

Total No. of Questions : 4]

SEAT No. :

PE13014

[Total No. of Pages : 2

[6503]-1001

F.Y. B.Sc. (Data Science)

**DS - 101 - T : PROBLEM SOLVING AND PYTHON PROGRAMMING
(2024 NEP Credit Pattern) (Semester - I)**

Time : 2 Hours]

[Max. Marks : 30

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

Q1) Attempt any SIX of the following :

[6×1=6]

- a) Define algorithm.
- b) State two features of Python.
- c) Write the syntax of for loop.
- d) Define a class in Python.
- e) What is a module?
- f) What is the use of the datetime() function?
- g) List any two built-in functions in the math package.
- h) What is the sys package?

Q2) Attempt any FOUR of the following :

[4×2=8]

- a) Write the symbols used in flowchart.
- b) Differentiate between list and tuples.
- c) Write syntax of if-elif-else.
- d) What is the meaning of IS-A Relationship?
- e) What are Random Modules?

P.T.O.

Q3) Attempt any TWO of the following :

[2×4=8]

- a) Write algorithm and flowchart of maximum of two numbers.
- b) Write a Python program to demonstrate list operations.
- c) Write a Python program to create a class student with attributes name and marks.

Q4) Attempt any TWO of the following :

[2×4=8]

- a) Explain Defining and Calling of user-defined functions.
- b) Explain NumPy package in Python with an example.
- c) Write a python program to accept a year and month from the user and display the corresponding calendar.

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Total No. of Questions : 4]

SEAT No. :

PE13015

[Total No. of Pages : 2

[6503]-1002

F.Y. B.Sc. (Data Science)

STATISTICS

DS-103-T : Descriptive Statistics

(2024 NEP Credit Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 30

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of single memory non programmable calculator is allowed.*
- 4) *Symbols and abbreviations have their usual meaning.*

Q1) Attempt any six of the following.

[6×1=6]

- a) Define median.
- b) If the classes are 0 – 10, 10 – 20, 20 – 30, 30 – 40 then the class width is.
- c) If $(Q_3 - Q_2) = (Q_2 - Q_1)$ then the distribution is.
- d) The value of mode for the given data: 2, 2, 2, 2, 2, 2, 2, is.
- e) Define covariance.
- f) What is coefficient of variation.
- g) Find the range for the following data:
12, 18, 25, 10, 30, 22, 15
- h) What does the value of $r = + 1$ indicate?

Q2) Attempt any four of the following.

[4×2=8]

- a) Define the terms:
 - i) Attribute
 - ii) Variable
- b) Express the second and third central moment in terms of raw moments.
- c) What is dispersion. State different measures of dispersion.
- d) In the regression analysis the equation of two lines of regression is $2x + 3y = 8$ and $x + 2y = 5$, find mean value of x and y .
- e) State the types of correlation for the followings.
 - i) Weight and blood pressure of individuals
 - ii) Supply and price of vegetables

P.T.O.

Q3) Attempt any two of the following.

[2×4=8]

- a) The following data is related with the two workers doing same job in company.

	Worker A	Worker B
Mean time of completing the job (in minutes)	40	42
Standard Deviation (minutes)	8	6

Which worker is more consistent?

- b) What do you mean by central tendency? State different measures of central tendency.
- c) Define the term correlation. Explain different types of correlations with two real life examples of each.

Q4) Attempt any two of the following.

[2×4=8]

- a) Five entries at a musical competition were rated by two judges x and y as follows.

Rank by x	1	5	2	3	4
Rank by y	1	5	4	2	3

- b) Explain the procedure of fitting of exponential curve of the type $y = ab^x$.
- c) Compute mode of the following frequency distribution.

Class	100-200	200-300	300-400	400-500
Frequency	15	20	10	5



Total No. of Questions :4]

SEAT No. :

PE13016

[Total No. of Pages : 2

[6503]-1003

F.Y.B.Sc. (Data Science)

DS-105 T : COMPUTATIONAL MATHEMATICS

(2024 Credit Pattern) (Semester-I)

Time : 2 Hours]

[Max. Marks : 30

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Scientific and Non-programmable calculator is allowed.*

Q1) Attempt any SIX of the following:

[6×1=6]

- a) A homogeneous system of linear equations is always consistent, state whether True or False.
- b) What is echelon form of a matrix?
- c) Define vector space.
- d) What is linear independence?
- e) Define eigen value.
- f) Find the characteristic polynomial of the following matrices $\begin{bmatrix} 3 & 2 \\ -1 & 0 \end{bmatrix}$
- g) What is an equivalence relation?
- h) Define diagonalization of a matrix.

Q2) Attempt any FOUR of the following:

[4×2=8]

- a) Reduce the matrix $\begin{bmatrix} 1 & 3 \\ 3 & 4 \end{bmatrix}$ to echelon form.
- b) Find the determinant of a matrix $\begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$.

P.T.O.

- c) Check whether the vectors $\begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$ are linearly dependent.
- d) Write the characteristic equation of the matrix $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$.
- e) Find the complement of Boolean variable A.

Q3) Attempt any TWO of the following: [2×4=8]

- a) Solve the system of linear equations using Gaussian elimination.

$$x + y + z = 6$$

$$2x + 3y + z = 11$$

$$x + 2y + 3z = 14$$
- b) Find the basis and dimension of the vector space spanned by vectors (1,1,0) (1,0,1) (0,1,1).
- c) Find the eigen values of the matrix $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$.

Q4) Attempt any TWO of the following: [2×4=8]

- a) Solve the system of linear equation using cramer's rule.

$$x + y = 5$$

$$2x - y = 1$$
- b) Find eigen values and eigen vectors of the matrix $\begin{bmatrix} 3 & 1 \\ 0 & 2 \end{bmatrix}$.
- c) Express the Boolean function
 $F(A,B) = \sum (1,3)$ in Disjunctive
 Normal Form (DNF)



Total No. of Questions : 4]

SEAT No. :

PE13017

[Total No. of Pages : 2

[6503]-1005

F.Y.B.Sc. (Data Science)

SEC-101-DS-T : COMPUTER ORGANIZATION

(2024 Credit Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 30

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

Q1) Attempt any six of the following.

[6×1=6]

- a) Draw the symbol of AND gate.
- b) Define serial communication.
- c) Write applications of microprocessor.
- d) What is combinational circuit?
- e) What is numeric co-processor?
- f) What is the base of binary number system?
- g) What is multiplexer?
- h) Write name of universal gates.

Q2) Attempt any four of the following.

[4×2=8]

- a) Explain half adder.
- b) What is cache memory? What are the different types of its address mapping?
- c) Write a note on arithmetic and instruction pipeline.
- d) Convert the following :
 - i) $(110110)_2 = ()_{10}$
 - ii) $(24A)_{16} = ()_2$
- e) Explain the concept of stack.

P.T.O.

Q3) Attempt any two of the following.

[2×4=8]

- a) Draw and explain the working of 1:2 demultiplexer.
- b) Draw and explain the block diagram of parallel interface.
- c) Differentiate between processor and co-processor.

Q4) Attempt any two of the following.

[2×4=8]

- a) Differentiate between synchronous and asynchronous counter.
- b) What is flag register? Explain any three flags.
- c) Define the terms:
 - i) Instruction pointer
 - ii) Instruction register
 - iii) Stack pointer
 - iv) Program counter.

