KANNUR UNIVERSITY

(Abstract)

B.Sc Artificial intelligence and Machine learning Programme under CBCSS (OBE)-LRP Pattern w.e.f 2023 admission - Modified Model Question Papers - Approved & Implemented- Orders issued.

ACADEMIC C SECTION

ACAD C/ACAD C5/19900/2023

Dated: 09.02.2024

Read:-1. UO No. ACAD C/ACAD C5/19900/2023 Dated 20/12/2023

2. U.O.Note from EXC1/EXC I-III/38761/2023 Dated 28/12/2023

3. Lr. No.ACAD C/ACAD C5/19900/2023 Dated 03/01/2024

4. Email dated 04/01/2023 from Principal, Don Bosco Arts and Science College

ORDER

1. Scheme Syllabus, Pattern of question paper and Model Question papers of B.Sc Artificial Intelligence and Machine Leaning Programme was implemented at Don Bosco Arts and Science College Angadikkadavu, under Choice Based Credit and Semester System (in Outcome Based Education System-OBE) with effect from 2023 admission vide paper read (1) above.

2. As per the paper read (2) above, the Examination Branch pointed out certain discrepancies in the Model Question Paper of B.Sc Artificial Intelligence and Machine Leaning Programme implemented vide Paper read 1 above.

3. The Principal, Don Bosco Arts and Science College, who prepared and submitted the above mentioned Syllabus in the circumstance of nonexistence of Board of studies was requested to make necessary corrections in the Model Question Paper vide paper read(3) above.

4. The Principal, Don Bosco Arts & Science college, Angadikkadavu, submitted the modified Model Question paper, after rectifying the defects pointed out by the examination Branch, vide paper read (4) above.

5. The Vice-Chancellor, after considering the matter in detail, and in exercise of the powers of the Academic Council, conferred under Section 11(1), Chapter III of Kannur University Act, 1996 has **accorded sanction to approve and implement the modified Model question paper of B.Sc Artificial Intelligence and Machine Leaning Programme CBCSS (OBE) w.e.f. 2023 admission, at Don Bosco Arts and Science College, Angadikkadavu, subject to report to the Academic Council.**

6.. Modified Model Question Paper of B.Sc Artificial Intelligence and Machine Learning Programme CBCSS (OBE) w.e.f. 2023 admission is appended and uploaded in the University web site (www.kannuruniversity.ac.in)

7. The U.O. read as paper (1) above stands modified to this extent.

8. Orders are issued accordingly.

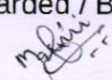To: 1. The Principal, Don Bosco Arts and Science College, Angadikkadavu

Copy To: 1.The Examination Branch, (Through PA to CE)
          2. AR III/ES Section (Exam)
          3. EX CI/EG I
          4. PS to VC/PA to R
          5. DR/AR-1 Acadmic
          6. Computer Programmer, Web Manager
          7. SF/DF/FC

Forwarded / By Order

SECTION OFFICER

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Model Question Papers

BSc (AI & ML) Degree Regular Examination

1B01 AIML   INTRODUCTION TO COMPUTER SCIENCE

Time: 3 hours   **Maximum Mark: 40**

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.   **(6x1=6)**

1. List any two characteristics of a good program.
2. Find 2 s Complement of 1101100.
3. What is Linker?
4. Define ASCII.
5. What is Unicode?
6. What is Internet?

PART – B
(Short Essay)
Answer any six questions. Each question carries 2 marks.   (6 x 2 =12)

7. Give two differences between compiler and interpreter.
8. Explain floating point representation of data.
9. Discuss the steps involved in developing a program.
10. a)Add 1101 and 1111 b)Subtract 0111 from 1110.
11. What is meant by Object Oriented Programming?
12. Note on GRAY Code.
13. What is computer virus and its types?
14. Explain firewall and its use.

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.   **(4x3=12)**

15. Explain any three input devices.
16. Convert the following numbers
    a)34.4674 from base 10 to base 2.
    b)C15 from base 16 to base 10
    c)1110101100110 to Octal
17. Explain algorithm and flowchart.
18. Write a note on cyber ethics.
19. Explain the steps involved in problem solving using computers.
20. Explain ROM and its types.

PART – D

21. Explain secondary storage devices.
22. Explain Types of Software's.
23. Explain various number systems with example.
24. Explain Types of Computer Languages.

2B02 AIML   PROGRAMMING IN C

Time: 3 hours   **Maximum Mark: 40**

PART – A
(Short Answer)
Answer **all** questions. Each question carries 1 mark.   **(6x1=6)**

1. List the importance of a C program.
2. Who developed C programming?
3. Define variable.
4. Define keyword.
5. Write file modes.
6. What is union?

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.   **(6x2=12)**

7. What is nested if statements in C? Explain with an example.
8. What do you mean by two dimensional arrays? Give an example.
9. Explain switch statement with example.
10. Explain the basic structure of C program with an example.
11. Explain break, continue statements with suitable examples.
12. Differentiate between actual Parameters and formal parameters.
13. What is pointer? Explain with syntax.
14. Write a program to print all prime numbers between given limits.

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.   **(4x3=12)**

15. Explain formatted and unformatted functions in C programming with example.
16. Explain different primitive data types in C with example.
17. Write a program to read and display n elements in an array.
18. Differentiate between structure and union.
19. Explain the dynamic memory allocation technique.
20. Explain storage classes in C.

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.   **(2x5=10)**

21. Explain different type of looping structures in C with example.
22. Explain different type of operators in C with example.
23. Explain C tokens in detail.
24. Write a program to create a file and store some records in it. Display the content of the same.

BSc (AI & ML) Degree Regular Examination

3B04 AIML   INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. What is a State Space?
2. What is best first search?
3. What are predicates?
4. Give the name of a knowledge representation method.
5. What is learning?
6. Expand CNN.   (6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. What is a production system?
8. Write a note on heuristic search.
9. Represent the statement "All men are mortal" in predicate logic.
10. What is clustering?
11. Write a note on perceptron.
12. What is an expert system?
13. What is a decision tree?
14. Write a note on neural networks.   (6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. Write a note on Means Ends Analysis.
16. Write a note on Constraint Satisfaction.
17. Differentiate forward and backward reasoning.
18. Explain the procedure of knowledge acquisition in expert systems.
19. Explain different types of learning.
20. Write a note on time series prediction.   (4 X 3 = 12 Marks)

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. Describe the characteristics of production systems.
22. Describe the architecture of expert systems.
23. Explain Bayesian belief networks.
24. Explain the architecture of CNN.

BSc (AI & ML) Degree Regular Examination

3A01 AIML   OPERATING SYSTEM AND LINUX SHELL PROGRAMMING

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. What is Operating System?
2. Define System calls.
3. What is Scheduling?
4. What is Open source software?
5. Define Shell.
6. What is Deadlock?

(6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Compare Free software and Open source software.
8. What is cat command?
9. What is vim editor.
10. What is thread?
11. Compare cp and mv command.
12. Define Swapping.
13. What is AWK?
14. What is mkdir command

(6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. Explain different types of system calls.
16. Explain variables in shell programming
17. Explain Round robin scheduling.
18. Explain Process scheduling?
19. Explain different page replacement algorithms.
20. What are shell scripts?   (4 X 3 = 12 Marks)

21. List and explain different types of Operating system.
22. Explain necessary conditions for deadlock.
23. Explain Banker's Algorithm
24. Explain different control statements in shell programming

(2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

3A02 AIML   **DATA STRUCTURES**

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
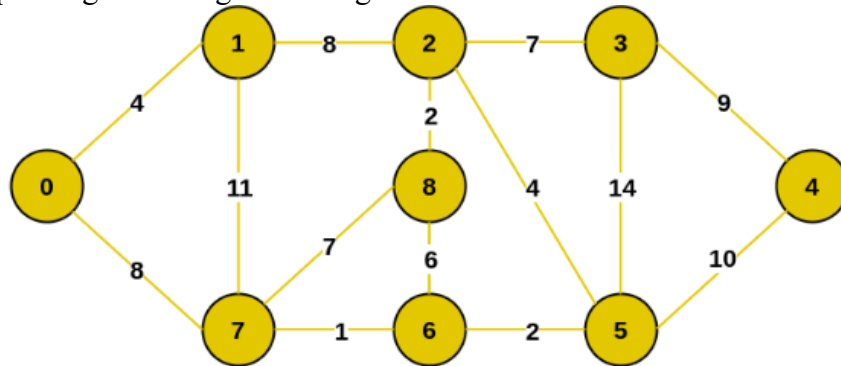Answer All questions. Each question carries 1 mark.

1. What are the basic data structures?
2. Define tree.
3. What is sorting?
4. Define array.
5. How to calculate height and level of a tree?
6. Note on information storage.   (6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Find minimum spanning tree using Prim's algorithm.

8. What is the difference between queue and circular queue?
9. Evaluate the expression (A+B/C*D-(E/F))-G*H
10. Write algorithm for BFS.
11. Note on hexadecimal representation of numbers.
12. How to perform bubble sort?
13. Explain any two hashing functions.
14. Explain Boolean algebra laws.   (6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. Explain stack operations.
16. Explain binary search with example.
17. Explain Dijkstra's algorithm with example.
18. Discuss heaps.
19. Write a program to insert and delete elements from beginning in linked list.
20. Explain addressing and byte ordering.   (4 X 3 = 12 Marks)

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. Describe Binary Search tree in detail.
22. Write a detailed note on quick sort algorithm and explain with example.
23. Explain IEEE Floating point representation.
24. Write in detail about Queue Data Structure.   (2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

4B05 AIML DIGITAL FUNDAMENTALS AND COMPUTER ORGANIZATION

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer **All** questions. Each question carries 1 mark.

1. Define logic gates.

2. What is flipflop?

3. Define cache memory.

4. Define DMA.

5. Write the format of an instruction.

6. Define pipeline.   (6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Explain logic gates.

8. Explain combinational logic circuit.

9. Compare SRAM and DRAM.

10. What is ROM?

11. What is interrupts?

12. Which are the layers of abstraction?

13. Explain structural hazards.

14. Explain instruction categories.

(6 X 2 = 12 Marks)

15. Explain key components of a computer.

16. Explain DMA.

17. Explain counters.

18. Explain instruction set principles.

19. Explain registers.

20. Explain the use of Karnaugh map through example.   (4 X 3 = 12 Marks)

21. Explain theorems an properties of Boolean algebra with example.

22. Explain different flipflops.

23. Explain instruction set architecture.

24. Explain cache memory mapping mechanisms.   (2 X 5 = 10 Marks)

4B06 AIML   PYTHON FOR MACHINE LEARNING

Time: 3 hours   **Maximum Mark: 40**

PART – A
(Short Answer)
Answer **all** questions. Each question carries 1 mark.   **(6x1=6)**

1. Give an example for a mutable data types.
2. How to remove and rename a directory in Python?
3. Write if….else syntax.
4. What type of language is python?
5. What is exception?
6. What is array?

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.   **(6x2=12)**

7. What are local and global variables in python?
8. Explain any three features of Python.
9. Define pandas dataframe.How to add a new column to pandas dataframe?
10. What is pass in python? Explain with an example.
11. Differentiate between break, continue statements.
12. What is PYTHONPATH in python?
13. What are some of the most commonly used built-in modules in python?
14. Write a python script to sort a dictionary by value.

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.   **(4x3=12)**

15. What is the difference between python arrays and lists?
16. Explain numpy arrays in detail.
17. Write a program to read and display n elements in an array.
18. What are the steps to create 1D, 2D and 3D arrays?
19. What are lambda functions? What are the characteristics of lambda functions?
20. Discuss the different argument passing mechanism in python with suitable example.

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.   **(2x5=10)**

21. Explain control structure inpython with example.
22. Explain exception handling.
23. Write a program to count the frequencies of each word from a file.
24. Discuss the relation between tuples and lists, tuples and dictionaries in detail.

BSc (AI & ML) Degree Regular Examination

4B07 AIML   DATABASE MANAGEMENT SYSTEMS

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. What is a Data Base System?
2. Define Schema.
3. Define Primary Key.
4. Give the syntax for creating a table in SQL.
5. Define Weak Entity.
6. How is 2NF different from 1 NF?   (6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Who is a database administrator?
8. What is the difference between logical physical data independence?
9. What is a sub query?
10. Explain sequences.
11. What is cardinality and degree of a table?
12. What is drop table?
13. Can you change the structure of a table? If so, how?
14. Give any two data types in SQL.   (6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. Compare different levels of abstraction in DBMS.
16. Explain integrity constraints.
17. Discuss hierarchical data model.
18. Discuss TCL.
19. Explain any three SQL functions.
20. Explain the categories of database users.   (4 X 3 = 12 Marks)

21. Explain the purpose of DBMS.
22. Draw an ER Diagram for Library Management System.
23. Explain Relational Calculus.
24. Create table Student with rollno, name, sex and marks as attributes. (Rollno is the Primary Key). Write queries for
    1) Insert Records
    2) Sort students based on marks
    3) Display the highest mark.   (2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

5B10 AIML   INTRODUCTION TO R PROGRAMMING

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. Define R programming.
2. List out any five features of R.
3. Explain RStudio.
4. What are the different values that can be assigned to a numeric datatype in R?
5. Write R program to create a blank matrix.
6. Write the syntax to obtain the following matrix, A =[-8 3 0 4 -1 2 -5 7 3] .

(6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Write a R program to find the maximum and the minimum value of a given vector. Explain the functions with syntax
8. Define operators in R.
9. Describe the function cat() in R. How is it different from print() for output?
10. Write an if-else statement to check whether a given number is even or odd.
11. Write R code to calculate the sum of all elements in a matrix M.
12. Create a vector v and convert it into a matrix with 3 rows and 4 columns.
13. What are the different data types in R?
14. Summarize the advantages and disadvantages (6) Remembering BTL-1 of R?

(6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. Explain the difference between a matrix and a data frame in R. Give an example of when you would use each.
16. Write a function that checks if a given string contains the substring "R programming". The function should return a Boolean value.
17. Explain any 4 graphs in R with syntax.
18. Create two matrixes in R and perform matrix multiplication.
19. List out the properties of the following:
    i)   Matrix subtraction
    ii)   Matrix Division
    iii)   Matrix addition
    iv)   Matrix multiplication

20. Write a program to add two matrices. How do you access the elements in the 2nd column and 4th row of a matrix? (4 X 3 = 12 Marks)

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. Explain Different operators in R Programming with example.
22. Explain decision making statements in R.
23.
    i)   Provide an example of how to create a numeric vector containing the elements 5, 10, 15, ..., 50 using the seq() function.
    ii)   Explain the process of subsetting a vector using logical indexing.
    iii) Illustrate the use of the rep() function to create a vector repeating the elements "A", "B", and "C" three times each.

24.
    i)   Create a data frame named "student_data" with columns "Name", "Age", and "Grade".
    ii)   How can you access the second row of the data frame "student_data"?
    iii) Write code to calculate the mean age of students in the "student_data" data frame.
                                                                        (2 X 5 = 10 Marks)

5B 11AIML   SOFTWARE ENGINEERING

Time: 3 hours   **Maximum Mark: 40**

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.   **(6*1=6)**

1. What are the attributes and objectives of design?
2. Expansion of FAST is..........
3. What is Function oriented design
4. What is Feasibility study?
5. Define SRS.
6. What is software process?

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.   **(6x2=12)**

7. What are the advantages of developing prototypes?
8. Define Black Box testing/Functional testing?
9. Explain Types of requirements.
10. What is the difference between verification and validation?
11. Briefly explain the steps of requirement engineering.
12. What are DFDs? Explain the various symbols used in DFDs
13. Differentiate conceptual and technical design
14. Explain the term modularity, write any two properties of modular system.

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.   **(4x3=12)**

15. What is structural Testing? Explain various approaches to structural testing.
16. Explain the different strategies/techniques for performing system design.
17. Explain the characteristics of SRS.
18. Explain different types of coupling.
19. Briefly explain object oriented design.
20. Explain use case approach with example.

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.   **(2x5=10)**

21. Explain different levels of testing.
22. Explain waterfall model.
23. Explain agile development techniques.
24. Explain various steps of requirement analysis (With suitable diagrams).

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5B12 AIML OBJECT ORIENTED PROGRAMMING USING JAVA

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer **All** questions. Each question carries 1 mark.

1. What is a byte code?

2. What is type wrapper?

3. Define exception.

4. Define package.

5. Define abstract class.

6. Define garbage collection.   (6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Explain the history of java.

8. Explain array.

9. Compare String and StringBuffer class.

10. What is dynamic method dispatching?

11. Differentiate between throw and throws.

12. How to create user define exceptions?

13. Explain synchronization.

14. Explain collection.   (6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. Explain features of java.

16. Explain thread life cycles.

17. Explain the creation of packages through example.

18. Explain the operators in java.

19. Compare method overloading and overriding with example.

20. Write a program that implement interface.   (4 X 3 = 12 Marks)

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. Explain exception handling with example.

22. Explain control structures with example.

23. Explain multi-threading. Write a program that implement the concept of multithreading.

24. Explain object-oriented concepts.   (2 X 5 = 10 Marks)

Time: 3 hours   Maximum Mark: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.   **(6*1=6)**

1. What is Data Mart?
2. What is mean by promoted border set?
3. Explain ETL.
4. Define Association rule.
5. What is spatial data mining?
6. What are data cubes?

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.   **(6*2=12)**

7. Differentiate DBMS vs Data mining.
8. Explain web mining.
9. Explain logistic regression model.
10. Explain temporal data bases.
11. Explain Partition algorithm.
12. Write a short note on Spatial databases.
13. Compare OLTP and OLAP.
14. Explain Machine Learning and its types.

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.   **(4*3=12)**

15. Explain KDD and its steps.
16. Explain model based clustering methods.
17. Explain clustering paradigms.
18. Explain DBSCAN Clustering Algorithm.
19. Explain Data preprocessing Steps.
20. Write a note on Data Mining Application Areas.

21. Explain Hierarchical Methods.

22. Explain Data warehousing Architecture.

23. Explain issues and challenges of Data Mining.

24. Explain Different Types of Schemas.

BSc Degree AI & ML Regular Examination

5B13B AIML PATTERN RECOGNITION

Time: 3 Hours   Max. Marks: 40

PART – A

(Short Answer)

Answer **All** questions. Each question carries 1 mark.

1. Which learning approach involves training models using labeled data in pattern recognition?
2. What comparison is made to determine classification in the likelihood ratio form of decision making?
3. Which type of density function is often used for modeling continuous features in classification?
4. Which algorithm is used for solving temporal probabilistic reasoning?
5. What is the primary purpose of resampling in classifier design?
6. What is the primary purpose of Multidimensional Scaling?

(6 X 1 = 6 Marks)

PART – B

(Short Essay)

Answer **any six** questions. Each question carries 2 marks.

7. **What are the common applications of pattern recognition?**
8. What is feature extraction in pattern recognition? Give an example.
9. Describe the significance of the likelihood ratio form in decision-making processes.
10. Outline the key principle behind the Neyman-Pearson Criterion in hypothesis testing.
11. Discuss the role of cross-validation in refining classifier performance.
12. Describe the fundamental principle behind using resampling techniques for estimating statistics.
13. Explain the fundamental concept of applying Graph-Theoretic Methods in data analysis.
14. Explain the role of criterion functions in the context of clustering algorithms.

(6 X 2 = 12 Marks)

PART – C

(Essay)

Answer **any four** questions. Each question carries 3 marks.

15. Compare and contrast supervised, unsupervised, and semi-supervised learning methods in the context of pattern recognition.
16. Describe the stages involved in the design cycle of a pattern recognition system. Highlight the significance of each stage.
17. Explain the fundamental principles of Bayesian learning and its significance in machine learning.

18. Discuss the concept of identifiability in mixture densities. Provide examples to illustrate the challenges and potential solutions in addressing identifiability problems.
19. Explain the role of maximum likelihood estimation in modeling normal mixtures.
20. Discuss the differences between Classical MDS and Non-Metric MDS techniques.

(4 X 3 = 12 Marks)

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. Describe the design cycle of pattern recognition.
22. Explain the following
    a) Posterior Probability Form
    b) Likelihood Ratio Form
    c) Discriminant Function Form
23. Describe the Challenges in Classifier Evaluation.
24. Describe advancements and challenges in Statistical Modeling and Data Analysis.

(2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

5B13C AIML DATA SCIENCE AND ANALYTICS

<u>Time: 3 hours</u>   <u>Max. Marks: 40</u>

PART – A

(Short Answer)

Answer **all** questions. Each question carries 1 mark.

1. What are the primary sources of data in the context of data analytics?

2. State one significant need for data analytics in modern contexts.

3. Define Data Pre-processing.

4. Define Exploratory Data Analysis (EDA).

5. Define Big Data.

6. What is Hadoop Distributed File System (HDFS)?   **(6x1=6 Marks)**

PART – B

(Short Essay)

Answer **Any Six** questions. Each question carries 2 marks.

7. Distinguish between analysis and reporting in data analytics.

8. Briefly describe the characteristics of data in analytics.

9. Differentiate Feature Generation and Feature Selection in data analytics.

10. Explain the steps involved in Data Cleaning in data analytics.

11. What is Web scraping in the context of data collection?

12. State the significance of the Discovery Phase in the Data Analytics Lifecycle.

13. Explain two sources of Big Data and their significance in analytics.

14. Explain two examples illustrating the use of MapReduce for data processing tasks.

(6x2=12 Marks)

PART – C

(Essay)

Answer **any four** questions. Each question carries 3 marks.

15. Explain the classification of data and provide examples of each.

16. What are feature selection algorithms? Explain their importance in model building with examples.

17. Explain the role of Data Visualization in interpreting complex datasets.
18. Explain the steps involved in Data Cleaning in data analytics.

19. Explain the types of NoSQL databases and compare SQL with NoSQL databases.

20. Explain the role of Pig and Hive in data analysis within the Hadoop ecosystem.

(4x3=12 Marks)

PART – D

(Long Essay)

Answer **any two** questions. Each question carries 5 marks.

21. List and explain modern data analytics tools with examples of their applications.

22. Explain in detail the various phases of the data analytics lifecycle and their significance.

23. Define Exploratory Data Analysis (EDA) and discuss its importance in the initial phases of the data analytics lifecycle.

24. Explain the significance of Hadoop in handling Big Data and its applications.

(2x5=10 Marks)

BSc (AI & ML) Degree Regular Examination

6B16 AIML   DIGITAL IMAGE PROCESSING

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. What is image enhancement?
2. What are image negatives?
3. What is histogram matching?
4. Write the objective of sharpening.
5. What is noise in digital images?
6. Expand GIF.   (6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Give the general form of log transformation.
8. What is contrast stretching?
9. What is a histogram?
10. What are averaging filters?
11. Write a note on image reconstruction.
12. What are periodic noises?
13. What is digital water marking?
14. What are skeletons?   (6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. Write a note on power law transformations.
16. How do you sharpen images?
17. Write a note on Notch filters.
18. How can you reduce noise in images?
19. Write a note on image segmentation.
20. Explain region bound thresholding.   (4 X 3 = 12 Marks)

(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. Describe the steps in digital image processing.
22. Discuss image smoothing filters.
23. Explain color image processing.
24. Explain any two image compression methods.   (2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

6B17A AIML   INTRODUCTION TO DEEP LEARNING

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. What is deep learning?
2. What is feed forward neural networks?
3. What is convolutional neural network?
4. What do you mean by recurrent nets?
5. Define deep recurrent networks.
6. Define transfer learning.   (6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Differentiate between deep learning and machine learning.
8. Write a note on hyper parameter tuning.
9. Explain briefly about stacking in CNN.
10. What are the applications of CNN?
11. Write a note on bidirectional RNNs.
12. What do you mean by sparse encoders?
13. Explain briefly about the size of the dev and test sets.
14. Differentiate transfer learning and multi-task learning.

(6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. Explain briefly about basic supervised classification task.
16. Write a note on optimization of logistic classifier using gradient descent.
17. Write a note on striding in CNN.
18. Write a note on recurrent neural networks.
19. Explain briefly about encoder-decoder sequence to sequence architectures.
20. Explain briefly about multi-task learning   (4 X 3 = 12 Marks)

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. Explain stochastic gradient descent in detail.
22. Explain in detail about convolution neural networks.
23. Explain unfolding computational graphs in detail.
24. Explain in detail about structuring machine learning projects.

(2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

6B17B AIML DATA VISUALIZATION

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. What is display space?
2. What is rendering time?
3. What is lightness?
4. What do you mean by contrast?
5. What is space perception?
6. What is a tactile map?   (6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Write a note on data visualization.
8. Write a note on the computational support for data visualization.
9. What is constancy?
10. What is encoding of values?
11. Write an example for complex information space.
12. Write a note on visual interface.
13. What is information visualization?
14. What is sketching?

                                           (6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. Describe various visualization stages.
16. Describe different types of data.
17. Differentiate visual and data objects.
18. Explain the space and time limitations in human vision.
19. Write a note on 3D interactive illustrations of data.
20. Write a note on Virtual Reality.   (4 X 3 = 12 Marks)

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. Explain different types of tasks in data visualization.
22. Explain encoding of relations and connections.
23. Describe narratives and gestures for explanation.
24. Explain Norman's action cycle.

(2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

6B17C AIML CLOUD COMPUTING

Time: 3 hours   **Max. Marks: 40**

PART – A

(Short Answer)

Answer **all** questions. Each question carries 1 mark.

1. Define cloud computing.
2. What is full virtualization?
3. Define SOA.
4. What is Big Data?
5. What are the deployment models of cloud?
6. What is SaaS?

(6x1=6 Marks)

PART – B

(Short Essay)

Answer **any six** questions. Each question carries 2 marks.

7. What are the benefits of cloud computing?
8. Write a note on DaaS.
9. What are the Server Types within IaaS solutions?
10. Write a note on desktop virtualization.
11. Compare private and public cloud.
12. Write the role of Open SaaS.
13. What is memory virtualization?
14. Write a note on Security as a Service.

(6x2=12 Marks)

PART – C

(Essay)

Answer **any four** questions. Each question carries 3 marks.

15. What are the Tools and Products available for Virtualization?

16. What are the services offered by cloud?

17. Define and describe SaaS.

18. Describe virtualization in detail.

19. Explain Hadoop.

20. Define and describe IaaS.

(4x3=12 Marks)

PART – D

(Long Essay)

Answer **any two** questions. Each question carries 5 marks.

21. What are the three components of cloud solutions? Explain.

22. What are the different types of virtualization? Explain.

23. What is PaaS? Explain the benefits and disadvantages of PaaS solutions.

24. What are the advantages and disadvantages of cloud-based data storage?

(2x5=10 Marks)

BSc (AI & ML) Degree Regular Examination

6B18 AIML   COMPUTER NETWORKS

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. ISO OSI stands for**……………….**
2. The set of rules a computer must follow on a network is called…………..
3. What is datagram in network communication?
4. Algorithms that change routing decisions based on changes in topology and traffic is called**……….**
5. Write any four application of internet.
6. What is Flow control?

(6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Define Optimality principle.
8. What is meant by congestion?
9. What is Asynchronous data transmission?
10. What are design issues of datalink layer?
11. Compare Analog and Digital signal.
12. What are the components of data communication?
13. What is Flooding?
14. What are design issues of network layer?

(6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. Explain different network topologies.
16. Explain Framing techniques.
17. Explain Dijkstra's shortest path routing algorithm.
18. Explain congestion control algorithms?
19. Explain different classification of Networks.
20. What are the merits computer networks?

(4 X 3 = 12 Marks)

21. List and explain elementary protocols used in DataLink Layer.
22. With a neat diagram explain OSI reference model.
23. Explain TCP/IP layers with neat diagram.
24. Explain Guided media with neat diagram.

(2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

6B19 AIML   NATURAL LANGUAGE PROCESSING

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. What is Natural Language Processing?
2. What is Morphology?
3. What is parsing?
4. What are the applications of N-grams?
5. What is semantic analysis?
6. What is clue-based model?   (6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. What do you mean by ambiguity in NL?
8. What are the rules of word formation?
9. Define Morphemes and give examples.
10. Differentiate between top down parsing and bottom up parsing.
11. What is meant by statistical parsing?
12. Differentiate between lexical semantics and formal semantics.
13. Write a note on text coherence.
14. Explain briefly about discourse processing.

(6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. List various applications of NLP and explain any two applications.
16. Explain types word classes in English NL.
17. Write a note on Unification of feature structures.
18. Write a note on N-Gram language model.
19. Explain the use of CFG in NLP with suitable example.
20. Explain various elements of FOPC.   (4 X 3 = 12 Marks)

21. Explain various stages involved in NLP process with suitable example.
22. Explain various approaches to perform POS tagging.
23. Write FOPC for the following sentences:
    All cats and dogs hate each other
    I arrived in New York.
24. Explain various approaches to semantic analysis and different semantic relationships between the words.

(2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

6B20 AIML   SOFT COMPUTING

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. What is soft computing?
2. Give an example for a fuzzy statement.
3. What are crisp sets?
4. What is membership function?
5. Write an example for a fuzzy rule.
6. Give an example for a GA operator.   (6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Write two advantages of neural networks.
8. What neuro fuzzy hybrid system?
9. What are the properties of fuzzy sets?
10. What are fuzzy if then rules?
11. Write a note on fuzzy controller.
12. What are compound rules?
13. Mention the classification of genetic algorithm.
14. Give two applications of genetic algorithm.   (6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. What is the role of hybrid systems?
16. What are the tools for soft computing?
17. Explain inference in fuzzy logic.
18. Explain fuzzy to crisp conversion.
19. Write a note on fuzzy expert systems.
20. Discuss various operations in GA.   (4 X 3 = 12 Marks)

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. Describe the application scope of neural networks.
22. Explain fuzzification and defuzzification.
23. Describe different types of fuzzy reasoning.
24. Explain various genetic representations.   (2 X 5 = 10 Marks)

Complementary Elective I (Mathematics)

BSc (AI & ML) Degree Regular Examination

IC01MAT – AIML Differentiation and Matrix Theory

Time: 3 Hours   Max. Marks: 40

Part A (Short Answer)

Answer all questions   (6 x 1 = 6)

1. Define equivalence relation
2. Find the derivative of $y = 5x^4 - 3x^2 + 1$
3. State Rouche's Theorem.
4. State Leibnitz's theorem for n^{th} derivatives
5. Find the derivative of $\sqrt{\sec(2x + 3)}$
6. Define one-one and onto functions.

Part B (Short Essay)

Answer any 6 questions   (6 x 2 = 12)

7. Find the nth derivative of $\frac{x}{x^2-1}$
8. Find the nth derivative of sin(ax+b)
9. If $y\sqrt{1-x^2} + x\sqrt{1-y^2} = 1$. Find $\frac{dy}{dx}$
10. Find the rank of the matrix $\begin{bmatrix} 1 & -1 & -1 \\ 1 & 1 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.
11. Find the derivative of $\left(\frac{e^x-1}{e^x+1}\right)$
12. Check whether the function $f(x) = x^2$ is one-one or not.
13. Define a function. Give an example.
14. Explain partially ordered set and give an example.

Part C (Essay)

Answer any 4 questions   (4 x 3 = 12)

15. Solve the following system of equations using Crammer's rule.
    $2x + 3y = 8$
    $4x - y = 5$

16. Use Rouche's theorem to determine the number of solutions of the equations
    $3x - 2y = 6$
    $6x - 4y = 12$

17. Find the nth derivative of $\frac{x}{(x-1)(2x+3)}$ using partial fraction.

18. If $y = \tan^{-1}(\frac{1+x}{1-x})$, Find $\frac{dy}{dx}$.

19. Define composition of functions. If $f(x) = 2x + 3, g(x) = x^2$, find $f \circ g(x)$.

20. Define invertible functions. Determine whether the function is invertible $f(x) = 3x + 1$.

Part D (Long Essay)

Answer any 2 questions   (2x 5 = 10)

21. If $(1-x^2)y_2-xy_1-a^2y=0$, Prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1}-(n^2 + a^2)y_n = 0$

22. Find the inverse of the matrix $\begin{bmatrix} 2 & -2 & 0 \\ 1 & 1 & 3 \\ 3 & 0 & 1 \end{bmatrix}$ using Gauss-Jordan method.

23. Check the consistency of the system and solve.
    $x + 2y - z = 0$
    $x - y - z = 0$
    $2x + y + 3z = 0$

24. Solve the system using Cramer's rule.
    $2x + y - z = 1$
    $x + y + z = 2$
    $2x + y + 3z = 3$

2C02MAT - AIML Integration and Linear Algebra

Time: 3 Hours   Max. Marks: 40

Part A (Short Answer)

Answer all questions   **(6 x 1 = 6)**

1. If $z = x^3 + y^3 - 3axy$ find $\frac{\partial z}{\partial x}$.
2. State Cayley-Hamilton theorem.
3. Define Linear Dependence and Linear Independence
4. State Euler's theorem on homogeneous functions
5. Define vector space and give an example
6. Define eigen values and eigen vectors.

Part B (Short Essay)

Answer any 6 questions   **(6 x 2 = 12)**

7. Find the first order partial derivatives of $z = x^2 y - x \sin xy$

8. What is meant by similarity of matrices.

9. Show that $\int_0^{\frac{\pi}{2}} \cos^7 x \, dx = \frac{16}{35}$

10. Evaluate $\int_0^{\frac{\pi}{2}} \cos^4 x \, dx$

11. Find the eigen values of the matrix $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$

12. Define Basis of a vector space and give an example.
13. Define linear transformation. Give an example of a linear transformation from $\mathbb{R}^2$ to $\mathbb{R}^3$
14. Define a quadratic form. Find the matrix corresponding to the quadratic form
    $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$

Part C (Essay)

Answer any 4 questions   **(4 x 3 = 12)**

15. Find the value of $\lim_{\substack{x \to 1 \\ y \to 2}} \frac{3x^2y}{x^2+2y^2+4}$

16. If $u=sin^{-1}(\frac{x^2+y^2}{x+y})$. Prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$=tan u.

17. Give a set of three vectors in $\mathbb{R}^3$ that are linearly dependent, and justify your answer.

18. Verify Cayley-Hamilton theorem for the matrix $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$, and find the inverse.

19. Find the characteristic equation of the matrix $\begin{bmatrix} 1 & 5 \\ -1 & 4 \end{bmatrix}$

20. If $y = tan^{-1}(\frac{1+x}{1-x})$, Find $\frac{dy}{dx}$

Part D (Long Essay)

Answer any 2 questions   **(2x 5 = 10)**

21. Find the characteristic equation of the matrix A = $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ Andhence compute A^{-1} using Cayley- Hamilton

    theorem. Also express $A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$ as a   linear polynomials in A.

22. Find the characteristic equation of the matrix $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ .And hence compute $A-1$ using Cayley-
    Hamilton theorem

23. Evaluate $\int sin^2xcos^4x \, dx$

24. Evaluate $\int \frac{x^2+x+1}{(x+1)^2(x+2)} \, dx$.

3C03MAT – AIML **Differential Equations and Fourier Series**

Time: 3 Hours   Max. Marks: 40

Part A (Short Answer)

Answer all questions   **(6 x 1 = 6)**

1. Determine the order and degree of the differential equation $x\frac{dy}{dx} + 3x + y = 0$
2. Solve $y' = ky$
3. Define Bernoulli Equation
4. When do we say a second order ODE is linear?
5. Write the characteristic equation of $y'' + 3y' - 4y = 0$.
6. Define an even function and odd function in the context of Fourier series

Part B (Short Essay)

Answer any 6 questions   **(6 x 2 = 12)**

7. Solve $\frac{dy}{dx} + 2xy = 0$
8. Verify that the functions $y = e^{3x}$, $y = e^{-2x}$ are solution of the homogenous linear differential equation $y'' - y' - 6y = 0$
9. Find the Fourier series of f given by $f(x) = x, where \ -\pi < x < \pi \ and$
10. $f(x) = f(x + 2\pi) \ \forall \ x \in \mathbb{R}$
11. Find the general solution of $y' = (y - x)^2$
12. Check whether the equation $\cos(x + y)\,dx + (y^2 + 2y + \cos(x + y))\,dy = 0$ is exact or not.
13. Apply the given operator to the given function (D+5I)(D-I)(e^{5x}).

14. Find the Wronskian of $e^x \ and \ xe^x$

Part C (Essay)

Answer any 4 questions   **(4 x 3 = 12)**

14. Test for exactness and solve $(y - 1)dx + (x - 3)dy = 0$.
15. Find the solution of the initial value problem $y'' - 2y' + y = 0, \quad y(0) = 1, \ y'(0) = 2$
16. Express the function   f(x) = x^2 ,when $-\pi < x < \pi$ as a Fourier series with period 2π.
17. Solve $y' = -2xy$, $y(0) = 2$.
18. solve $x^2D^2 + xD - y = 0$
19. Solve $y'' + 5y' + 6y = e^{-3x}$.

Part D (Long Essay)

Answer any 2 questions   **(2x 5 = 10)**

20. Make the following equation exact and hence solve $ydx + (x^2y - x)dy = 0$

21. Find the Fourier series of the function
$$f(x) = \begin{cases} 0 & when \quad -2 < x < -1 \\ k & when \quad -1 < x < 1 \\ 0 & when \quad 1 < x < 2 \end{cases} \qquad \text{with period 4}$$

22. Solve $(x^2 + 1)\frac{dy}{dx} + 2xy = x^2$.

23. Find the general solution of $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$.

4C04MAT – AIML Linear Programming and Game Theory

Time: 3 Hours   Max. Marks: 40

Part A (Short Answer)

Answer all questions   **(6 x 1 = 6)**

1. Define the transportation problem in linear programming.
2. What is a saddle point in game theory?
3. Define the term feasible solution of a linear programming problem.
4. What is an unbalanced transportation problem?
5. Define slack variable in a linear programming problem.
6. Explain two-person zero-sum game.

Part B (Short Essay)

Answer any 6 questions   **(6 x 2 = 12)**

7. Define pure strategy and mixed strategy for a game.
8. Explain the concept of sequencing 'n' jobs through '2' machines.
9. Obtain an initial basic feasible solution to the following transportation problem using the north-west corner rule.

	D_1	D_2	D_3	D_4	Availability
O_1	5	3	6	2	19
O_2	4	7	9	1	37
O_3	3	4	7	5	34
Demand	16	18	31	25	

10. How is the dominance property used in solving games?
11. State the general LPP in the canonical form.
12. Explain loops in transportation problems.
13. Explain the dominance property in game theory.
14. Explain the characteristics of a standard linear programming problem

Part C (Essay)

Answer any 4 questions   **(4 x 3 = 12)**

15.   Find an initial basic feasible solution to the following transportation problem.

	I	II	III	IV	V	Availability
A	20	28	32	55	70	50
B	48	36	40	44	25	100
C	35	55	22	45	48	150
Requirement	100	70	50	40	40	

16. Consider the 2×2 game: $\begin{pmatrix} 4 & 7 \\ 6 & 5 \end{pmatrix}$
    a) Does it have a saddle point?
    b) Determine the frequency of optimum strategies by matrix oddment method and find the value of the game.

17. Solve the following linear programming problem graphically.
    Minimize $z = 4x_1 + 2x_2$ subject to the constraints
    $$x_1 + 2x_2 \geq 2$$
    $$3x_1 + x_2 \geq 3$$
    $$4x_1 + 3x_2 \geq 6$$
    $$x_1 \geq 0, x_2 \geq 0$$

18. Write the optimum sequence algorithm for processing *n* jobs through two machines.

19. Write a short note on maintenance crew scheduling.

20. Explain the Maximin-Minimax principle in game theory.

Part D (Long Essay)

Answer any 2 questions   **(2x 5 = 10)**

21. Solve the following 2×3 game graphically.

         Player B

   Player A$\begin{pmatrix} 1 & 3 & 11 \\ 8 & 5 & 2 \end{pmatrix}$

22. Briefly explain the MODI method used in solving transportation problems.

23. Determine the optimal sequence of jobs that minimizes the total elapsed time based on the following information processing time on machines is given in hours and passing is not allowed:

Jobs	A	B	C	D	E	F	G
Machine M_1	3	8	7	4	9	8	7
Machine M_2	4	3	2	5	1	4	3
Machine M_3	6	7	5	11	5	6	12

24. Solve the following LPP by Simplex method:

Maximize Z= $x_1 + x_2$

Subject to $2x_1 + x_2 \geq 4$

$\qquad x_1 + 7x_2 \geq 0, x_1, x_2 \geq 0$

Complementary Elective II (Statistics)

BSc (AI & ML) Degree Regular Examination

1C01STA – AIML: Descriptive Statistics

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. What is the difference between primary data and secondary data?
2. What type of diagram is used to represent categorical data?
3. Define kurtosis.
4. Write down the equation for finding the correlation in the case of equal ranks
5. Write a short note on Quartiles.
6. Define sampling units.

(6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Define sampling and non-sampling errors

8. Explain relative measures of dispersion
9. Calculate the harmonic mean of the following data
   12, 10, 8, 13, 18, 15, 9, 17, 20
10. Write merits and demerits of geometric mean.
11. Find the average speed of an object moving along 4 sides of a square at speed 200,300,400 and 500km/hr?
12. Give any measures of skewness. Also give its formula
13. Write a short note on Quartiles, Percentiles and Deciles.
14. Calculate standard deviation for the following data.

Class :	0-10	10-20	20-30	30-40	40-50
Freq:	30	12	5	11	7

(6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. For any two positive numbers x and y ;   AM ≥ GM ≥ HM

16. Explain simple random sampling and systematic random sampling.

17. What is mean by cumulative frequency curve. How can it be used to obtain media.
18. Compute Q1 and Q3 from the following data.

    X: 5   20   24   29   35
    F : 2   3   4   3   5

19. Calculate geometric mean for the following data.

Class	0-10	10-20	20-30	30-40
Frequency	10	5	8	3

20. Represent the following data by a histogram

Mark in English	0-10	10-20	20-30	30-40	40-50
No. of students	3	20	20	15	6

(4 X 3 = 12 Marks)

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. Describe censes and sample. Specify their merits and demerits
22. Find the mean, median and mode for the following data.

Class	0-20	20-40	40-60	60-80	80-100	100-120	120-140
Frequency	6	8	10	12	6	5	3

23. The following table shows the numbers of hours spent by a child on different events on a working day. Represent the data on a pie chart.

Activity	School	Sleep	Playing	Study	TV	Others
No. of Hours	6	8	2	4	1	3

24. Explain the following sampling schemes. Give the situations where they are used.
    i)   Simple random sampling
    ii)   Systematic sampling
    iii)   Stratified sampling

(2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

2C02STA – AIML Statistical Methods

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. Define Index Number
2. Define Scatter diagram
3. Define time series
4. What do you mean by vital statistics
5. What do you mean by regression
6. The correlation between two variables is zero. How will you interpret it?

(6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. The lines of regression concerning x and y are y = 32 – x and x = 13 – 0.25y. Obtain their means.
8. Calculate Karl Pearson's Correlation coefficient for the following data and interpret its values.

Marks (English)	: 48 35 17 23 47
Marks (Maths)	: 45 20 40 25 45

9. What are the components of time series
10. Write merits and demerits of scatter diagram
11. Write down any two limitations of index numbers
12. Obtain Fisher's index number
13. Explain time reversal test of index number
14. Why there are two regression lines?

(6 X 2 = 12 Marks)

(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. What is the effect of change of scale on correlation coefficient?
16. The equations of two regression lines obtained are 25x-6y-7=0 and 9x-4y+15=0
    i.   Identify the regression lines
    ii.   Obtain the mean of x and mean of y
    iii. Find r_{xy}
17. From the following data, calculate the rank correlation coefficient

A	60	34	40	50	45	41	22	43	42	66	64	46
B	75	32	34	40	45	33	12	30	36	72	41	57

18. What do you mean by cost of living index number? What are its uses?
19. Explain moving average method for measuring trend of a time series
20. Explain the importance of time series analysis

(4 X 3 = 12 Marks)

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. Obtain the trend values for 3 year moving average for the following data.

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Profit	40	42	40	48	52	49	50	54	55	52

22. Calculate Laspeyer's and Paasche's price index number for the following data:

Commodity	Price in base year	Price in current year	Quantity in base year	Quantity in current year
A	0.80	0.70	10	11
B	0.85	0.90	8	9
C	1.30	0.80	5	5.5

23. Illustrate with the help of an example to calculate 7 years moving average by taking your own artificial data from 2006 and 2022
24. From the following data obtain the two regression equation.

X	6	2	10	4	8
Y	9	11	5	8	7

(2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

3C03STA – AIML Probability and Distribution Theory

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. Give the frequency definition of probability.
2. What do you mean by a random experiment.
3. Define statistic
4. Write the pdf of Normal distribution.
5. What do you mean by sample space?
6. Define independence of events.

(6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. Write any four properties of normal distribution
8. Write down the properties of Probability Density Function.
9. Write a short note on Expectation of a random variable
10. Distinguish between continuous and discrete random variables with the suitable examples
11. If P(A)=3/5, P(B)=3/10, P(AB)=1/5 . Are A and B are independent event?
12. Write the limitations of classical definition of probability.
13. Write the pdf of t and F distribution
14. Obtain the mean of Poisson distribution.
    (6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. If two events are independent, show that their compliments are also independent.
16. State and prove multiplication theorem for probability.
17. Define mathematical expectation of a random variable. Show that E(cX) = cE(X) where c is a real constant
18. A, B, C are any three arbitrary events such that P(A) = P(B) = P(C) = 0.25, P(A∩B) = P(B∩C) = 0 and P(C∩A) = 0.125. Find the probability that at least one of the event in AB and C occurs.
19. Explain the relationship between χ^2, t and F distribution
20. Using axiomatic approach prove that P(A^c) = 1 – P(A).

(4 X 3 = 12 Marks)

21.
    i)   State and prove Baye's theorem.
    ii)   Show that if A and B are independent events A^c and B^c are independent events.

22. A, B and C are three arbitrary events. Find expression for the event noted below, in the context of A, B and C.
    i)   Only A occurs
    ii)   Both A and B, but not C occurs
    iii)   All three events occurs
    iv)   At least one occurs
    v)   At least two occurs

23. Derive Poisson distribution as a limiting case of binomial distribution.

24. Derive the distribution of sample mean.

(2 X 5 = 10 Marks)

BSc (AI & ML) Degree Regular Examination

4C04STA– AIML Inferential Statistics

Time: 3 Hours   Max. Marks: 40

PART – A
(Short Answer)
Answer All questions. Each question carries 1 mark.

1. Define convergence in distribution
2. Define a consistent estimator
3. What do you mean by confidence interval estimation?
4. Define a null hypothesis
5. What do you mean by critical region in testing procedure?
6. Define the term ANOVA
         (6 X 1 = 6 Marks)

PART – B
(Short Essay)
Answer **any six** questions. Each question carries 2 marks.

7. State Weak Law of large numbers.
8. Obtain the two types of errors associate with statistical hypothesis.
9. Distinguish between one-tail and two tailed tests
10. State Weak Law of large numbers.
11. Differentiate between simple and composite hypothesis
12. What is paired t-test ? Give an example
13. Define efficiency of an estimator. Give example
14. Explain the technique of one-way classified ANOVA

                                                                       (6 X 2 = 12 Marks)

PART – C
(Essay)
Answer **any four** questions. Each question carries 3 marks.

15. State central limit theorem for iid random variable.
16. Explain goodness of fit
17. State Neymann Pearson lemma
18. What are the assumptions of one way ANOVA
19. A coin is tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased.
20. Obtain the 95% confidence interval for the difference of the mean of two population.

                                                                       (4 X 3 = 12 Marks)

PART – D
(Long Essay)
Answer **any two** questions. Each question carries 5 marks.

21. State Chebychev's inequality and write about its applications
22. Explain the two methods of estimation .
23. If $Y \geq 1$ is the critical region for testing $H_0: \theta=2$ against $H_1: \theta=1$ on the basis of single observation from a population $F(Y,\theta)= \theta e^{-\theta y}$, $Y \geq 0$. Obtain probabilities of type 1 and type 2 error.
24. The 3 samples below have obtained from normal population with equal variances. Test the hypothesis that the sample means are equal by using ANOVA

SAMPLE 1	SAMPLE 2	SAMPLE 3
8	7	12
10	5	9
7	10	13
14	9	12
11	9	14

(2 X 5 = 10 Marks)

GENERIC ELECTIVE COURSE

Fifth Semester Degree (CBCSS-OBE- Regular / Supplementary /Improvement) Examination

5D01 AIML Artificial Intelligence And Machine Learning

Time : 2 Hours   Max. Marks: 20

Part A
(Answer All Questions)

1.   What is a state space?
2.   What are heuristics?
3.   What is predicate?
4.   What is knowledge?
5.   What is a neural network?
6.   What is a decision tree?   (6X1=6 Marks)

Part B
(Answer Any Four Questions)

7.   What is a production system?
8.   Write a note on constraint satisfaction?
9.   Differentiate forward and backward reasoning.
10.   What is an expert system?
11.   What is a back propagation network?
12.   Write a note on time series prediction.   (4X2=8 Marks)

Part C
(Answer Any One Question)

13.   Describe the architecture of expert systems.
14.   Describe the architecture of Convolution Neural Networks.

                                                                        (1X6=6 Marks)

Fifth Semester Degree (CBCSS-OBE- Regular / Supplementary /Improvement) Examination

5D02 AIML Data Mining

Time : 2 Hours   Max. Marks: 20

Part A
(Answer All Questions)

1.   What is data mining?
2.   Give an application area of mining.
3.   What is an association rule?
4.   What is a cluster?
5.   What is a decision tree?
6.   What is temporal mining?   (6X1=6 Marks)

Part B
(Answer Any Four Questions)

7.   Differentiate DBMS and DM.
8.   Write a note on apriori algorithm.
9.   Explain dynamic item set counting.
10.   Write a note on CLARANS.
11.   What is Web content mining?
12.   Write a note on text clustering.   (4X2=8 Marks)

Part C
(Answer Any One Question)

13.   Explain methods to discover association rules.
14.   Explain Web Mining.   (1X6=6 Marks)

Fifth Semester Degree (CBCSS-OBE- Regular / Supplementary /Improvement) Examination

5D03 AIML: Programming in Python

Time : 2 Hours   Max. Marks: 20

Part A
(Answer All Questions)

1.   What is a variable?
2.   What are comments?
3.   What is run time error?
4.   What are function arguments?
5.   What is an array?
6.   What is splitting?   (6X1=6 Marks)

Part B
(Answer Any Four Questions)

7.   List the features of Python.
8.   Differentiate break and continue statements.
9.   Write a note on recursion.
10.   Write a note on Dictionaries.
11.   Explain exception handling.
12.   Describe various operations on arrays.   (4X2=8 Marks)

Part C
(Answer Any One Question)

13.   Describe various operators in Python.
14.   Explain the file handling in Python.   (1X6=6 Marks)