



# Chhattisgarh Swami Vivekanand Technical University

University Teaching Department

B.Tech (Honours)

Class Test - II, September, 2022

Data Structure using C (A000272(022))

Time Allowed: 2 hours

Maximum Marks: 40

Minimum Pass Marks: 14

Roll No- 300022822042

- Note: (iii) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.  
(iv) The figure in the right-hand margin indicates marks.

- I. (a) Represent the following polynomials using linked list representation. [4]  
 $5x^2 + 6x + 9$  and  $8x + 2$ . Represent the addition of polynomials using linked list representation.
- (b) Explain insertion and deletion of node at the beginning of a singly linked list. [8]
- (c) Explain insertion and deletion of node at the end of a singly linked list. [8]
- (d) Explain insertion and deletion of node at the beginning of a doubly linked list. [8]
- II. (a) Evaluate the following expression: [4]  
(i)  $2 \ 3 \ 4 \ * \ +$   
(ii)  $3 \ 4 \ * \ 2 \ 5 \ * \ +$
- (b) Explain quick sort with example. Also, discuss the selection of pivot element and its effect on time complexity. [8]
- (c) Convert the following infix expression to postfix expression: [8]  
 $K + L - M * N + (O \wedge P) * W / U / V$
- (d) Convert the following infix expression to prefix expression: [8]  
 $K + L - M * N + (O \wedge P) * W / U / V$



**Chhattisgarh Swami Vivekanand Technical University**

**University Teaching Department**

**CSE (Artificial Intelligence/Data science)**

**Class Test - II, Sept. , 2022**

**Digital Logic & Design <A000274 (028)>**

*Time Allowed: 2 hours*

*Maximum Marks: 40*

*Minimum Pass Marks: 14*

Roll No - 300012821042

- Note: (i) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.  
(ii) The figure in the right-hand margin indicates marks.

I. (a) What is DTL? Explain with truth table.

[4]

(b) Explain the digital ICs characteristics in following terms-

1. Noise margin

2. Figure of merit

[8]

(c) Explain the TTL NAND gate in brief with truth table.

[8]

(d) Explain the Tristate TTL in brief with truth table

[8]

II. (a) Explain SR flip Flop with truth table

[4]

(b) Explain the PISO Shift register with timing diagram

[8]

(c) Explain the JK flip flop in detail and what is race around condition?

[8]

(d) Design the any asynchronous counter/ripple with application.

[8]





**Chhattisgarh Swami Vivekanand Technical University**

**University Teaching Department**

**(A000271(014))**

**B.Tech (Honours)**

**CT-II**

**(Data Science/ Artificial Intelligence)**

**Engineering Mathematics-II**

**Time Allowed: 2 hours**

**Maximum Marks: 40**

**Minimum Pass Marks: 14**

*Roll No - 300012824042*

- Note:**
- (i) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.
  - (ii) Include suitable header file in all your program.
  - (iii) The figure in the right-hand margin indicates marks.

- I. (a) Solve  $\frac{dy}{dx} + (\cot x)y = 2\cos x$  [4]
- (b) Explain homogeneous linear differential equation with constants coefficients with example and solve  $\frac{d^2y}{dx^2} - 4y = \cos^2 x$ . [8]
- (c) Solve  $(D^2 - 2D + 1)y = x^2 e^{3x}$ . [8]
- (d) Solve by variation of parameters : [8]  
 $(D^2 + 4)y = 4\tan 2x$ .
- II. (a) Solve :  $(D^2 + 2DD' + D'^2)z = e^{2x+3y}$ . [4]
- (b) Write application of Wave equation and Heat equation. Solve PDE [8]  
 $(D^2 - DD' - 6D'^2)z = xy$ .
- (c) Write property of Laplace Transformation. Find (any two) [8]  
(1)  $L\{\sinh(at)\}$  (2)  $L\{t \cos t\}$  (3)  $L\{\sin(\sqrt{t})\}$
- (d) State that Convolution theorem and find (any two) [8]  
(a)  $L^{-1}\left\{\frac{P+2}{P^2-4P+13}\right\}$  (b)  $L^{-1}\left\{\frac{1}{(P+1)^2}\right\}$  (c)  $L^{-1}\left\{\frac{1}{P^2-6P+10}\right\}$





**Chhattisgarh Swami Vivekanand Technical University**

**University Teaching Department**

**B.Tech (Honours) (Data Science/ Artificial Intelligence)**

**Class Test - II, September, 2022**

**Object Oriented Programming - A000273 (022)**

*Time Allowed: 2 hours*

*Maximum Marks: 40*

*Minimum Pass Marks: 14*

*Roll No 30001281042*

- Note: (i) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.  
(ii) The figure in the right-hand margin indicates marks.

- I. (a) Define operator overloading. Name the operators which cannot overload. [4]  
(b) WAP in C++ to overload unary plus and minus operator. [8]  
(c) Write the concept of dynamic memory allocation with one programming. [8]  
(d) Why friend function is used in C++, Explain with proper illustration. [8]
- II. (a) Explain exception handling with their keywords. [4]  
(b) Write the concept of function overriding with one example. [8]  
(c) Write about template function and template class with an example. [8]  
(d) Why we use abstract class? Explain with suitable example. [8]



**Chhattisgarh Swami Vivekanand Technical University**  
**University Teaching Department**  
**B.Tech. (Honours) CSE (Data Science/ Artificial Intelligence)**  
**Class Test –II -September, 2022**  
**Subject: Python for Data Science (A000275 (022))**

Time Duration: 2 hours

Maximum Marks: 40

Minimum Pass Marks: 14

- Note:**
- (i) Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.
  - (ii) The figure in the right-hand margin indicates marks.

- I** (a) Assume the two arrays given below: [4]

[1 2 3]      [[1 2 3]  
                 [4 5 6]  
                 [7 8 9 ]]

Using NumPy, write a code for the following operations:

- i) Creation of the above two NumPy arrays.
- ii) Apply `intersect1d()` and `cumsum()` on them.

- (b) What is the use of Boolean Indexing? Explain various functions available for NumPy array creation. [8]

- (c) Using suitable code, create a 2D and 3D NumPy array and perform arithmetic operations between them. [8]

- (d) Write a short note on:

- 1. String Manipulation Functions [8]
- 2. Plotting using Pandas

- II** (a) Briefly discuss the methods available in Pandas to handle the missing data and duplicate values in a DataFrame. [4]

- (b) Explain 1D, 2D and 3D NumPy array slicing with the help of suitable example. [8]

- (c) Assume the data given below: [8]

	Name	Score	Attempts	Qualify
a	James	35.0	3	Yes
b	Emily	19.0	2	No
c	Michael	38.0	3	Yes
d	Mathew	20.5	1	Yes
e	Laura	13.5	1	No
f	Kevin	NaN	2	No
g	Jonas	36.0	1	Yes

Using Pandas, write a code for the following operations:

- i) Creating a DataFrame for these data.
- ii) Change the new column name 'Score' to 'CT marks'
- iii) Drop the row with 'NaN' value.
- iv) Sort the 'Score' column in descending order.

- (d) Explain `rank()`. Write a code using Pandas to add five new columns to the data given in the above question and store the values obtained by five different ranking methods in these new columns. [8]