**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI**
**University Teaching Department**
**September 2023**
**CLASS TEST – RE CT-1**
Department of computer science and Engineering DS

Subject Code: A000274 (028)

*Subject: Digital Logic Design* *MAX. MARKS: 40*
*TIME: 120 Minutes*
**Note:** ***Attempt ANY Eight questions. All questions carry equal marks.***

| | | |
|---|---|---|
| Q-1 | What is Boolean Algebra, and how does it relate to digital logic design? | 5 |
| Q-2 | Explain the concept of De Morgan's Theorem and its significance in logic simplification. | 5 |
| Q-3 | Differentiate between SOP (Sum of Products) and POS (Product of Sums) forms in Boolean Algebra. | 5 |
| Q-4 | What are canonical forms in Boolean Algebra, and why are they important in digital circuit design? | 5 |
| Q-5 | How are Karnaugh maps used to simplify logical expressions? Provide an example. | 5 |
| Q-6 | Discuss the importance of binary codes in digital systems and provide an example of a binary code. | 5 |
| Q-7 | Explain the process of code conversion and its applications in digital electronics. | 5 |
| Q-8 | What are the fundamental components of combinational logic design, and why are they essential in digital circuits? | 5 |
| Q-9 | Describe the operation of a full adder and provide its truth table. | 5 |
| Q-10 | How does a multiplexer differ from a demultiplexer, and what are their respective applications in digital systems? | 5 |

# Chhattisgarh Swami Vivekanand Technical University

**University Teaching Department**

# (A000271(014))

B. Tech (Honours)

**Re-CT-II**

**(Data Science/ Artificial Intelligence)**

## Engineering Mathematics-II

*Time Allowed:* 2 hours

*Maximum Marks:* 40
*Minimum Pass Marks: 14*

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

III. (a)Give an example of linearly independent set by using determinant of Matrix . [4]

(b)Define rank of Matrix with one example .Find the solution of systems of linear equations by using Gauss elimination method : [8]

**4x+3y=11, 5x-3y=7;** [8]

(c) Explain Linear transformation with properties and prove that
(i) $T: R^{n\times n}(R) \to R^{n\times n}(R)$ such that $T(A) = A^T$,
*(Where $A^T$ is traspose of matrice A.)* is linear transformation.
*(ii)* $T: R^2(R) \to R^2(R)$, $T(x, y) = (x - y, x + 5y)$
is linear transformation.

(d) Define Vector Space and Subspace with example and also Write its property? *Find the eigenvalues and eigenvectors of the following matrix:* [8]

$$A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$$

(a). Evaluate : (1) $L\{2\cos^2 t\}$ (2) $L\{e^{-2t}\cos 4t\}$. [4]

IV. (b) Define Inverse Laplace transform? Write the application and properties of Inverse Laplace Transform? State and prove First Shifting theorem? [8]

(c) Evaluate (1) $L\{t\}$ (2) $L\{\sin 2t\}$ (3) $L\{(\sin t)^2\}$ (4) $L\{\sinh t\}$.

(d)State that Convolution theorem and find inverse Laplace transform of 1/s(s+2) . by using convolution theorem. [8]

# Chhattisgarh Swami Vivekanand Technical University

## University Teaching Department

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

## RE-Class Test - II, Sept., 2023

**Subject: Data Structures using C** **Code: A000272 (022)**

*Time Allowed:* 2 hours *Maximum Marks:* 40

*Minimum Pass Marks:* 14

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

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### UNiT- 1

Q.1. (a) Define Data types and ADT. [4]

(b) Explain Data Structures with types and operation. [8]

(c) Briefly Explain Algorithms with characteristics and advantages. [8]

(d) Difference between Flow chart, Algorithms and Programs. [8]

### UNIT-2

Q.2. (a) Explain Array with types. [4]

(b) Define Searching and design an algorithm with operation of linear Search. [8]

(c) Define Sorting and design an algorithm with operation of Insertion sorting.

Data: 30, 50, 70, 60, 10, 90, 40, 20 [8]

(d) Write an algorithm to find the LOC and delete an ITEM from Linear array with example. [8]

**B.Tech (Honours)**

*(Artificial Intelligence and Data Science)*

Re-Class Test - I, AUG,2023

(AICTE Scheme)

(Computer Science and Engineering Branch)

Subject- **Python for Data Science**

*Subject Code: A000275(022)*

*Time Allowed:* 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) Explain the reason to choose python for data science . | [2] |
| | (b) Explain elements of pythons. Also elaborate Types in python | [6] |
| | (c) explain operators in python with examples. | [6] |
| II | (a) Explain For loop | [2] |
| | (b) explain following data structures | [6] |
| | i. Tuple | |
| | ii. List | |
| | iii. dict | |
| | (c) explain Namespaces, Scope, and local Function | [6] |
| III | (a) what is OOP? | [2] |
| | (b) Explain the concept data abstraction and data hiding. | [5] |
| | (c) What is inheritance? Explain various types of inheritance supported by python with examples. | [5] |

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# Chhattisgarh Swami Vivekanand Technical University

## University Teaching Department

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

## Class Test - II, Aug, 2023

**Subject: Data Structures using C** **A000272 (022)**

*Time Allowed:* 2 hours *Maximum Marks:* 40

*Minimum Pass Marks:* 14

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

### UNIT- 3

Q.3. (a) Define Doubly Linked list. [1]

(b) Define linked list and write an algorithm to find a LOC and delete an Item from linked list. [6]

(c) Define is a circular linked list and Write an algorithm to insert a new node into it. [6]

(d) What are the operation of Data structure and write an algorithm of Sparse matrices. [6]

### UNIT-4

Q.4. (a) Define Queue with operations. [1]

(b) Explain Stacks with operations and applications. [6]

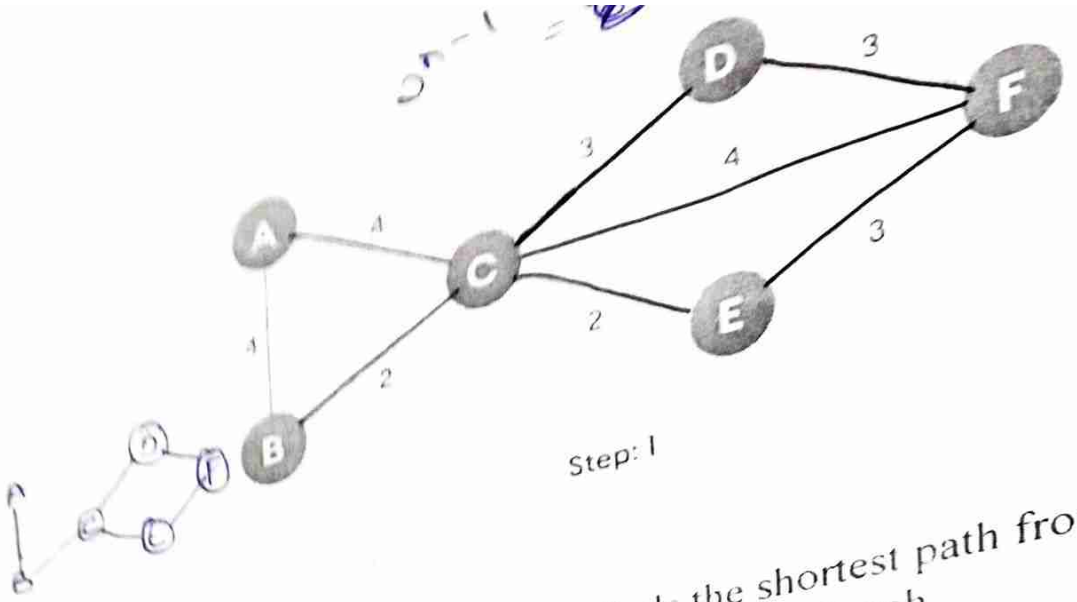
(c) Write an algorithm of transforming Infix into postfix expressions with example: ((A+B)*D )↑(E-F) [6]

(d) Define recursions and Write an algorithm to insert an Item into a circular queue. [6]

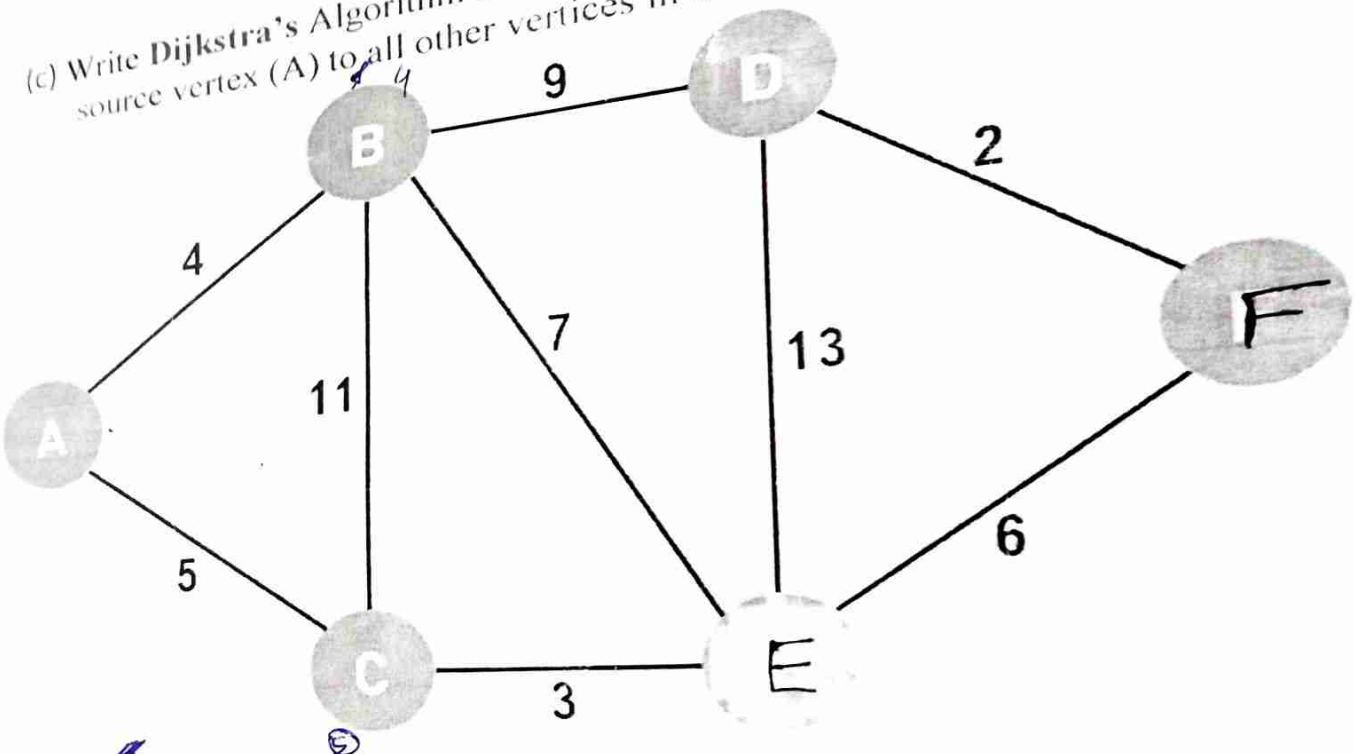
### UNIT-5

Q. 5. (a) Define Binary Tree with types. [2]

(b) Define Spanning Trees and Find out minimum spanning tree using prims algorithm. [6]




(c) Write **Dijkstra's** Algorithm and finds the shortest path from a source vertex (A) to all other vertices in the Graph. [6]




(d) Define Tree Traversal and write an algorithm of In order traversal with with example. [6]

**CHHATTISGARH SWAMI VIVEKANAND TECHN**
**University Teaching Departme**
**August 2023**
**CLASS TEST - II**

Department of computer science and Engineering DS

*Subject: Digital Logic Design* *MAX. MARKS: 40* *Subject Code: A0002*
*TIME: 120 Minutes*
**Note: Attempt ANY Eight questions. All questions carry equal marks.**

| | | |
|---|---|---|
| Q-1 | Create a full adder circuit utilizing fundamental logic gates and elucidate its functioning. | 5 |
| Q-2 | Devise a circuit that converts Binary Coded Decimal (BCD) to Excess-3 code. Include the truth table and elucidate the process of conversion. | 5 |
| Q-3 | Construct a circuit capable of adding two BCD numbers and provide an explanation of its operational process. | 5 |
| Q-4 | Explain the fundamental concept of Programmable Logic Devices (PLDs) and conduct a comparative analysis of PAL, PLA, CPLDs, and FPGAs based on their attributes and applications. | 5 |
| Q-5 | Detail the operational principles of a JK flip-flop and explain its characteristic table. | 5 |
| Q-6 | Design a synchronous 3-bit up-counter using D flip-flops. Provide the state diagram and the corresponding transition table. | 5 |
| Q-7 | Construct a finite state machine (FSM) that detects the pattern 1011 in a serial input stream. Shiw the state diagram and the output sequence for a given input stream. | 5 |
| Q-8 | Describe the various steps involved in the VLSI design flow, highlighting the importance of design entry and synthesis | 5 |
| Q-9 | Compare and contrast different modelling styles in Verilog HDL: dataflow, behavioural, and structural modelling. Provide examples of each. | 5 |
| Q-10 | Write a structural Verilog code to implement half adder circuit ~~shown in Fig~~. write the test bench to verify the functionality of design. | 5 |

**Chhattisgarh Swami Vivekanand Technical University**

**University Teaching Department**

# (A000271(014))

B. Tech (Honours)

CT-II , AUG, 2023

**(Data Science/ Artificial Intelligence)**

## Engineering Mathematics-II

*Maximum Marks:* 40
*Minimum Pass Marks:* 14

*Time Allowed:* 2 hours

Note: Each question contains four parts. Part (a) of each question is compulsory. Attempt any two parts from (b), (c), and (d) of each question.

I (a) Use the Fubini's theorem to evaluate $\int_{-1}^{2}\int_{0}^{\frac{\pi}{2}} y(sinx)dxdy$. [4]

(b) Sketch the region of integration and change the order of integration in $I = \int_0^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} 6xdydx$ and hence evaluate. [8]

(c) Solve $x^2y_2 + y = 3x^2$ [8]

(d) Apply the method of variation of parameters to solve: [8]
$(D^2 + 4)y = 4tan2x$.

II (a) Explain The general equation of Langrange's theorem and solve PDE [4]
$yzp + zxq = xy$

(b) Solve $(D^2 + 2^2)y = sec(2x)$ [8]

(c) Solve (1) $(D^2 + 2DD' + D'^2)z = e^{2x+3y}$ [8]

(2) $(2D^2 - 5DD' + 2D'^2)z = 24(y - x)$.

(d) Evaluate $\iint_R e^{x^2+y^2}\, dy\, dx$ where R is the semi-circular region bounded by the x-axis and the curve $y = \sqrt{1 - x^2}$ [8]

B. Tech (Honours)

*(Artificial Intelligence and Data Science)*

Class Test - II, AUG,2023

(AICTE Scheme)

(Computer Science and Engineering Branch)

Subject- Object Oriented Programming using C++

*Subject Code:* **A000273(022)**

*Time Allowed:* 2 hours

*Maximum Marks:* 40

*Minimum Pass Marks:* 14

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) Write down a C++ program to implement function overloading. [4]

(b) How overriding is different from the overloading. [8]

(c) What is the significance of static data and member functions in C++? [8]

(d) Explain Run-Time Type Information in detail. [8]

II. (a) What is the use of "this" keyword in C++ explain with example [4]

(b) Write a C++ program demonstrating use of the pure virtual function with the use of base and derived classes. [8]

(c) Explain Error handling during file operations with Error handling function [8]

(d)Define is Containers, Explain its type. [8]

**B. Tech (Honours)**

*(Artificial Intelligence and Data Science)*

Class Test - II, AUG,2023

(AICTE Scheme)

(Computer Science and Engineering Branch)

Subject- **Python for Data Science**

*Subject Code: A000275(022)*

*Maximum Marks*: 40

*Minimum Pass Marks*: 14

*Time Allowed*: 2 hours

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) Explain Vectorization [2]

(b) Explain NumPy with its feature for data analysis. Show a comparative example and elaborate reason to chose NumPy [6]

(c) Perform following operations in NO Array: [6]

i. create an array for size 16.
ii. Reshape above array
iii. Create a NumPy array filled with all zeros.
iv. Create a NumPy array filled with all ones.
v. Create a slice.
vi. Broadcast a scalar value to this slice

(d) Explain Transpose and swapaxes for both 1D and 2D array. [6]

II (a) Explain functions in pandas to detect missing data. [1]

(b) What is data Frame. Create a data frame and execute following examples [6]

i. head()
ii. manipulating rows and column
iii. del keyword

(c) What is reindexing? explain following operations [6]

i. ffill method
ii. column row reindexing

(d) Explain following operations: [6]

i. Reduction methods
ii. describe method
iii. Unique values
iv. value_counts
v. isin

III (a) What is Built in python 'None'? [1]

(b) Explain the concept of Handling Missing data in Python. [6]

(c) What is the need of string manipulation. Explain Vectorized String Manipulation. [6]

(d) What is matplotlib? Explain plotting with: [6]

i. Line plot
ii. Bar plot
iii. Histogram Plot

Roll No. : 300012822005

Printed Pages : 5

# A000275(022)

## B. Tech. (Hon's) (Second Semester) Examination, April-May 2023

## (AICTE Scheme)

## (Computer Science and Engg. Branch)

## PYTHON for DATA SCIENCE

*Time Allowed : Three hours*

*Maximum Marks : 100*

*Minimum Pass Marks : 35*

*Note : Attempt all questions. Part (a) is compulsory and carry equal 4 marks each. Attempt any two out of part (b), (c) or (d) in all questions and carries equal 8 marks each.*

### Unit-I

1. (a) Why is Python considered a popular programming language for Data Science?

(b) Explain the essential Python libraries used in Data Science and provide examples of how they are utilized in real-world data analysis tasks.

(c) Discuss the different types of built-in data types in Python, including Strings, Lists, Tuples, Dictionaries, and Sets.

(d) Write a Python program that involves decision-making and looping constructs to perform a data analysis task. Clearly explain the logic behind your program and demonstrate how it works with an example dataset.

## Unit-II

2. (a) What are User-defined Modules and Packages in Python? 4

(b) Explain the concept of Python files, including file manipulations and various file and directory-related methods. Provide examples of how these file operations can be used to read, write and manipulate data.



(c) Discuss Python Exception Handling with the examples of using try, except and finally blocks to handle different types of exceptions effectively. 8

(d) Describe the fundamental concepts, of Object-Orientd Programming (OOP) in Python and how constructors enable the initialization of objects and demonstrate how Data Hiding ensures data encapsulation within classes. 8

## Unit-III

3. (a) What is the difference between a User-defined Module and a Package in Python? How can you import and use them in your python programms? 4

(b) Explain the concept of File manipulations in python, including opening, reading, writing and closing files.

(c) Explain Intrinsic NumPy array creation with the help of Python code.

(d) What is Boolean indexing. Explain in detail.

4. (a) What are the core data structures provided by the pandas library in Python?

(b) Describe the essential functionality of Pandas for data manipulation, including dropping entries, indexing, selection and filtering. Provide examples to illustrate how these operations can be applied to real-world data dets.

(c) Explain how pandas allows you to compute various descriptive statistics on DataFrame columns. Illustrate with examples of computing mean, median, standard deviation etc.

(d) How can you use pandas to identify unique values, perform value counts, and check membership within a Data Frame? Provide examples of how these operations help in data exploration and analysis. 8

## Unit-V

5. (a) How can you handle missing data in a dataset using pandas? Explain different techniques for dealing with missing values.



(b) Vectorized String Functions in Pandas allow efficient manipulation of string data. Describe how these functions work. 8

(c) Plotting with pandas is a powerful way to visualize data. Explain the process of creating line plots, bar plots, histograms and density plots using pandas. Provide examples of when each type of plot is suitable for data visualization. 8

(d) Scatter or point plots are useful for visualizing the relationship between two variables. Describe how you can create scatter plots using Pandas and provide examples to demonstrate scatter plot creation. 8

# A000276(046)

## B. Tech. (Hon's) (Second Semester) Examination, April-May 2023

## (Computer Science and Engg. Branch)

## (Data Science & Artificial Intelligence)

## ENTREPRENEURSHIP

***Time Allowed : Three hours***

***Maximum Marks : 40***

***Minimum Pass Marks : 14***

***Note :*** *Attempt all questions. Part (a) is compulsory for question one, two and three and attempt any* ***one*** *part from (b) and (c). Question* ***four*** *is compulsory.*

### Unit-I

1. (a) Mention any four major entreprenеurial skills. 2

(b) Classify entrepreneurs according to stages of development.

(c) What are the characteristics of good Entrepreneur?

**Unit-II**

2. (a) Define Motivation.

(b) What are the factors that considered as barriers to negotiation? Explain any two in detail. 6

(c) Discuss "3 Category Factor" motivating entrepreneurs. 6

**Unit-III**

3. (a) What do you mean by Negotiation? 2

(b) How will differentiate between the 'Perfect Competition' and 'Monopoly' market? 6

(c) Distinguish between the "Monopolistic" and "Oligopoly". 6

**Unit-IV**

4. Go through the case mentioned below and answer the question given at the end of the passage :

Kunal Bahl was born on February 1, 1983, in New Delhi, India. He studied at the University of Pennsylvania, where he earned a degree in dual majors a B. S. in





Entrepreneurship from the Wharton School of Business and a B. A. in International Studies from the College of Arts and Sciences. He and his co-founder, Rohit Bansal, established Snapdeal in February 2010. Originally launched as a daily deals platform, the company evolved into a full-fledged online marketplace, connecting buyers and sellers across various product categories. Snapdeal aimed to democratize e-commerce by providing a platform for small and medium-sized businesses to reach a wider customer base. Kunal Bahl and Rohit Bansal recognized the growing trend of e-commerce and online shopping in India. They saw an opportunity to tap into the market by offering daily deals on products and services through an online platform. Their initial focus on deals laid the foundation for what would eventually become a comprehensive online marketplace.

Snapdeal faced intense competition from established players like Flipkart and Amazon. To differentiate itself, the company focused on expanding its seller network and offering a diverse range of products. Snapdeal also introduced innovations like allowing sellers to create their online stores within the platform, thereby enabling customization and brand building for sellers. The Indian

e-commerce sector underwent regulatory changes during Snapdeal's growth. Kunal Bahl and his team had to adapt to evolving foreign investment regulations and marketplace guidelines. They restructured the business model, ensured compliance and maintained transparent operations to build trust with stakeholders.

Customer trust was vital for Snapdeal's success. The company implemented measures to enhance the shopping experience, including quality control for products, secure payment gateways and robust customer support. Snapdeal introduced features like "Snapdeal Gold", offering faster shipping, extended return periods, and better customer service. Under Kunal Bahl's leadership, Snapdeal expanded its offerings, reaching customers across various cities and towns in India. The company's focus on affordability, variety, and convenience resonated with a wide range of consumers. Snapdeal's growth contributed to the democratization of e-commerce and the digital economy in India.

Kunal Bahl's entrepreneurial journey with Snapdeal showcases his ability to innovate, adapt to challenges, and lead a company through a rapidly changing business landscape. His vision and commitment to empowering





small businesses while providing value to customers have made Snapdeal a significant player in the Indian e-commerce industry.

**Questions :**

(a) How did Kunal Bahl and his-co-founder Rohit Bansal identify the opportunity for Snapdeal? 4

(b) What strategies did Snapdeal employ to compete with established e-commerce players? 4

(c) How did Snapdeal navigate regulatory challenges in the Indian e-commerce sector? 4

(d) How did Snapdeal address customer concerns and build trust in the online marketplace? 4

# A000271(014)

## B. Tech. (Hon's) (Second Semester) Examination, April-May 2023

## (AICTE Scheme)

## (Data Science/Artificial Inteligence Branch)

## ENGINEERING MATHEMATICS-II

*Time Allowed : Three hours*

*Maximum Marks : 100*

*Minimum Pass Marks : 35*

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

### Unit-I

1. (a) If $a_1, a_2$ and $a_3$ are any three fixed elements of the field $\mathbb{R}$ then prove that the ordered triads

$(x_1, x_2, x_3)$ such that $a_1x_1 + a_2x_2 + a_3x_3 = 0$ is the subspace of the vector space $V_3(\mathbb{R})$

(b) Prove that the mapping $D : P_3[x] \to P_2[x]$ defined as $D[p(x)] = \dfrac{d(p(x))}{dx}$ is a Linear Transformation and find the Transition matrix corresponding to the basis $B = \{1, x, x^2\}$ Is the transformation singular, explain your answer also find the Rank and Nullity of the tranaformation? 8

(c) State the Caley Hamilton's theorem Verify Caley Hamilton's theorem for the Matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$ and hence find $A^{-1}$ 8

(d) Explain Gauss Elimination method Solve the system of linear equation by using Gauss Elimination method. $x + y + z = 9$, $2x - y + z = 5$, $4x + y - z = 7$ 8

## Unit-II

(a) State the Fubini's theorem and verify it, if

$$I = \int_1^2 \int_0^4 2xy \, dy \, dx$$ 4

where $1 \le x \le 2$, $0 \le y \le 4$.

(b) Find the region of the integration if $-2 \le y \le 2$, $y^2 \le x \le 4$ and also find the area. 8

(c) Evaluate :

$$\int_0^{\log 2} \int_0^x \int_0^{x+y} e^{x+y+z} \, dx \, dy \, dz$$ 8

(d) Evaluate $I = \iint_R e^{x^2+y^2} \, dx \, dy$, where $R$ is the semi-circular region bounded by the $x$-axis and the curve $y = \sqrt{1-x^2}$. 8

## Unit-III

3. (a) Define Exact differential equation and solve : 4

$$(1 + 4xy + 2y^2)dx + (1 + 4xy - 2x^2)dy = 0$$

(b) Explain Cauchy's Euler equation and solve

$$x^2\frac{d^2y}{dx^2}-3x\frac{dy}{dx}+4y=2x^2$$

(c) Solve

$$\left(D^2-3D+2\right)y=\sin 3x$$

(d) Solve by variation of parameters :

$$\left(D^2+9\right)y=\operatorname{cosec}(3x)$$

## Unit-IV

4. (a) Define Lagrange's method for partial differential equation and solve $a(p+q)=1$. 4

(b) Classify and solve the PDE $r-x^2t=0$ or

$$\frac{\partial^2 z}{\partial x^2}-x^2\frac{\partial^2 z}{\partial y^2}$$

8

(c) Solve

$$\left(D^2-2DD'+D'^2\right)z=\frac{x^2+xy+y^2}{e^{(x)}}$$ and



8

$$\left(D^2+3DD'+2D'^2\right)z=e^{2x+3y}$$

(d) Solve : 8

$$\left(D^2-5DD'+4D'^2\right)z=\cos(4x+y)$$

## Unit-V

5. (a) Write property of Laplace transformation.

Find :

(i) $L\left\{e^{2t}\sin(t)\right\}$

(ii) $L\left\{e^{3t}\cosh(2t)\right\}$ 4

(b) Define inverse Laplace Transformation and find that

$$L^{-1}\left\{\frac{A}{(s+1)}\middle|\frac{B}{(s+2)}\middle|\frac{C}{(s)}\right\}=$$ 8

(c) State that Convolution theorem and find the value of $\sin t * t^2$. 8

(d) Solve the differential equation by using Laplace transform :

$y'' + 4y' = 0$, with initial value problem

$y(0) = 1, \quad y'(0) = 6$

8

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# A000273(022)

## B. Tech. (Hon's) (Second Semester) Examination, April-May 2023

### (AICTE Scheme)

### (Computer Science and Engg. Branch)

### OBJECT ORIENTED PROGRAMMING

### (Artificial Intelligence and Data Science)

*Time Allowed : Three hours*

*Maximum Marks : 100*

*Minimum Pass Marks : 35*

*Note : Attempt all questions. Part (a) is compulsory. Attempt any* **two** *out of part (b), (c) or (d) in all question.*

### Unit-I

1. (a) What are the data types in C++? 4

(b) Comparison the procedural oriented programming and object oriented programming.

(c) What are the concepts of object oriented programming explain in details?

(d) Explain the concept of polymorphism by an example in C++.

## Unit-II

2. (a) Explain access modifiers with its type.

(b) What is static class data? Write a program for it.

(c) Explain object as function arguments in details.

(d) What is the concept of constructor? Type of constructor with example.

## Unit-III

3. (a) What is member function explain with example. 4

(b) Discuss the role of acess specifiers in inheritance and show their visibility when they are inherited as public, private and protected. 8

(c) What is overloading? Explain overload unary and binary operators in C++ with example. 8





(d) What is inheritance? Draw a diagram to represent the forms of inheritance. 8

## Unit-IV

4. (a) Explain Addresses and pointers with example 4

(b) What is memory management? Explain with new and delete operators. 8

(c) Explain friend function and static function with example. 8

(d) Explain Assignment and copy initialization with comparison chart. 8

## Unit-V

5. (a) Draw a neat and clean sketch to show the different streams available in C++. 4

(b) Explain the role of seekg(), seekp(), tellg(), tellp(), function in the process of random access in a file. 8

(c) What is a user defined exception? Write down the scenario where we require user defined exceptions

(d) Write a C++ program using function template to find the product of two integers or floating point type of data. 8

Roll No. : 300012822005

# A000274(028)

## B. Tech. (Hon's) (Second Semester) Examination, April-May 2023

### (AICTE Scheme)

### (Computer Science and Engineering Branch)

### (Data Science)

## DIGITAL LOGIC & DESIGN

***Time Allowed : Three hours***

***Maximum Marks : 100***

***Minimum Pass Marks : 35***

***Note :*** *Each unit consists of four questions. For each unit, question (a) is mandatory and solve any* ***two*** *questions from (b), (c) and (d). The question (a) carries 4 marks, while the questions (b), (c) and (d) each carries 8 marks.*

### Unit-I

1. (a) Prove the following using the Boolean algebraic theorem :

$$A + A'B + AB' = A + B$$

(b) Find out the following code conversion :

(i) BCD equivalent of $(8620)_{10}$

(ii) Binary equivalent of $(.65625)_{10}$

(iii) Decimal equivalent of $(6327.4051)_8$

(iv) Decimal equivalent of $(34AC)_{16}$

(c) Design a circuit using gates to realise function :

$$Y = (A + BC')(B + C'A)$$

Find out whether it is possible to design the circuit with only one type of gates (NAND or NOR). If yes design the circuits.

(d) Minimize the two variable logic function using k-map and write down the minimized Boolean expression :

$$F(A, B, C, D) = \Sigma m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)$$

## Unit-II

2. (a) Design a 2 bit comparator using gates.

(b) How to design a full adder circuit using two half adder circuit?

(c) What is BCD adder? Explain the BCD addition with suitable example

(d) Explain parallel adder with suitable logic diagram.

## Unit-III

3. (a) Convert the SR flip flop in to D Flio flop.

(b) Explain the D Flip-Flop with following terms :

(i) Block diagram

(ii) Logic circuit

(iii) Truth table

(iv) Application

(c) Explain the PISO shift register in following terms :

(i) Logic diagram

(ii) Timing diagram

(iii) Data Shifting with truth table

(iv) Application

(d) Design the mod-3 synchronous counter using JK flip flop.

## Unit-IV

4. (a) What is a noise margin, and why is it important in digital curcuits?

(b) What do you understand by TTL? How it came in

consideration and explain the TTL NAND gate in brief.

(c) Explain the advantage and disadvantages CMOS logic.

(d) What do you mean by digital IC? Explain its characteristics in following terms :

(i) Noise margin

(ii) Power dissipation

(iii) Fan in and Fan out

(iv) Figure of merits

## Unit-V

5. (a) What is different style of design Entry in the CAD Tool. Explain any one in brief.

(b) What is difference between simulation and synthesis process.

(c) Write a structural Verilog code to implement 2:1 multiplexer circuit.

(d) Write behavioural Verilog code to implement positive edge triggered T flip-flop.

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Roll No. 300012822005

# A000272(022)

## B. Tech. (Hon's) (Second Semester) Examination, April-May 2023

## (AICTE Scheme)

## (Computer Science and Engg. Branch)

## DATA STRUCTURE using C

## (Artificial Intelligence and Data Science)

***Time Allowed : Three hours***

***Maximum Marks : 100***

***Minimum Pass Marks : 35***

***Note :*** *Each question contains four parts. Part (a) of each question is compulsory. Attempt any* ***two*** *parts from (b), (c) and (d) of each question.*

### Unit-I

1. (a) Explain Abstract Data Type. 4

(b) Differentiate between static and dynanic and linear and nonlinear data structures. 8

(c) Explain concept of algorighm and flowchart with proper pseudo code and example. 8

(d) Explain program development phases with proper steps and examples. 8

## Unit-II

2. (a) Show storage representation of array with example. 4

(b) Explain string with the example of Palindrome. 8

(c) Explain binary search algorithm with proper example. 8

(d) Explain bubble sort with proper algorithm and example. 8

## Unit-III

3. (a) What is linked list? Write different types of linked list. 4

(b) Describe representation and manipulations of polynomials/sets using linked lists. 8

(c) Explain dynamic memory management with proper example 8

(d) Explain concept of sparse matrix with suitable example 8





## Unit-IV

4. (a) What do you mean by stack and queue as ADT? 4

(b) Explain recursion with suitable example. 8

(c) Explain insertion and deletion of nodes in binary search tree using proper diagram. 8

(d) Write Kruskal's algorithm and explain it with suitable example. 8

## Unit-V

5. (a) Write definition and time complexity of Bigoh `O` Omega `Ω` and Theta `θ`. 4

(b) Explain average and worst case analysis of binary search, quick sort, merge sort and insertion sort 8

(c) Explain concept of Divide and Conquer with example of Tower of Hanoi. 8

(d) Write short notes on : (any **two**) 8

(i) n-queens problem

(ii) Greedy (job scheduling)

(iii) Dynamic programming