Roll No. .....

ID–2871

B. C. A. (Part III)

EXAMINATION, March-April, 2025

Paper First

STATISTICAL ANALYSIS

Time : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 27

Note : Attempt any *two* parts from each question. All questions carry equal marks.

Unit—I

1. (a) In how many way can 4 boys and 4 girls sit around a circular table such that no two girls sit side by side ?

   (b) If ${}^{n}C_{x} = 56$ and ${}^{n}P_{x} = 336$, find the value of n and x.

(c) Use Binomial theorem to prove that :

(i) $3^n = \sum_{r=0}^{n} C(n, r)\, 2^n$

(ii) $C(n, 1) + 2C(n, 2) + \ldots\ldots + nC(n, n) = n.2^{n-1}$

Unit—II

2. (a) Find the mean deviation from the following series :

Age (less than)	No. of Persons
10	15
20	30
30	53
40	75
50	100
60	110
70	115
80	125

(b) Find the standard deviation of the following series :

x	f
0	150

10	140
20	100
30	80
40	80
50	70
60	30
70	14
80	0

(c) Find the mean and standard deviation from the following frequency distribution :

Age	Frequency
10—20	4
20—30	8
30—40	10
40—50	16
50—60	12
60—70	0
70—80	4

Unit—III

3. (a) Two dices are thrown. Find the probability that the sum of faces is :

   (i) 7 or 8

   (ii) More than 8

   (b) For some normal distribution the first moment about 10 is 40 and 4th normal about 50 is 48. What is the mean variance and standard deviation of the normal distribution ?

   (c) Fit Poisson's distribution to the following and calculate theoretical frequencies : $(e^{-0.5} = 0.61)$.

Death	Frequency
0	122
1	60
2	15
3	2
4	1

Unit—IV

4. (a) Prove that the Karl Pearson's coefficient of correlation r lies between – 1 and + 1.

(b) Find the coefficient of correlation from the following table :

x	y
10	18
14	12
18	24
22	6
26	30
30	36

(c) Fit normal curve at the following data :

Class	Frequency
15—20	8
20—25	13
25—30	19
30—35	10

Unit—V

5. (a) Ten individuals are chosen at random from a population and their heights are found to be in inches :

63, 63, 64, 65, 66, 69, 69, 70, 70, 71

Discuss the proposal that the mean height in the universe is 65 inches, given that for 9 degree of freedom the value of students t at 5% level of significance is 2.262.

(b) The sum of deviations from the mean of a sample of the size 8 is 94.5. In other sample of the size 10, the sum of the deviation from mean is 101.7.

Example whether the difference in the deviation is significant.

(c) A coin is tossed 400 times and it turns up head 216 times. Discuss whether the coin may be unbiased one and explain.

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ID–2872

B. C. A. (Part III)
EXAMINATION, March-April, 2025

Paper Second

PROGRAMMING IN PYTHON

Time : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 27

Note : Attempt any *two* parts from each question. All questions carry equal marks.

Unit—I

1. (a) Explain relation operator and logical operator with example.

   (b) Write a Python program to find the simple interest where principal amount, rate of interest and time will be given.

   (c) Explain the concept of data types in Python with example.

P. T. O.

Unit—II

2. (a) Explain various looping statements with example.

   (b) Explain how we can create a function and execute it with example. Also explain the types of argument in Python.

   (c) Explain the following :

   (i) Print function

   (ii) Input function

Unit—III

3. (a) Explain the concept of creating and deleting a formatted file with example.

   (b) Explain the concept of string manipulation with various string functions and operator in Python with example.

   (c) Write and explain the Python program to convert hexadecimal number into binary number.

Unit—IV

4. (a) What is List data type ? Explain inserting, replacing and removing an element in list with example.

(b) What is dictionary data types ? Explain dictionary with example. Also explain accessing and remaining values in dictionary.

(c) Explain the following :

(i) Differenciate between list and tuple.

(ii) Concept of stack data structure.

Unit—V

5. (a) Explain user defined function with example. Also write a Python program for it and explain.

(b) Explain try and except clause with example in brief.

(c) Explain math module and its *five* functions with example.

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B. C. A. (Part III)

EXAMINATION, March-April, 2025

Paper Third

DOT NET TECHNOLOGY

Time : Three Hours

Maximum Marks : 80

Note : Attempt any *two* question from each Unit is compulsory. All questions carry equal marks.

Unit—I

1. (a) Explain the architecture of the .NET Framework with a detailed diagram. Describe its main components.

   (b) What is the Common Language Runtime (CLR) ? Explain its features and working mechanism in detail.

   (c) Explain Garbage Collection in .NET. How does it help in memory management ?

P. T. O.

Unit—II

2. (a) What are the different data types available in VB.Net ?

   (b) Discuss in detail the different types of Operators in VB.Net with suitable examples.

   (c) Differentiate between functions and subprocedure.

Unit—III

3. (a) Define MDI Forms. How are they different from simple forms ?

   (b) Discuss the working of the Timer and Scrollbar controls in Windows Forms.

   (c) Explain how to create and manage Menus and Submenus in a Windows Forms application.

Unit—IV

4. (a) What do you understand by OOPs ?

   (b) What is inheritance in VB.Net ? Explain with an example.

   (c) What is the purpose of a constructor in VB.Net ?

Unit—V

5. (a) What is ADO.Net, and why is it used in database programming ?

(b) How do you create a database application in Windows Forms using ADO.Net ? Provide a simple example.

(c) What is the difference between a DataSet and a Data Reader in ADO.Net ? How do they work in data retrieval ?

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B. C. A. (Part III)

EXAMINATION, March-April, 2025

Paper Fourth

SOFTWARE ENGINEERING

Time : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 27

Note : Attempt any *two* parts from each question. All questions carry equal marks.

Unit—I

1. (a) Define software engineering and explain its importance in software development.

   (b) Explain knowledge engineering and its role in software development.

   (c) Compare flow-based, databased and object-oriented analysis approaches.

P. T. O.

Unit—II

2. (a) Define system design and differentiate between idealized and constrained design.

   (b) Describe data oriented design using Warnier-Orr and E-R modeling approaches.

   (c) What are cohesion and coupling ? Explain their role in system design.

Unit—III

3. (a) What are Case Tools ? Discuss their relevance in modern software development.

   (b) Explain the importance of coding standards in software development.

   (c) Describe the process of re-engineering legacy systems and its benefits.

Unit—IV

4. (a) Explain different types of software testing including black box and white box testing.

   (b) What are software quality metrics ? Explain with example.

   (c) Explain the COCOMO model for cost estimation in software projects.

Unit—V

5. (a) Explain the different phases of software project management.

(b) Discuss the importance of software project teams and their roles.

(c) How do project managers monitor and control software projects ? Explain.

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B. C. A. (Part III)

EXAMINATION, March-April, 2025

DATA STRUCTURE

Time : Three Hours

Maximum Marks : 75

Note : Attempt any *two* parts from each Unit. All questions carry equal marks.

Unit—I

1. Explain all types of asymptotic notations in complexity analysis of algorithms.
2. What is Data Organization ? Explain classification of data structure and its applications.
3. Define Algorithm. How to measure time and space complexities in algorithm ? Explain with example.

Unit—II

1. Write an algorithm for INSERT operation in sorted array and calculate its complexity.

P. T. O.

2. What is a Pointer ? How is it different from an array ?
3. How data is organized in records ? Explain with an example.

Unit—III

1. How to delete a node from a circular linked list ? Explain with example.
2. Write the types of queue and its applications.
3. Which data structure is used for implementing recursion ? Explain.

Unit—IV

1. Construct a binary tree from the traversal given below :

   Pre-order : [3, 9, 20, 15, 7]

   In-order : [9, 3, 15, 20, 7]

2. What is Binary Tree ? How is it different from binary search tree ?
3. Write and explain an algorithm to insert a node in binary search tree.

Unit—V

1. Write binary search algorithm. Explain the steps to search 23 in the given array :

   2, 5, 8, 12, 16, 23, 38, 56, 72, 91

2. What is Hashing ? Write its applications.
3. Write an explain any *two* sorting algorithms in data structure.

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ID–2876

B. C. A. (Part III)
EXAMINATION, March-April, 2025

Paper Sixth

COMPUTER SYSTEM ARCHITECTURE

Time : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 27

Note : Attempt any *two* parts from each question. All questions carry equal marks.

Unit—I

1. (a) Explain arithmetic operations on binary numbers.

   (b) Explain the following binary codes :

   (i) Grey codes

   (ii) Excess-3 codes

   (c) What is Error Detection Code ? Explain its use with suitable example.

P. T. O.

Unit—II

2. (a) What is Boolean algebra ? Explain its use and basic Boolean law.

   (b) What are sequential circuits ? Explain with example.

   (c) Explain the following :

   (i) Product of sum

   (ii) Shift register

Unit—III

3. (a) What is Macro Computer ? Explain block diagram of a macro computer.

   (b) Explain program control instruction sequence.

   (c) Explain the following :

   (i) Motherboard

   (ii) SMPS

Unit—IV

4. (a) What are I/O controllers ? Explain difference between isolated I/O and memory mapped I/O.

   (b) Explain synchronous and asynchronous data transfer with suitable example.

(c) Explain the following :

(i) Handshaking

(ii) I/O processor

Unit—V

5. (a) What is Auxiliary Memory ? Explain with its types.

(b) What are semiconductor memories ? Explain it.

(c) Explain the following :

(i) Associative memory

(ii) Writing into cache

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