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# A000271(014)

## B. Tech. (Hon's) (Second Semester) Examination, April-May 2022

### (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) Define linearly independent set and dependent set with examples. 4

(b) Describe types of system of linear equation. Find the solution of systems of linear equations by using Gauss elimination method : 8

$4x + 3y = 11,\ 5x - 3y = 7$

(c) Explain linear transformation with properties and prove that :

(i) $T : \mathbb{R}^{n \times n}(\mathbb{R}) \to \mathbb{R}^{n \times n}$ such that $T(A) = A^T$

(where $A^T$ is traspose of matrice $A$) is linear transformation.

(ii) $T : \mathbb{R}^n(\mathbb{R}) \to \mathbb{R}^n(\mathbb{R}),\ T(a_1, a_2, a_3, \ldots\ldots a_n)$

$= (a_1, a_2, a_3, \ldots\ldots a_{n-1}, 0)$ is linear transformation. 8

(d) State and prove that rank nullity theorem, construct a transition matrix of : 8

$B = \{(1, 0), (0, 1)\}$ to $B' = \{(1, 1), (1, 0)\}$

## Unit-II

**2.** (a) Evaluate : 4

$$\int_0^5 \int_0^{x^2} x(x^2 + y^2)\, dx\, dy$$

(b) Change the order of integration in $I = \int_0^{4a} \int_{x^2/4a}^{2\sqrt{ax}} dy\, dx$ and hence evaluate. 8

(c) Evaluate : 8

$$\int_0^2 \int_0^x \int_0^{x+y} \left\{ e^x (y+2z)\, dz \right\} dx\, dy$$

(d) Show that area between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is $16/3\, a^2$. 8

## Unit-III

**3.** (a) Solve : 4

$$x \frac{dy}{dx} - 2y = x^2$$

(b) Explain linear differential equation with constants coefficient with example and solve 8

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

(c) Solve : 8

$$\left(D^2 + 2D + 1\right) y = x \cos x$$

(d) Solve by variation of parameters : 8

$$\left(D^2 + 1\right) y = \operatorname{cosec} x$$

## Unit-IV

**4.** (a) Find order and degree of partial differential equation : 4

(i) $\frac{\partial z}{\partial x}+\frac{\partial z}{\partial y}=z+xy$

(ii) $\left(\frac{\partial z}{\partial x}\right)^2+\frac{\partial^2 z}{\partial y^3}=2x\frac{\partial z}{\partial x}$

(iii) $z\frac{\partial z}{\partial x}+\frac{\partial z}{\partial y}=x$

(iv) $\frac{\partial^2 z}{\partial x^2}+\frac{\partial z}{\partial y}=1$

(b) Write application of wave equation and heat equation.

Solve PDE $\left(D^2-2DD'+D'^2\right)z=12xy$. 8

(c) Solve : 8

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

(d) Solve : 8

$$\left(D^3-4D^2D'+4DD'^2\right)z=4\sin(2x+y)$$

## Unit-V

5. (a) Write property of Laplace transformation. Find :

(i) $L\{\cosh(at)\}$

(ii) $L\{\sin 2t \cos 2t\}$ 4

(b) Define unit step function and Dirac delta function.

Find $L\left\{\sin\left(\sqrt{t}\right)\right\}$. 8

(c) State that convolution theorem and find the value of $\cos at * \cos at$. 8

(d) Solve the integral equation : 8

$$y(t) = t^2 + 2\int_0^t y(u)\sin(t-u)\,du$$

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# A000272(022)

## B. Tech. (Hon's) (Second Semester) Examination, Nov.-Dec. 2022

**(AICTE Scheme)**

**(Computer Science and Engg. Branch)**

**DATA STRUCTURE using C**

***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) What is a data structure? List some common data structures. 4

(b) Why do we need data structures? How data structures are classified? Differentiate linear and non-linear data structure. 8

(c) Define ADT with their various features. Explain different operations associated with queue ADT. 8

(d) Write an algorithm for recursive solution to the tower of Hanoi problem for N disks. 8

## Unit-II

**2.** (a) Write the basic differences between linear search and binary search. 4

(b) Explain selection sort with an example. 8

(c) Compare all sorting time complexity w.r.t. best case, average case and worst case analysis. 8

(d) Sort a series of numbers 5, 3, 4, 1, and 2 so that they are arranged in ascending order with the help of bubble sort. 8

## Unit-III

**3.** (a) Define linked list with their types. 4

(b) Discuss the basic operations that can be performed on a singly linked list. 8

(c) What is doubly linked list? Write a code for inserting a new node at the beginning into doubly list. 8

(d) Write about Addition and transpose of sparse matrix in brief. 8

## Unit-IV

**4.** (a) Convert the following expression into postfix notation using stack method A*B + C / D. 4

(b) Explain stack with an example and their various types. 8

(c) Explain queue with an example and their various types. 8

(d) Evaluate the following expressions : 8

(i) 7, 8, 3, +, *, 15, 5, /, –

(ii) –, *, 5, +, 6, 2, /, 12, 4

## Unit-V

**5.** (a) Explain DFS and BFS in brief. 4

(b) Explain MST with their types and example. 8

(c) Write about in-order, pre-order and post-order traversing with an example. 8

(d) Explain time complexity in terms of Bigoh- 'O', Omega 'Ω', Theta 'θ' notations, w.r.t. best, average and worst case analysis. 8

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# A000273(022)

## B. Tech. (Hon's) (Second Semester) Examination, April-May 2022

### (AICTE Scheme)

### (Computer Science and Engg. Branch)

### OBJECT ORIENTED PROGRAMMING

***Time Allowed : Three hours***

***Maximum Marks : 100***

***Minimum Pass Marks : 35***

***Note :*** *All 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) What will happen when the following program is run? 4

```
class personal
{
```

```
        public :
        int p( );
    };
int personal :: p( ) {
    return 1;
    }
void main( ) {
    personal a;
    a.x = & personal :: p;
    cout<<(a.*(a.x) ( ))
    return 0;
    }
```

(b) Write the various features of object oriented programming language with proper elaboration. 8

(c) Write the basic differences between object oriented programming and procedure oriented programming language. 8

(d) Write the various operators, keywords and data types used in C++. 8

## Unit-II

2. (a) What will happen when the following program is run? 4

```
Class pract
        {
                int a,b,c;
                public :
                pract(int x, int y, int z){
                a = x, b = y, c=z;}
void show ( ) {
cout<<"\n Values are :"<<a<<\t<<b<<\t<<c; }
};
void main( ) {
        pract object (10, 20, 30);
        pract object2 = object
        pract object3 = object
        object3.show ( );
        return 0;
        }
```

(b) Illustrate parameterized and copy constructor with one programming example. 8

(c) Write a program in C++ to implement standard string class with at least five standard string functions. 8

(d) WAP in C++ to make a class of faculty, data members are Id, name, salary, post and the member functions are input( ), display( ). Print five faculty information with the help of array objects. 8

## Unit-III

3. (a) Write about access modifiers in brief. 4

(b) Define operator overloading. WAP in C++ to perform mathematical operations on complex numbers using binary operator overloading. 8

(c) Design three classes student, test and results where a result in inherited from test and test is inherited from student class. Write possible function to initialize the value. Also write a main function for execution by creating objects. 8

(d) Write about code reusability in C++ with their types. 8

## Unit-IV

4. (a) Distinguish between early binding and late binding. 4

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

(c) Describe when to make a virtual function "pure". Generalize the implications of making a function a pure virtual function. 8

(d) Why we need friend function? Explain with suitable example. 8

## Unit-V

5. (a) Write about various stream classes in C++. 4

(b) WAP in C++ that will create a data file containing the list of telephone numbers. Use a class objects to store each set of data. 8

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

(d) Write a function template to perform linear search in an array. 8

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# A000274(028)

## B. Tech. (Hon's) (Second Semester) Examination, April-May 2022

### (New AICTE Scheme)

### (Computer Science and Engineering Branch)

### DIGITAL LOGIC & DESIGN

### (Data Science)

***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 carry 8 marks.*

### Unit-I

**1.** (a) Simplify the following Boolean function and also write the theorem used in each step

$$F = (B + BC')(B + B'C')(B + D)$$

Note : Draw the gate level schematic for the original and reduced expression.

(b) Find out the following code conversion :

(i) Decimal equivalent of binary number $(11.111)_2$

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

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

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

(c) A logic circuit is represented as :

$P = \Sigma m(1, 3, 6)$ write its expression in standard canonical form. Determine its truth table and draw logic diagram.

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

$$F(A, B, C, D) = \Sigma m(0, 1, 2, 5, 7, 8, 9, 10, 13, 15)$$

## Unit-II

**2.** (a) Design a 2 bit comparator and find out the how many times the value of A = B.

(b) What is PAL? Design a 3-input, 3-output PAL where input variables are A, B, C :

$$X(A, B, C) = \Sigma m(2, 3, 5, 7)$$

$$Y(A, B, C) = \Sigma m(0, 1, 5)$$

$$Z(A, B, C) = \Sigma m(0, 2, 3, 5)$$

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

(d) Explain the serial adder or parallel adder with suitable example.

## Unit-III

**3.** (a) Explain the pseudo random binary sequence generator with truth table. Assume the PRNG's seed as '0001'.

(b) Explain the J.K. flip flop with following term :

(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 BCD asynchronous counter with its application and uses.

## Unit-IV

**4.** (a) What is RTL? Explain the RTL NOR gate in brief with truth table.

(b) What do you understand by TTL? How it came in consideration and explain the TTL NANDgate in brief.

(c) Explain the tristate TTL in brief.

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

(i) Noise margin

(ii) Power dissipation

(iii) Fan in & Fan out

(iv) Figure of merits

## Unit-V

**5.** (a) What is different style of design entry in the CAD tool? Explain any two in brief.

(b) Draw the follow chart for digital design process. What are difference between simulation and synthesis process.

(c) Write a structural verilog code to implement 4:1 multiplexer circuit.

(d) Write behavioural verilog code to implement positive edge triggered D flip flop.

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# A000275(022)

## B. Tech. (Hon's) (Second Semester) Examination, April-May 2022

**(New AICTE Scheme)**

**[Branch : Computer Science and Engg. (AI & DS)]**

**PYTHON for DATA SCIENCE**

***Time Allowed : Three hours***

***Maximum Marks : 100***

***Minimum Pass Marks : 35***

***Note :*** *For each unit Q. 1 is compulsory. Attempt any two parts from (a), (b) and (c) of Q. 2 in each unit. Import the suitable library for all the programs.*

### Unit-I

**1.** Write the output of the following code snippet : 4

```
numbers = [ ]
for i in range (0. 5) :
```

```
    print ("Enter number", i, ":")
    item = float(input ( ))
    numbers.append(item)
print(numbers)
```

2. (a) Define Data Science. Explain the various stages involved in the lifecycle of Data Science. 8

   (b) Give any four differences between List, Tuple, Set and Dictionary. Explain the features of Python with respect to Data Science. 8

   (c) What are the identity and membership operators in Python? With the help of suitable program, explain the difference between implicit and explicit type conversion. 8

## Unit-II

1. Write short note on :

   (i) Abstract class

   (ii) Self Parameter

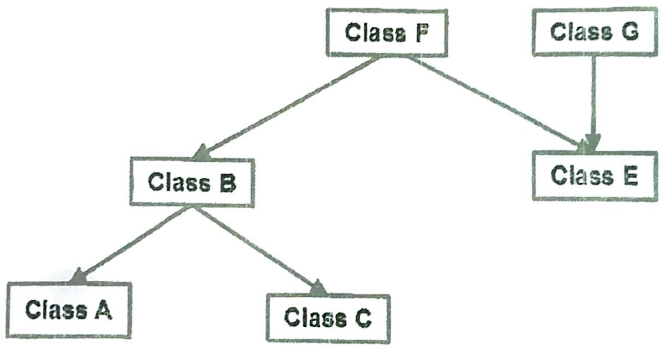
   (iii) Pass Statement

   (iv) _init_( )

2. (a) How Data Hiding is implemented in Python? Explain Exception Handling methods using suitable example. 8

(b) Describe any four methods each of File and Directory handling. 8

(c) Write a program to implement the following hybrid inheritance using suitable user defined function for each class : 8




## Unit-III

1. Define ndarray. Write a Python code to create a 0D, 1D, 2D, 3D and 5D Numpy arrays. 4

2. (a) Explain Intrinsic NumPy array creation with the help of suitable code. 8

(b) What is Boolean Indexing? Write a program to create the following two arrays and perform arithmetic operations on them : 8

| First array | Second array |
|---|---|
| [[0 1 2] | [10 10 10] |
| [3 4 5] | |
| [6 7 8] | |

(c) Apply the following universal functions in a NumPy array : cumprod(), union 1d( ) using suitable code explain how slicing is implemented in 3D NumPy array. 8

## Unit-IV

1. Differentiate between : 4

   (i) sort_index() and sort_values()

   (ii) loc[ ] and iloc[ ]

2. (a) What is Data Frame? Explain different methods of creating Pandas DataFrame using suitable program. 8

   (b) Consider the marks of the students in three subjects. 8

| | Name | Subject 1 | Subject 2 | Subject 3 |
|---|---|---|---|---|
| 0 | ABC | 78 | 84 | 86 |
| 1 | PQR | 85 | 94 | 97 |

| | | | | |
|---|---|---|---|---|
| 2 | XYZ | 96 | 89 | 96 |
| 3 | MNO | 80 | 83 | 72 |
| 4 | DEF | 86 | 86 | 83 |

Write a code using Pandas :

(i) To create the DataFrame for the above record.

(ii) To sort the 'Name' column in ascending order.

(iii) To display all the record of each student with marks in each subject > = 85.

(iv) Rename Columns Subject 1, Subject 2 and Subject 3 to 'Python', 'AI' and 'DS' respectively.

(c) How a new column can be added into a DataFrame? What are the different ranking methods in Pandas? Explain with the help of suitable program. 8

## Unit-V

1. What is Data Cleaning? Why Data Cleaning is essential in Data Science? 4

2. (a) Briefly explain the methods used for : 8

(i) Handling Missing Data

(ii) Replacing Values and Removing Duplicates

(b) What do you understand by Vectorization? Explain various string manipulation functions in Pandas DataFrame. 8

(c) What are outliers? Briefly explain Line Plots, Bar Plots, Histograms Plots for data visualization using Pandas. 8

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# A000276(046)

## B. Tech. (Hon's) (Second Semester) Examination, April-May 2022

**(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 the four major contribution of entrepreneurship in country's economy. 2

   (b) Discuss the roles of an Entrepreneurship. 6

(c) What are the characteristics of good Entrepreneur? 6

## Unit-II

2. (a) Define Negotiation. 2

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

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

## Unit-III

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

Almost after twenty years of struggle, Radha became the only woman entrepreneur in Orissa to manufacture

Electrical appliances. She has been able to set her market in the market and is known for quality, standard and safe product. She has successfully managed business to business and business to customer models. She has been awarded for her commendable work from prestigious industrial institutions and media. She started her career as a worker in electrical goods manufacturing company. Under her supervision came the unit where electrical appliances were serviced. She worked there for a couple of years and gained experience in this field. Being an efficient worker, Radha could not satisfy her restless search for a challenge that stretched her interest of starting a service unit of appliances. She resigned from the job and stepped out to do something on her own, in this same field. But Smita did not have the capacity to become self-employed because she was not clear about the prospects. She had lost her father, but her uncle motivated and supported her to go ahead. This chain of difficulties did not lessen Radha's welled-up enthusiasm. After persistent attempts and not very supportive banker, Radha lost hope of getting a loan and with her own resource of Rs. 27,000 managed to set up a unit in a rented premise in a busy commercial area. The place proved to be one of the advantages for

Radha. She started with a team of three including herself. For her financial need she twice received micro credit loans from ICECD. The Chinese products in India market initially had poses challenges. But she continued with her good quality and service to clients and succeeded. She feels her products have the required market now and will have in future too. Today, 50 year old Radha is a genial housewife, a grandmother, and a prosperous entrepreneur in the field of electrical appliances. Her tailpiece advice to every prospective woman entrepreneur is —never let your low educational qualification dampen your enterprising inclination, for you too can succeed like me.

**Questions :**

(a) What made Radha a successful women entrepreneur? 4

(b) Identify the challenges and problems of women entrepreneurs in India. 4

(c) Comment upon role of government in entrepreneurship development in India. 4

(d) What motivation did you get from Radha? 4