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Roll No. ..... Total Pages : 2

44217

BT-4/M-26

BAYESIAN DATA ANALYSIS

Paper–BS-AIDS-202A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting exactly at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Describe the Bayesian framework and explain three steps of bayesian data analysis in detail.

   (b) Derive and explain Bayes' Law. Discuss its role in statistical inference with suitable examples. 7+8

2. Explain Bayesian networks. Also discuss hierarchical models and non-parametric Bayesian models with examples. 15

UNIT–II

3. (a) What is posterior predictive checking and discuss its importance in Bayesian data analysis.

   (b) Explain Bayes factors and their role in model comparison. 7+8

4. (a) Describe graphical posterior predictive checks with simple explanation.

   (b) Explain Bayesian decision theory with suitable examples. 7+8

UNIT–III

5. (a) What do you understand by Marcov chain simulation? Discuss.

   (b) Explain Gibbs sampling and its use in Bayesian computation. 7+8

6. (a) What is Hamiltonian Monte Carlo algorithm? Discuss NO U TURN sampler?

   (b) Differentiates numerical integration and distributional approximations in bayesian analysis. 7+8

UNIT–IV

7. (a) Describe the goals of regression analysis in Bayesian statistics.

   (b) Explain the concept of weekly informative priors in logistic regression. 7+8

8. (a) Describe generalized linear models (GLMs) in Bayesian framework.

   (b) Elaborate on the role of Dirichlet process models in Bayesian data analysis. 7+8

Roll No. ..... Total Pages : 3

BT-4/M-26 **44218**

DATA SCIENCE WITH R PROGRAMMING

Paper–PC-CSE-AIDS-204A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Write about data frame in R. Write about different operations on data frame with appropriate examples.(7)

   (b) Define Command line interface using HDFS files and give a brief note on Hadoop-specific file system types and HDFS commands. (8)

2. (a) Write about different functions for probability distribution in R that can be used for statistical data analysis. (7)

   (b) Give a detailed note on features and limitations of R programming and IBM SPSS. (8)

UNIT–II

3. (a) Explain in detail about One Sample T Test and Two Sample T Test with appropriate R code and examples. (7)

   (b) Write an R program to create a vector and to access elements in a vector. Explain about vector operations in R programming. (8)

4. (a) Describe R functions for reading a Matrix and an Array. Illustrate the R functions for manipulating Matrix and Array. (7)

(b) Write short notes on the following :

(i) Data Wrangling.

(ii) Data Frames and Vectors.

(iii) Debugging Tools.

(iv) Packages in R Programming. (2×4=8)

UNIT–III

5. (a) The Students taught by 3 different methods (A, B, C) gave the following performance as marks:

A	19, 9, 12, 16, 7, 1, 11
B	8, 13. 3, 17, 15
C	14, 11, 10, 9, 15,16

Calculate the analysis variance. Write the R code for implementing ANOVA to given data. (7)

(b) What is a Box Plot? Describe the components of a Box Plot. Construct Box Plot for the following data with R code 100, 95, 93, 100, 92, 95, 99, 100, 58, 75, 78, 45, 66, 89, 93. Construct the Box Plot components for the above data. (8)

6. (a) Write about Scatter Plot and Histogram with R examples. Explain its importance in graphical display of statistical data. Give appropriate examples. (7)

(b) How regression can be done in tabular data? What do you mean by the term "Logistic Regression"? Justify with example. (8)

UNIT–IV

7. (a) Implement Linear Regression model for GDP vs Sales in below data. The data represents four-wheeler sales with respective GDP year wise. Also predict the four wheeler sale in the year 2023 if GDP is 7.5. Write R code for implementing Linear Regression and Prediction. (7)

Year	GDP	Sales
2017	6.2	26.3
2018	6.5	26.65
2019	5.48	25.03
2020	6.54	26.01
202 1	7.18	27.9
2022	7.93	30.47

(b) Solve a real-world classification problem using logistic regression and report confusion matrix results. Justify with Example. (8)

8. (a) Derive the SVM optimization problem and explain the concept of margin maximization. (7)

(b) Explain the working of the k-Nearest Neighbour(K-NN) algorithm with a suitable example. (8)

Roll No. ..... Total Pages : 2

BT-4/M-26 **44219**

INTELLIGENT COMMUNICATION SYSTEMS

Paper–ES-CS-AIDS-206A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. Explain the sampling theorem and quantization in detail with diagram. 15

2. Compare ASK, FSK, BPSK in detail. 15

UNIT–II

3. (a) Explain Huffman Encoding with a simple example. 7.5

   (b) Explain Channel coding theorem. 7.5

4. Explain trellis diagram and Viterbi Algorithm in detail. 15

UNIT–III

5. Explain the OSI Reference Model in detail with functions of each layer. 15

6. Discuss Asynchronous Transfer Mode and its features. 15

UNIT–IV

7. Explain the concept and architecture of Intelligent Communication Systems. 15

8. Explain Predicate Logic and Clausal Form in detail. 15

Roll No. ..... Total Pages : 2

BT-4/M-26 **44221**

DATABASE MANAGEMENT SYSTEM

Paper–PC-CS-AIDS-210A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. Explain three tier schema architecture of DBMS with suitable diagram. Also write advantages of DBMS. 15

2. Explain ER diagrams. Draw ER diagram for a hospital. Also explain the concept of extended ER diagrams. 15

UNIT–II

3. Define DDL, DML, DCL. Also write and explain commands of DDL, DML and DCL. 15

4. Differentiate Relational algebra and relational calculus. Explain various operations of relational algebra with suitable example. 15

UNIT–III

5. Define normalization. Explain 3NF with suitable example. Also explain why 3NF is considered best for relational database designs.

6. Define functional dependency. Explain various types of functional dependency in detail. Consider a relation R(A, B, C, D, E) with the following three functional dependencies.

AB ->C ; BC-> D ; C-> E;

The number of superkeys in the relation R is ..... .

15

UNIT–IV

7. Explain concept of transaction processing in detail. Also explain conflict serializability. 15

8. Write short note on :

(a) Deferred Update.

(b) Shadow paging.

(c) Database recovery. 15

Roll No. .....

Total Pages : 2

BT-4/M-26

44222

OPERATING SYSTEM

Paper–PC-CS-AIDS-212A

Time : Three Hours]

[Maximum Marks : 75

Note : Attempt *five* questions by selecting at least *one* question from each unit.

UNIT–I

1. (a) Explain the structure of Operating System and its various types. (8)

   (b) Differentiate between Multiprogramming, Multitasking and Multiprocessing Operating Systems. (7)

2. (a) Explain various services provided by Operating System. (7)

   (b) How System Calls functions affects the operation of an Operating System? Explain with example. (8)

UNIT–II

3. (a) Differentiate between Shortest Job First and Shortest Remaining Time First CPU scheduling Algorithm with example. (7)

   (b) What is Critical Section Problem? How to overcome Critical Section problem? (8)

4. (a) Differentiate between User Thread and Kernel Thread. (8)

   (b) What is PCB (Process Control Block)? What information is associated in PCB? (7)

UNIT–III

5. (a) What is a Safe State? How Banker's algorithm is used in Deadlock Avoidance? (8)

   (b) Differentiate between MFT and MVT. (7)

6. (a) Write a short note on Thrashing. (8)

   (b) What is LRU Page Replacement Algorithm? Find the total number of Page Faults in the given Page reference string with four Frames :

   6, 7, 3, 9, 1, 3, 2, 6, 8, 5, 3, 4, 2, 6, 1. (7)

UNIT–IV

7. (a) What do you mean by Security? What are different Security Threats to a System? (8)

   (b) Differentiate between Buffering and Caching. (7)

8. (a) Why Disk Scheduling is required? Explain SSTF (Shortest Seek Time First) Disk Scheduling. (8)

   (b) Explain various File Access Methods in details. (7)

AIDS 6th/ Library

Roll No. ..... Total Pages : 02

BT-6/M-26 46290

COMPILER DESIGN

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. Discuss the phases of compiler indicating the inputs and outputs of each phase in translating the statement "amount = principle + rate * 36.0". 15

2. Design finite automata for the following regular expression and convert it into equivalent minimized DFA :

   (a + abb)*aba*. 15

Unit II

3. Brief about the bottom up parser. Construct the CLR(1) parsing table for the following grammar. Also show whether it is LALR(1) or not :

   $S \rightarrow AaAb \mid BbBa$

   $A \rightarrow \in$

   $B \rightarrow \in$. 15

4. Create Syntax Directed Translation for the Boolean Expressions. **15**

Unit III

5. Discuss error recovery modes in various phases of compiler. **15**

6. Design a Directed Acyclic Graph for the following code :

```
int a[10], b[10], d, i;
d = 0;
for ( i = 0; i < 10 ;i++) d=d+a[i] * b[i];
```

where each element of an array occupies 4 bytes. **15**

Unit IV

7. What do you understand by machine dependent and machine independent optimization ? Also discuss the principal sources of optimization along with examples. **15**

8. Describe Global Data Flow Analysis and write its algorithm. **15**

Roll No. ..... Total Pages : 05

BT-6/M-26 46291

APPLIED STATISTICAL ANALYSIS FOR AI

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Define Statistics. Discuss its importance and limitations in detail. 7

   (b) Explain the various methods that are used in the collection of primary data, pointing out their merits and demerits. 8

2. (a) Define statistical distance. Name a few multivariate models that are based on statistical distance. 7

   (b) What do you mean by SPSS Statistics ? Difference between Independent and Dependent Variables. Explain with example. 8

Unit II

3. (a) The median and mode of the following wage distribution are known to be Rs. 33.5 and Rs. 34 respectively. Find the values of A, B and C :

Wage (in Rs.)	No. of person
0-10	4
10-20	16
20-30	A
30-40	B
40-50	C
50-60	6
60-70	4

Total number of persons is 23. **7**

(b) What do you mean by Probability Distribution ? Difference between Discrete and Continuous Random Variables. Explain with Example. **8**

4. (a) In a test on 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and S.D of 60 hours. Estimate the number of bulbs likely to burn for (i) more than 2150 hours (ii) less than 1950 hours (iii) more than 1920 hours but less than 2160 hours. **2+2+3=7**

(b) Write Short notes on the following : 4×2=8

(i) Data Transformation

(ii) Random Variables

(iii) Estimator and Estimate

(iv) Discrete Random Variable.

Unit III

5. (a) Explain clearly the procedure generally followed in testing of a hypothesis. Also point out the difference between type-I and type-II errors with help of example. 7

(b) What do you mean by Hypothesis in Statistical Analysis ? Difference between Null and Alternative Hypothesis. Explain with example. 8

6. (a) A sample of 12 students from a school has the following scores in an I.Q. test.

89 87 76 78 79 86 74 83 75 71 76 92

Do this data support that the mean I.Q. mark of the school students is 80 ? Test at 5% level of significance. ($t_{0.05}$ = 2.26 for 11 degree of freedom). 7

(b) A random sample of 10 student's marks in Mathematics and Statistics are given below. Test whether the correlation exists between the marks of two subjects at 5% level of significance. ($t_{0.05}$ = 2.36 for 08 degree of freedom) **8**

Marks in Mathematics	**Marks in Statistics**
68	59
54	68
78	72
75	67
76	72
85	78
54	64
68	58
87	68
75	74

Unit IV

7. (a) The equation of two regression lines obtained in a correlation analysis of 60 observations are $5x - 6y = 24$ and $768x - 1000y = 3708$. If the variance of y is 2, find the variance of x and correlation coefficient of x and y. **7**

(b) What do you mean by Correlation ? Explain Karl Pearson Coefficient Correlation with Example. 8

8. (a) Explain Spearman's Rank Order Correlation with Example. 7

(b) Explain Polynomial Regression Model and Decision Tree with Example. 8

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Roll No. ..... Total Pages : 03

BT-6/M-26 46292

BIG DATA ANALYTICS

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Explain the Map Reduce Algorithm, its architecture and its core phases. Discuss the core components of HDFS ecosystem. 7

   (b) Write a 2-step Map Reduce algorithm to multiply two large matrices. Describe the four layers of Hadoop ecosystem with diagram. 8

2. (a) Define Distributed File System. Explain the evolution of Big Data with suitable examples. Discuss the 5V characteristics of Big Data in detail. 8

   (b) Differentiate between Structured, Semi-structured, and Unstructured data with appropriate examples. Explain the need for Big Data Analytics in modern enterprises. 7

Unit II

3. (a) Discuss Hadoop Ecosystem components such as: HDFS, YARN, Hive, Pig, HBase, Sqoop, Flume. **7**

   (b) What is Apache Spark? Explain its architecture and working. Compare Hadoop MapReduce and Spark. **8**

4. (a) Define Data Serialization. Why is serialization important in Hadoop ? Explain the need for serialization in distributed systems like Hadoop. **7**

   (b) Explain NoSQL databases and their types with examples. Discuss job scheduling mechanisms in Hadoop with examples. **8**

Unit III

5. (a) Explain NameNode, DataNode and Secondary NameNode in HDFS and write its common HDFS Commands, file read and write operations with syntax. **8**

   (b) How SSH and Hadoop configurations work together in a cluster setup, Explain. **7**

6. (a) Explain the MangoDB Architecture in detail. Describe the roles of the JobTracker and TaskTracker. 8

(b) Discuss HBase Architecture including HMaster and RegionServers. Explain how HBase differs from traditional RDBMS and write a note on the Get and Put operations. 7

Unit IV

7. (a) Define YARN (Yet Another Resource Negotiator) is the architectural center of Hadoop 2.x. Explain responsibilities Resource Manager, Node Manager and Application Manager. 8

(b) Describe Hadoop 1.x to 2.x was essentially the "decoupling" of the system to make it more scalable and versatile. 7

8. (a) Describe Data Locality principle, High Availability, Check Pointing in Hadoop. 8

(b) Explain the NameNode failover process. 7

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Roll No. ..... Total Pages : 02

BT-6/M-26 46293

APPLIED MACHINE LEARNING

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Define Machine Learning. Explain its applications in different fields. 8

   (b) Explain inferential statistical analysis in Machine Learning. 7

2. (a) Explain types of data in Machine Learning : structured and unstructured data. 7

   (b) What are basic algebraic machine learning techniques ? 8

Unit II

3. (a) Explain overfitting and methods to avoid it. 7

   (b) Describe Support Vector Machine classification including linear and nonlinear classifiers. 8

4. (a) Discuss Random Forest and ensemble learning methods. 8

(b) Explain pattern recognition accuracy measures. 7

Unit III

5. (a) Explain Principal Component Analysis (PCA) for dimensionality reduction. 7

(b) Discuss linear regression and logistic regression models. 8

6. (a) Explain Fisher's Linear Discriminant and classification techniques. 8

(b) Explain Fuzzy K-Means clustering. 7

Unit IV

7. Discuss Fuzzy Inference Systems and Mamdani model. 15

8. (a) Explain the architecture of Artificial Neural Networks. 8

(b) Discuss the backpropagation learning algorithm in detail. 7

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Roll No. ..... Total Pages : 03

BT-6/M-26 46296

ENTERPRISE RESOURCE PLANNING

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Define Enterprise Resource Planning. Explain the origin and evolution of ERP systems. 8

   (b) Discuss the benefits of ERP systems in modern organizations with suitable examples. 7

2. (a) Explain the conceptual model and structure of ERP systems. 8

   (b) Explain the following ERP-related concepts : 7

   (i) Business Process Reengineering (BPR)

   (ii) Data Warehousing

   (iii) Online Analytical Processing (OLAP).

Unit II

3. (a) Explain the concept of an ERP Marketplace and discuss the changing ERP market trends. 8

   (b) Discuss the functional modules of ERP software used in organizations. 7

4. (a) Explain the concept of ERP integration and discuss its importance in enterprise management. 8

   (b) Discuss the role of ERP in the following applications : 7

   (i) Supply Chain Management (SCM)

   (ii) Customer Relationship Management (CRM).

Unit III

5. (a) Explain the ERP Implementation Life-Cycle with suitable stages. 8

   (b) Discuss the role of consultants, vendors and employees in ERP implementation. 7

6. (a) Explain the role of SDLC and SSAD in ERP system development and implementation. 8

   (b) Discuss Object Oriented Architecture in ERP systems. 7

Unit IV

7. (a) Explain the relationship between ERP and e-Commerce and discuss their importance in modern business organizations. **8**

   (b) Discuss the future directions of ERP systems and their impact on organizations. **7**

8. (a) Explain the critical success factors and failure factors in ERP implementation. **8**

   (b) Discuss the challenges involved in integrating ERP into organizational culture. **7**

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Roll No. ..... Total Pages : 02

BT-6/M-26 46297

SOFT COMPUTING

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Differentiate between Hard Computing and Soft Computing with suitable examples.

   (b) Explain various applications of Soft Computing in different domains. **15**

2. Describe the scope, future trend and advantages of Soft Computing over traditional computing approaches. **15**

Unit II

3. (a) Describe various activation functions used in neural networks.

   (b) Explain the structure and working of a single-layer perceptron. **15**

4. Discuss Adaptive Resonance Theory (ART) and Self-Organizing Maps (SOM). **15**

Unit III

5. Explain fuzzy set theory and differentiate between fuzzy and crisp sets. Discuss fuzzy relations and their properties. **15**

6. Explain fuzzy decision making and fuzzy control systems. **15**

Unit IV

7. Explain various encoding methods used in GA. **15**

8. Explain applications of GA including multi-level optimization and GA-based backpropagation networks. **15**

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AIDS 7th/Library

Roll No. ..... Total Pages : 2

BT-7/M-26 **47393**

BUSINESS INTELLIGENCE AND DATA VISUALIZATION

Paper–HM-CS-AIDS-401A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions by selecting at least *one* question from each Unit.

UNIT–I

1. (a) Assess the impact of BI governance policies on decision-making effectiveness. (8)

(b) Explain with case studies how analytic processing supports predictive and prescriptive analytics compared to transaction processing. (7)

2. (a) Differentiate between successful and failed BI implementation projects. Identify critical success factors. (8)

(b) Discuss the role of analytics in enabling data-driven culture in organizations. (7)

UNIT–II

3. (a) Design a strategy to integrate heterogeneous data sources into a unified data warehouse. (8)

(b) Critically evaluate the trade-offs between top-down and bottom-up approaches to data warehouse development. (7)

4. (a) Explain future trends in data warehousing and their implications on real-time analytics. (8)

(b) Analyze the impact of data security and privacy regulations (e.g., GDPR) on data warehouse administration. (7)

UNIT–III

5. (a) Discuss in depth how stream analytics can transform healthcare applications. (8)

(b) Compare and contrast batch processing and stream processing in big data analytics. (7)

6. (a) Analyze the synergy between Big Data and Data Warehousing in modern enterprises. (8)

(b) Evaluate challenges faced by organizations when adopting big data vendors' solutions. (7)

UNIT–IV

7. (a) Explain how Six Sigma can be applied as a performance measurement system in conjunction with dashboards. (8)

(b) Discuss the design considerations for interactive performance dashboards in large organizations. (7)

8. (a) Critically evaluate the limitations of traditional reporting systems in comparison with visual analytics. (6)

(b) Explain with examples how balanced scorecards help align operational metrics with strategic goals. (9)

AIDS 7th / Library

Roll No. ..... Total Pages : 2

47394

BT-7/M-26

UNIVERSAL HUMAN VALUES-II :
UNDERSTANDING HARMONY

Paper–HSS-403A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions selecting at least *one* from each unit.

UNIT–I

1. Discuss the process of self exploration and one aspect in your life which you have self explored. Discuss natural acceptance and experiential validation in detail. (10+5=15)

2. Discuss in detail the meaning of happiness and prosperity. Discuss the current status of both in today's society. Discuss the methods to achieve both in detail. (6+4+5=15)

UNIT–II

3. Discuss the proposal of co-existence of Self and Body. Differentiate both based on their needs, activities and response in detail. (5+10=15)

4. Discuss the concept of sanyam and health as its natural outcome. Discuss the concept of body as instrument of self in detail. (9+6=15)

UNIT–III

5. Discuss the minimum and complete content of respect. Discuss the feeling of glory, gratitude and reverence in detail. (9+6=15)

6. Differentiate the effort for excellence and effort for competition with suitable examples. Discuss the concept of harmony in society in detail. (6+9=15)

UNIT–IV

7. Discuss the concept of harmony in complete nature. Discuss the steps to reach world family order through right understanding. (10+5=15)

8. Write short note on :
   (a) Existence as coexistence.
   (b) Professional ethics.
   (c) Holistic technologies and production systems.
   (5+5+5=15)

Roll No. ..... Total Pages : 2

47395

BT-7/M-26

CYBER LAW AND ETHICS

Paper–OE-CS-AIDS-401

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions by selecting at least *one* question from each unit.

UNIT–I

1. (a) Discuss the working of courts with help of court hierarchy. 7

(b) Differentiate real approach and consensual approach with example. 8

2. (a) What is DNS? Discuss the legal and technological significance of DNS. 7

(b) Discuss: How Internet can be used as a tool for global access. 8

UNIT–II

3. (a) Discuss the structure of the cyber appellate tribunal. 8

(b) Discuss the working of digital signature? 7

4. (a) What is IT Act 2000? What are its important sections? 8

(b) Define offence. Discuss its various types. 7

299

19/5

UNIT–III

5. (a) Differentiate ADR and ODR with example. 7

   (b) Discuss important sections in Indian evidence Act. 8

6. (a) What is Indian Panel code? Discuss its important section. 8

   (b) Discuss various protection mechanisms used for electronic database. 7

UNIT–IV

7. (a) What are different types of trademark? List any 5 classes of trademark with example. 8

   (b) Explain the architecture of block chain? 7

8. (a) What are the Principles of Ethical AI? Discuss Common ethical challenges in AI. 8

   (b) Discuss the role of cyber ethic in cyber crime. 7

Roll No. ..... Total Pages : 2

BT-7/M-26 **47400**

DATA MINING AND PREDICTIVE MODELLING

Paper–PE-CS-AIDS-417A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) What are the applications of Data Mining in various domains? Explain with examples. (8)

   (b) Describe the different kinds of data that can be mined. (7)

2. Discuss the technologies used in Data Mining. Explain the complete process of Data Mining. (15)

UNIT–II

3. (a) Explain Association Rule Mining using Apriori Algorithm. (8)

   (b) What is Decision Tree Induction? Explain the process in detail. (7)

4. Describe clustering in Data Mining. What are the requirements for cluster analysis? (15)

UNIT–III

5. (a) Explain Neural Networks in detail. How are they used in classification problems? (8)

(b) Explain Decision Trees and their use in classification and regression. (7)

6. Write a detailed note on Support Vector Machine (SVM) and Cox Regression. (15)

UNIT–IV

7. Discuss the importance of model validation. What are the various techniques used for validating a predictive model, and how do they ensure model reliability? (15)

8. Define MetaLevel Modelling. How is it different from traditional modeling techniques, and what are its typical use cases? (15)

Roll No. ..... Total Pages : 2

BT-7/M-26 **47404**

HUMAN AI INTERACTION

Paper–PE-CS-AIDS-425A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Define Human-AI Interaction and explain its importance in modern systems. 7

   (b) Explain prediction and forecasting using AI with examples. 8

2. (a) What are cognitive services? Explain with examples. 7

   (b) Explain visual analysis and natural language processing in qualitative analysis. 8

UNIT–II

3. (a) Explain Machine Learning in Human-AI interaction systems. 8

   (b) What are Recommender Systems? Explain their working. 7

4. (a) Explain problem solving and decision making in humans and machines in detail. 8

   (b) Discuss Augmented AI and methods to cope with human limitations. 7

UNIT–III

5. (a) Explain ethical issues in AI and responsible AI development. 7

   (b) Explain interactive visual analytics and its role in machine learning systems. 8

6. Explain Human-AI ecosystems, markets and co-creation in different domains. 15

UNIT–IV

7. Discuss case studies of AI applications in agriculture and manufacturing. 15

8. (a) Explain AI applications in transportation and finance with examples. 8

   (b) Discuss AI use cases in healthcare and security systems. 7

AIDS 8th/ Library

Roll No. ..... Total Pages : 2

BT–8/M-26 **48400**

REINFORCEMENT LEARNING

Paper–PC–CS–AIDS–402A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. What is Reinforcement learning? Explain different types of Reinforcement learning with suitable examples. 15

2. Discuss the process of Reinforcement learning in detail. 15

UNIT–II

3. What is the difference between Markov reward process and Markov decision process? 15

4. Write short on Bellman optimality equation. 15

UNIT–III

5. What is Q-learning? Explain all variants of Q-learning. 15

6. Compare first visit Monte Carlo with every- visit Monte Carlo. 15

UNIT–IV

7 Discuss Gradient MC and Semi-gradient TD(0) algorithms in detail. 15

8. Discuss all types of function approximation in detail. 15

Roll No. ..... Total Pages : 2

BT–8/M-26 **48401**

ENTREPRENEURSHIP AND START-UPS (FOR AIDS)

Paper–HSS–404A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** questions from each Unit. All questions carry equal marks.

UNIT–I

1. Explain the concept of the Entrepreneurial ecosystem. What are its essential components and how do they interact to promote entrepreneurship?

2. Compare and contrast Entrepreneurship, Intrapreneurship and Social Entrepreneurship, highlighting their distinct roles in modern economies.

UNIT–II

3. Evaluate different approaches to developing Entrepreneurial competencies, Including education, Experiential learning, mentoring and Incubation.

4. Discuss the importance of Risk-taking and Uncertainty management in Entrepreneurship, providing examples from high-growth Industries such as technology or healthcare.

UNIT–III

5. Define and elaborate the concept of a Business model. Why is it crucial for start-ups to develop innovative and sustainable business models?

6. Discuss the process of Creating value propositions using both conventional industry logic and value innovation logic. Provide sectoral examples to illustrate your answer.

UNIT–IV

7. Evaluate the impact of Entrepreneurship development programs (EDPs) and capacity-building initiatives on creating a vibrant start-up culture.

8. Discuss the process through which entrepreneurs can identify and select the most suitable institutional schemes for their ventures, including eligibility and benefits.

Roll No. ..... Total Pages : 2

BT–8/M-26 **48402**

AGILE SOFTWARE ENGINEERING

Paper–OE–CS–AIDS–408

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. (a) Explain the principles of Agile and discuss how Agile differs from traditional software development approaches? 10

   (b) How does Agile help in building quality software? 5

2. Discuss the Agile process methods in detail with suitable examples. 15

UNIT–II

3. (a) Describe how Scrum is applied in Agile project development? 8

   (b) Elaborate the structure and elements of the Agile Manifesto. 7

4. Analyze the role of quality, risk and metrics in Scrum-based Agile project management with suitable case examples. 15

UNIT–III

5. Discuss the importance of Agile Architecture and Feature-Driven Development in Agile Software Engineering. 15

6. Describe the process of Backlog management and its impact on Agile project success. Provide suitable examples. 15

UNIT–IV

7. (a) Discuss the importance of Agile metrics in monitoring project progress. 10

   (b) Write short notes on Configuration management in Agile. 5

8. (a) Explain the Agile approach to risk and the role of Agile configuration management. 8

   (b) What is the Rationale for using Agile Retrospectives? Explain with examples. 7

Roll No. ..... Total Pages : 2

BT–8/M-26 **48403**

APPLICATION OF DATA SCIENCE IN INDUSTRY

Paper–PE–CS–AIDS–416A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. Describe the concept of vector spaces and subspaces with applications in Data analysis. 15

2. Explain the concepts of projections and distance metrics in vector space models. 15

UNIT–II

3. Explain descriptive statistics and discuss the role of mean, variance and covariance in data analysis. 15

4. Describe the process of constructing and interpreting covariance matrices. 15

UNIT–III

5. Explain the typology of Data science problems and Outline a general solution framework. 15

6. Describe the process and importance of subset selection and variable importance assessment in multivariate regression. 15

UNIT–IV

7. Discuss a detailed case study of Walmart supply chain management and its data science applications. 15

8. Discuss real-time analytics techniques and their significance in modern datadriven industries. 15

Roll No. ..... Total Pages : 2

BT–8/M-26 **48404**

NEXT GENERATION DATABASES

Paper–PE–CS–AIDS–426A

Time Allowed : 3 Hours] [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. Explain three database revolutions with examples. 15

2. What is Big data and why is it important? Discuss seven characteristics of Big data. 15

UNIT–II

3. Explain column database with all advantages and disadvantages. 15

4. How do Document databases work? Explain in detail. 15

UNIT–III

5. Discuss XML tools and standards in detail. 15

6. Explain the various tools available in MongoDB. 15

UNIT–IV

7. Write short note on distributed database patterns. 15

8. Compare different types of Data models with advantages and disadvantages. 15