A000271(014)

B.Tech (Honours) (Second Semester) Examination, April-May 2024

(Data Science/Artificial Intelligence)

ENGINEERING MATHEMATICS-II

Time Allowed : Three hours

Maximum Marks : 100

Mimimum Pass Marks : 35

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.*

1. (a) Prove that union of two vector subspaces is subspace if and only if one of them containing in other. 4

(b) Solve by using Gauss elimination method : 8

$$x + 2y + 3z = 1$$

$$x + 3y + 6z = 3$$

$$2x + 6y + 13z = 5$$ 8

(c) Explain non-singular linear transformation with properties.

(i) Prove that a mapping from $R^2 \rightarrow R^2$ defined by

$$T(a_1, a_2) = (2a_1 - 2a_2, -a_1 + 3a_2)$$

Is linear transformation and also find the matrix of T with respect to the ordered bases $\{(1,0), (1,1)\}$.

(ii) Let the transformation $T : R^2(R) \rightarrow R^2(R)$, defined by $T(a_1,a_2) = (a_1 + a_2, a_1 - a_2)$, Then find the matrix of T relative to the basis

$B = \{(1, 2), (-1, 1)\}$ and $B' = \{(1, 0), (1,0)\}$ and also find nullity of T? 8

(d) State and prove Rank Nullity theorem. If $T : U \rightarrow V$, be linear transformation then prove that kernel of T is a subspace of U. 8

II. (a) Evaluate $I = \int_0^a \int_{x^2/a}^{2a-x} xydydx$ 4

(b) Change the order of integration in

$I = \int_0^1 \int_y^{2-y} xydxdy$ and hence evaluate. 8

(c) Evaluate : $\int_0^{\log 2} \int_0^x \int_0^{x+y} e^{x+y+z} dx\, dydz$ 8

(d) Show that area between the parabolas $y^2 = 4ax$

and $x^2 = 4ay$ is $\frac{16}{3}a^2$ 8

III. (a) Solve $x\frac{dy}{dx} + 5y = x^2$ 4

(b) Solve that $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = e^{3x}x^2$. 8

(c) Solve $(D^2 - 2D + 1)\, y = x \cos x$. 8

(d) Solve Cauchy linear equation :

$(x^2D^2 - 3xD + 4)y = 2x^2$.

IV. (a) Solve : $xzp + yzq = xy$. 4

(b) Classify and solve the PDE $r - t = 0$ or $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2}$ 8

(c) Solve : $(D^2 - 2DD' + D'^2)z = 12xy$ $(D^2 + 3DD' + 2D'^2)z = x + y$. 8

(d) Solve : $(D^2 - 2DD' + D'^2)z = 4\cos(2x + 3y)$. 8

V. (a) Write property of Laplace Transformation. Find4

(i) $L\{e^{-5t} \sin^2(2t)\}$ (ii) $L\{e^{-2t} \cos^2(3t)\}$

(b) Define inverse Laplace transformation and find that

$$L^{-1}\left\{\frac{s}{s^2 - 6s + 25}\right\}$$ 8

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

(d) State and prove First Translation theorem and Change of Scale property for Laplace transformation. 8

A000272(022)

B.Tech (Honours) (First Semester) Examination, April-May 2024

(Computer Science Engineering (Data Science)

DATA STRUCTURE USING C

Time Allowed : Three hours

Maximum Marks : 100

Mimimum Pass Marks : 35

Note : *Attempt all questions. Part (a) of each question is compulsory carrying 4 marks. Attempt any two parts from parts (b), (c) and (d) carrying 8 marks each.*

Unit-I

(a) Explain different Abstract Data types used in Data Structure.

(b) Illustrate basic criteria and distinct areas of an Algorithm.

(c) Write a Program in C to perform a binary search operation.

(d) Write an Algorithm to implement merge sort and explain it with an example.

Unit-II

(a) What is Sparse Matrix. Design a sparse matrix and compute its Transpose.

(b) Write a C Program to implement a Linked list.

(c) Write an algorithm to delete a node from a specific location from a linked list.

(d) Briefly describe about representation of Polynomial list through a linked list.

Unit-III

(a) Define the Linked list representation of a stack.

(b) Write the rules for conversion from infix to prefix. Convert the given infix expression to prefix expression : (A+B*C* (D*E^F+G)–H+I)

(c) Write a C Program to implement a stack using an array.

(d) Briefly explain about a Queue and describe its different operations.

Unit-IV

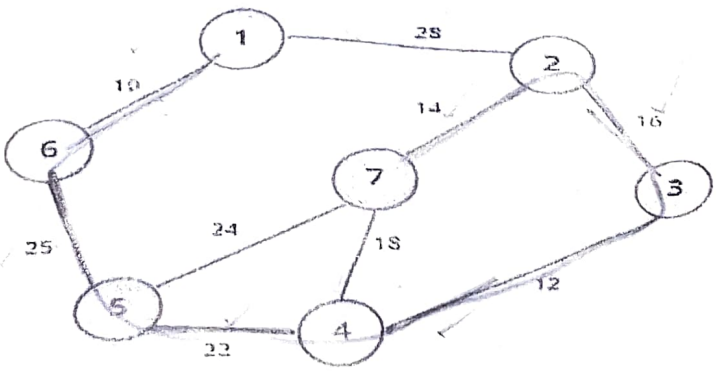
(a) Differentiate between tree and graph.

(b) Create a Binary Tree from the given Inorder and Preorder Sequence.

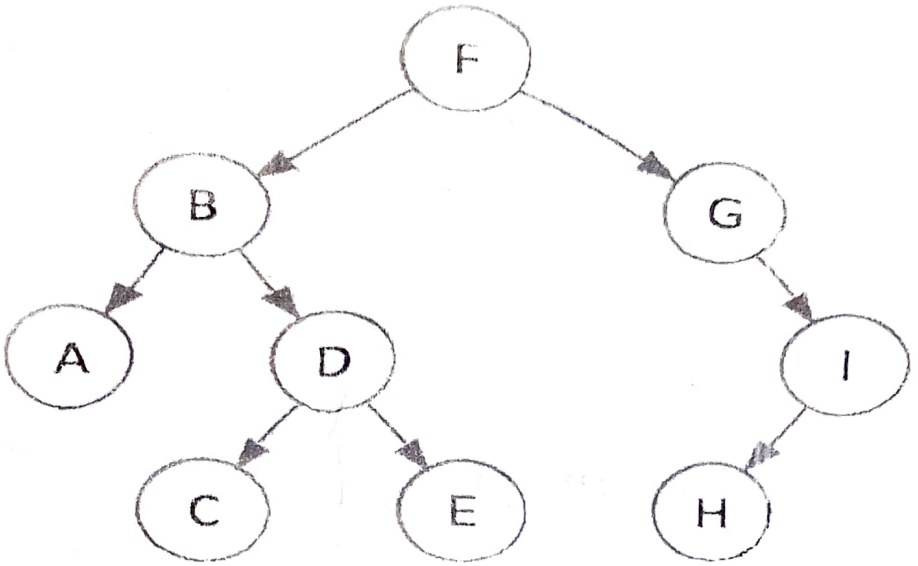
Inorder : DBOHPEJAKFLCMGN

Preorder : ABDEHOPJCFKLGMN

(c) Using Kruskal algorithm find out minimum path from vertex 1 to 7.



(d) Write the Inorder, Preorder and Postorder traversal of the given graph



Unit-V

(a) Briefly describe about the factors which influence time complexity.

(b) Illustrate about the Asymptotic Notations.

(c) Write the Insertion sorting algorithm and calculate its time complexity.

(d) Write an algorithm to implement Tower of Hanoi for 3 disc.

Printed Pages – 3 Roll No. : .....

A000273(022)

B.Tech (Honours) (Second Semester) Examination, April-May 2024

(AICTE Scheme)

(Data Science/Artificial Intelligence

OBJECT ORIENTED PROGRAMMING

Time Allowed : Three hours

Maximum Marks : 100

Mimimum Pass Marks : 35

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.*

Unit-I

I. (a) What is Object Oriented Programming? 4

(b) Explain key concepts of Object Oriented Programming? 8

(c) Explain various Data Types in C++? 8

(d) Write the basic difference between Object Oriented Programming and Procedure Oriented Programming. 8

Unit-II

II. (a) Define Destructor. 4

(b) Differentiate Run time and Compile time polymorphism. 8

(c) What is Static Class data? Write a program for it. 8

(d) Define Constructor with their types and characteristics. 8

Unit-III

III. (a) Write about access modifier in brief. 4

(b) Define Operator Overloading. WAP in C++ to perform mathematical operation on Complex numbers using binary operator overloading. 8

(c) Discuss the role of Access Specifiers in inheritance and show their visibility when they are inherited as Public, Private and Protected. 8

(d) Explain Derived class constructor *with suitable* example. 8

Unit-IV

IV. (a) Define Friend class. 4

(b) What is Memory Management? Explain with pointer to object. 8

(c) Define exception handling in C++ with their various keyword 8

(d) A pointer of base class point to an object of derived class justify your answer with suitable example. 8

Unit-V

V. (a) Explain streams classes. 4

(b) What is user defined exception? Write down the scenario where we require user defined exception 8

(c) WAP in C++ that will create a data file containing

the list of telephone numbers. Use a Class object to store each set of data. 8

(d) Define try catch and through keywords with an example. 8

Printed Pages – 4 Roll No. : .....

A000274(028)

B.Tech (Honours) (Second Semester) Examination, April-May 2024

DIGITAL LOGIC & DESIGN

Time Allowed : Three hours

Maximum Marks : 100

Mimimum Pass Marks : 35

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.*

Part-I

1. (a) Give examples and explain the converting binary codes between hexadecimal and octal number system. 4

(b) What is universal gate? Which are univeral gates?

Design all basic logic gates from any one universal gates. 8

(c) Compare and contrast SOP and POS forms in logic simplification. Provide examples for each form. 8

(d) Simplify $Y = \Sigma m (1, 5, 10, 11, 12, 13, 15)$ 8

Part-II

2. (a) Provide the circuit diagram for a 4-to 1 multiplexer. 4

(b) Discuss the design and application of De-multiplexers in digital circuits. 8

(c) Explain the concept of CPLDs and FPGAs. 8

(d) Explain the operation of a decoder. Design a 3 to 8 decoder. 8

Part-III

3. (a) Provide the truth table and excitation table for a J-K Flip-Flop. 4

(b) What is Shift Registers? Discuss any one type in detail with example. 8

(c) Explain D-flipflop in detail. 8

(d) Describe the concept of Finite State Machines (FSM) and how they are designed? Provide examples. 8

Part-IV

4. (a) Discuss the characteristics and applications of ECL logic family. 4

(b) Briefly explain the concept of fan-in and fan-out in digital circuits. 8

(c) What is Tristate logic? What are the advantages of using Tristate TTL logic? Provide examples. 8

(d) Explain RAM in detail.

Part-V

5. (a) Discuss the importance of VLSI design in modern electronic systems. 4

(b) Explain the VLSI design flow, highlighting the key stages and their significance. 8

(c) Discuss the different modeling styles in Verilog HDL. 8

(d) Write the code for Half adder along with test bench. 8

Printed Pages : 4

Roll No. : .....

A000275(022)

B.Tech (Honours) (Second Semester) Examination, April-May 2024

(Computer Science Engineering-Data Science)

PYTHON for DATA SCIENCE

Time Allowed : Three hours

Maximum Marks : 100

Mimimum Pass Marks : 35

Note : *(i) Each question cotains 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.*

Part-I

I. (a) Define Data Science. Why is Python preferred for Data Science? 4

(b) Write a Python program to demonstrate the use of

loops and conditional statements. 8

(c) Explain the different built-in data types in Python. Write a program to convert a string to a list and a tuple. 8

(d) Write a Python function to calculate the factorial of a number using recursion. Explain how recursion works in this example. 8

II. (a) What is exception handling in Python? Why is it important? 4

(b) Write a Python program to read a file and display its content. Handle any possible exceptions. 8

(c) Explain the concept of classes and objects in Python with an example. Create a class Rectangle with methods to calculate area and perimeter. 8

(d) Write a Python program to demonstrate inheritance. Create a base class Person and a derived class Employee. Add relevant attributes and methods to each class. 8

III. (a) What are NumPy arrays? How do they differ from python lists? 4

(b) Write a Python program to create a NumPy array and perform basic indexing and slicing operations. 8

(c) Explain the concept of broadcasting in NumPy. Provide an example to illustrate its use. 8

(d) Write a Python program to demonstrate the use of universal functions in NumPy. Include examples of element-wise array operations. 8

IV. (a) What is a Data Frame in Pandas? How is it different from a NumPy array? 4

(b) Write a Python program to load a CSV file into a Pandas data Frame and display its first five rows. 8

(c) Explain the process of indexing and selecting data in a Pandas Data Frame. Provide examples of label-based and position-based indexing. 8

(d) Write a Python program to group data in a Pandas Data Frame and compute summary statistics. Use a dataset of your choice to illustrate this. 8

V. (a) Why is data cleaning important in Data Science? 4

(b) Write a Python program to handle missing ata in a Pandas Data Frame. Demonstrate how to fill missing values with a specific value? 8

(c) Explain how to detect and filter outliers in a dataset using Pandas. Provide an example to illustrate this. 8

(d) Write a Python program to create a scatter plot and a histogram using Matplotlib. Use a sample dataset to demonstrate these visualizations. 8

 Roll No. : .....

A000276(046)

B. Tech. (Hon's) (Second Semester) Examination, April-May 2024

(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 five is compulsory. All questions carry equal marks.*

Unit-I

1. (a) Define Social-Entrepreneurship. 2

   (b) List out the economic factors that affect the growth of entrepreneurship. 6

(c) What are the advantages and disadvantages of entrepreneurship? 6

Unit-II

2. (a) Explain in short the term Negotiation. 2

(b) How lack of empathy, wrong focus and blame game act as barriers to negotiation? 6

(c) Discuss in detail the five stages of negotiation process. 6

Unit-III

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

(b) Discuss in detail the various elements of the "Market". 6

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

Unit-IV

4. (a) Define Ethnic diversity. 2

(b) Write down the steps for Questionnaire design methods. 6

(c) Discuss in detail the basics of competitive analysis. 6

Unit-V

5. Go through the case mentioned below and answer the question given at the end of the passage : 8

Green-Tech Innovations is a start-up company founded by two young entrepreneurs, Aisha and Raj, who met during their college years. Both were passionate about environmental sustainability and technology. They decided to combine their interests to create a company that develops eco-friendly products using cutting-edge technology.

Business Idea :

Green-Tech Innovations focuses on creating solar-powered gadgets for everyday use. Their flagship product is a solar-powered portable charger, which allows users to charge their devices using solar energy. The charger is compact, efficient, and perfect for outdoor activities or areas with unreliable electricity supply.

Challenges : Funding : Initially, Aisha and Raj struggled to secure funding. They participated in several start-up competitions and pitch events, eventually winning a small grant that helped them kick-start their project.

Market Entry : Entering the market was tough. Established brands dominated the market for portable chargers, and convincing customers to switch to a solar-powered option required effective marketing and customer education.

Production : Finding a reliable and eco-friendly manufacturer was another challenge. They spent months researching and finally partnered with a company that shared their vision for sustainability.

Successes : Innovative Product Design : The design and functionality of their charger attracted attention from tech enthusiasts and environmental advocates alike.

Strong Online Presence : Aisha and Raj utilized social media platforms effectively to market their product, reaching a broad audience and building a loyal customer base.

Strategic Partnerships : They formed partnerships with outdoor gear companies and environmental

organizations, which helped them gain credibility and expand their reach. Today, Green-Tech Innovations is thriving. They have expanded their product line to include solar-powered lanterns and water purifiers. The company has grown to a team of 20 employees and continues to innovate in the field of sustainable technology.

Questions :

(a) What were the main challenges faced by GreenTech Innovations in their early stages, and how did they overcome them?

(b) Why is having a strong online presence important for start-ups, particularly in the tech industry? Provide examples from the case study.

(c) How can strategic partnerships benefit a start-up? Discuss with reference to Green-Tech Innovations' experience.

(d) In your opinion, what are the key factors that contributed to the success of Green-Tech Innovations?