement.

f) What is function? Explain components of function.

g) Define the Variables in C Programming. Also define the variables rules and variables types.

Q 2. (2X7=14)

a) Write a program in C using functions to swap two numbers using global variables concept and call by reference concept.

b) If the marks obtained by a student in five different subjects are input through the keyboard, find out the aggregate marks marks and percentage marks obtained by the student. Assume that the maximum marks that can be obtained by a student in each subject is 100.

c) Explain the Instructions. Also explain the types of instructions are there.

Q3. (2X7=14)

a) The distance between two cities (in km.) is input through the keyboard. Write a program to convert and print this distance in meters, feet, inches and centimeters.

b) Write a c-program using function to check whether the given number is prime or not.

c) Any integer is input through the keyboard. Write a program to find out whether it is an odd number or even number.

Q 4. (2X7=14)

a) What is an operator? Explain the arithmetic, relational, logical, and assignment operators in C language.

b) Amit's basic salary is input through the keyboard. His dearness allowance is 30% of basic salary, and house rent allowance is 25% of basic salary. Write a program to calculate his gross salary.

c) Any year is input through the keyboard. Write a program to determine whether the year is a leap year or not.

Q 5. (2X7=14)

a) Write a c-program using functions to generate the Fibonacci series.

b) If a five-digit number is input through the keyboard, write a program to reverse the number.

c) What is a token? What are different types of tokens available in C language? Explain.