AIDS 4th/ Library

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

BT-4/M-23 **44216**

DATA SCIENCE WITH R PROGRAMMING
PC-CS-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) Explain the various tools used for Data Science. 7

   (b) Explain Bayes' Theorem with suitable example. 8

2. (a) What is Binomial Distribution ? Explain with example. 7

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

   (i) Spark

   (ii) Big Data

   (iii) Business Intelligence

   (iv) Random Variable.

Unit II

3. (a) Explain various Operators in R Programming. 7

   (b) How to deal with Missing Values in R Programming ? Explain with example. 8

4. (a) Write a R script to design a calculator using various functions in R Programming. 7

   (b) How to read various file in R Programming ? Explain with suitable example. 8

Unit III

5. (a) What do you mean by EDA ? How is it implemented in R Programming ? 7

   (b) Explain Hierarchical Clustering with its characteristics. 8

6. (a) Explain various Statistical graph used Central Tendency measurement in R Programming. 7

   (b) What do you mean by Outlier ? Explain the difference between Outlier Detection *vs.* Novelty Detection. 8

Unit IV

7. (a) What do you mean by Logistic Regression ? Explain its implementation in R Programming. 7

(b) What is Naive Bayes Algorithm ? Explain its implementation in R Programming. 8

8. (a) What do you know about Hard Margin SVM and Soft Margin SVM ? Explain with example. 7

(b) Prove that in the Bagging method only about 63% of the total original examples (total training set) appear in any of sampled bootstrap datasets. Provide proper justification. 8

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BT-4/M-23 44217

INTELLIGENT COMMUNICATION SYSTEMS

ES-CS-AIDS-206A

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 is the significance of Nyquist rate in communication ? Discuss sampling theorem and its applications. 7

   (b) Differentiate BPSK and QPSK. 8

2. (a) Explain data modulation. How does it differ from adaptive delete modulation ? 7

   (b) Differentiate TDMA and FDMA. 8

Unit II

3. (a) Compare connection type communication and connectionless type communication with example. 7

(b) Write and explain Vitterbi algorithm. 8

4. (a) Discuss various steps involved in lossless data compression using Huffman code. 8

(b) Explain channel coding theorem with a suitable example. 7

Unit III

5. Explain layered architecture of OSI mode. Differentiate OSI and TCP/IP reference models. 15

6. Differentiate B-ISDN and N-ISDN. Explain the layered architecture and cell structure of ATM. 15

Unit IV

7. (a) Explain the architecture of intelligent communication system. 8

(b) Define production rule. Discuss various applications of production rules in telecommunication. 7

8. Write short notes on the following : $2 \times 7\frac{1}{2} = 15$

(a) Horn set

(b) Herbrand universe theorem.

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BT-4/M-23 44218

INTERNET AND WEB TECHNOLOGY
PC-CS-AIDS-208A

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) Discuss collaboration and communication. How do you create cohesive organization system ? Discuss. 7

   (b) What are the different types of navigation systems ? Discuss designing aspects of elegant navigation system and how do you integrate navigation elements ? 8

2. (a) Elaborate the steps for designing search interface for searching your website. How do you make your search more effective ? 7

   (b) Draw a neat sketch and explore the components of architectural page mock-ups. 8

Unit II

3. (a) How is XHTML better than HTML ? Discuss syntactic difference between XHTML and HTML. Write note on text mark up and images. 7

   (b) What do you understand by HTML tags ? How do you create table and design forms ? 8

4. (a) What are the different levels and style specifications of Cascading Style Sheet (CSS) ? 7

   (b) Discuss CSS list properties, colour properties and conflict resolution. 8

Unit III

5. (a) Write note on object orientation and syntactic characteristics of java script. Explain await keyword and the yield keyword. 7

   (b) How are objects created and modified ? Write example in support to your answer. 8

6. (a) Discuss regular expression in JavaScript. How can it be used for pattern ? Justify your answer. 7

   (b) Write note on functions, constructors and errors in JavaScript. 8

Unit IV

7. (a) Discuss the key features of Python. Write a note on name space, data types and expressions used in Python. 7

(b) What are Dict and List comprehensions in Python ? Differentiate between .py and .pyc files. 8

8. (a) What is the usage of help() and dir() function in Python ? 7

(b) Define class and objects. How do you create class and objects in Python ? 8

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BT-4/M-23 44219

DATABASE MANAGEMENT SYSTEM

PC-CS-AIDS-210A

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) Describe the relationship between the terms database, data models, and schemas. How are data models characterized ?

   (b) Specify the three-level architecture of a DBMS and explain data independence in the context of this architecture.

2. What is the role of an E-R model in database design ? Explain the basic E-R model concepts of entities and their attributes with the help of an example.

Unit II

3. Answer the following with suitable examples :

   (a) What is a primary key in a relation ?

   (b) Discuss the entity integrity and referential integrity constraints.

   (c) Give one example of each of SQL commands for data definition and for retrieving information from a database.

4. What is the role of foreign key in JOIN operation ? Give the illustration of the following relational algebra operations on a database of your choice :

   (a) SELECT

   (b) PROJECT

   (c) DIVISION

   (d) JOIN.

Unit III

5. Design a relation schema that has updation anomalies. Describe 2nd and 3rd normal forms in terms of removing these anomalies.

6. What is functional dependency ? Show how functional dependencies are used to define normal forms for relation schemas.

Unit IV

7. What is Serializability and what are its benefits in the context of transaction processing ? Explain serializability using a suitable example. Also, describe in brief the main types of serializability in DBMS.

8. What problems and failures can occur in the concurrent execution of transactions in a multiuser system ? What is the effect of timestamp ordering on concurrency ? Also, describe how an optimistic concurrency control technique can be used to control concurrency.

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BT-4/M-23 44220

OPERATING SYSTEM

PC-CS-AIDS-212A

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. Enumerate the important functions of Operating Systems. Also, give a classification of operating systems w.r.t. advancements in technology and applications.

2. Give an overview of the Operating system structure along with a brief description of its layered and virtual machine approaches of structure.

Unit II

3. Answer the following questions in brief :

   (a) Distinguish between preemptive and non-preemptive scheduling.

(b) Give a brief description of any one scheduling algorithm of your choice.

(c) What is a thread ? What are its benefits ?

4. Give an overview of the critical section problem and briefly describe the requirements of synchronization mechanisms. Why is there a need for communication between processes ?

Unit III

5. When does a deadlock occur ? Is deadlock prevention different from deadlock avoidance ? Explain any *two* deadlock prevention approaches.

6. Distinguish between the following :

(a) Paging and segmentation

(b) Internal and external fragmentation

(c) Demand paging and page replacement.

Unit IV

7. (a) What is the structure of directories ? Also, describe how indexing is used to access files.

(b) What are the advantages of the Shortest Seek Time First disk scheduling algorithm ? Is it better than the First Come First Served method ? Justify.

8. (a) How is the Direct Memory Access (DMA) concept related to device controllers ? What is 'Interleaving' ?

(b) Describe the issues related to File systems' security and protection.

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BT-4/M-23 44233

BAYESIAN DATA ANALYSIS
BS-AIDS-202A

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) Design a Bayesian Data Analysis framework and discuss the working steps of Bayesian Data Analysis. 10

   (b) What is discrete probability ? Explain with an example. 5

2. Discuss various infinite models, such as hierarchical models and non-parametric models, in detail. 15

Unit II

3. (a) Discuss the role of posterior predictive checking of models in applied Bayesian statistics. 8

   (b) Describe Bayesian decision theory in different contexts. 7

4. (a) Discuss information criteria and cross-validation Model comparison based on predictive performance. 8

(b) Write a short note on hierarchical decision analysis for radon measurement. 7

Unit III

5. (a) What is Markov chain simulation? Explain with an example. 8

(b) What is Gibbs sampling? Give an example in R. 7

6. Discuss the following in detail : 15

(i) Hamiltonian Monte Carlo

(ii) Distributional approximations

(iii) Approximating conditional and marginal posterior densities.

Unit IV

7. (a) Discuss the goals of regression analysis. 7

(b) Explain the logistic regression model in detail. 8

8. Explain nonlinear and nonparametric models such as parametric nonlinear models, Gaussian process models, and Dirichlet process models. 15

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46290

BT-6/M-23

COMPILER DESIGN

Paper : PC-CS-AIDS-302A

Time : Three Hours] [Maximum Marks : 75

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

UNIT–I

1. What are different phases of compiler. Write applications and draw block diagram for these phases. (15)

2. (a) What is difference between finite and non-finite automata. (3)

(b) Write the process of converting a regular expression into an - NFA. Change for (a/b)*a and 00(01+10)*11. (12)

UNIT–II

3. Construct CLR parsing table for the given context free grammar and explain step by step

S-->AA

A-->aA|b. (15)

4. What is LR parser and explain its algorithm. Draw LR parsing table for the following grammar :

$E \rightarrow E + T|T$
$T \rightarrow TF|F$
$F \rightarrow F^*|a|b.$ (15)

UNIT–III

5. (a) What do you mean by sementic error and attribute grammar. (5)

(b) Explain the following allocation in detailed :

(i) Static allocation.

(ii) Stack allocation.

(iii) Heap allocation. (10)

6. Explain Three-Address Code Intermediate code generator and Directed Acyclic Graph. Draw DAG for :

$t_0 = a + b$
$t_1 = t_0 + c$
$d = t_0 + t_1.$ (15)

UNIT–IV

7. What is optimization in compiler design. Explain Peephole optimization, Loop optimization and machine dependent optimization with the help of example. (15)

8. (a) What is error recovery method? Explain Panic mode and statement mode of error recovery methods with the help of example. (10)

(b) Explain heap storage management with the help of example. (5)

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BT–6/M–23 **46291**

APPLIED STATISTICAL ANALYSIS FOR AI

Paper–ES–CS–AIDS–304 A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *five* questions.

1. (a) What is statistics and explain statistics in our everyday life.

(b) Retail stores experience their heaviest returns in December each year. Most are gifts that, for some reason, did not please the recipient. The number of items returned, by a sample of 30 persons at a large discount department store, is observed and the data of the table given below are obtained.

Number of items returned

1	4	3	2	3	4	5	1	2	1
2	5	1	4	2	1	3	2	4	1
2	3	2	3	2	1	4	3	2	5

Determine the frequency distribution. Draw the line diagram and the histogram of the frequency distribution.

2. Explain in detail :

(i) Population.

(ii) Sample.

(iii) Types of sampling.

(iv) Sampling classification.

(v) Graphical representation of data.

3. The monthly rents for 8 one-bedroom apartments located in one area of the city, are :

625 740 805 670 705 740 870 875

(a) Give *two* possible factors that may contribute to variation in the monthly rents.

(b) Calculate the sample variance.

(c) The sample standard deviation.

4. (a) Find the mean and standard deviation of the following :

Series	Frequency
15–20	2
20–25	5
25–30	8
30–35	11
35–40	15
40–45	20
45–50	20
50–55	17
55–60	16
60–65	13
65–70	11
70–75	5

(b) A die is tossed thrice. A success is 'getting 1 or 6' on a toss. Find the mean & variance of the number of successes.

5. (a) A coin was tossed 400 times and the head turned up 216 times. Test the hypothesis that the coin is unbiased.

(b) A normal population has a mean of 6.8 and a standard deviation of 1.5. A sample of 400 members gave a mean of 6.75. Is the difference significant?

6. (a) Samples of sizes 10 and 14 were taken from two normal populations with standard deviations 3.5 and 5.2. The sample means were found to be 20.3 and 18.6. Test whether the means of the two populations are the same at 5% level.

(b) Explain the analysis of variance (ANOVA). Distinguish between one-way and two-way ANOVA techniques.

7. Calculate the co-efficient of correlation and obtain the least square regression line of y on x for the following data :

x	1	2	3	4	5	6	7	8	9
y	9	8	10	12	11	13	14	16	15

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

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

9. The marks secured by recruits in the selection test (X) and in the proficiency test (Y) are given below :

Serial No.	1	2	3	4	5	6	7	8	9
X	10	15	12	17	13	16	24	14	22
Y	30	42	45	46	33	34	40	35	39

Calculate the rank correlation coefficient.

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46292

BT-6/M-23

BIG DATA ANALYTICS

Paper : PC-CS-AIDS-306A

Time : Three Hours] [Maximum Marks : 75

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

UNIT–I

1. (a) What do you mean by big data? How is it different from traditional data? (7)

(b) Why do we need a big data analytics in the business? What is the role of drivers in big data? Justify with example. (8)

2. (a) What do you understand by Algorithm using Map Reduce? How pig is used for this purpose? Explain. (7)

(b) Write short note on 4 Vs in Big Data and explain the Matrix Vector Multiplication by Map Reduce. (8)

UNIT–II

3. (a) What do you mean by Apache Hadoop Ecosystem? Draw the Architecture of Hadoop. (7)

(b) What are the major configuration parameters required in a Map Reduce program? Justify. (8)

4. (a) Who takes care of replication consistency in a Hadoop cluster and what do under/over replicated blocks mean? Draw the Architecture of Hadoop Cluster. (7)

(b) If you have an input file of 350 MB, how many input splits would HDFS create and what would be the size of each input split? Explain with Diagram. (8)

UNIT–III

5. (a) What is Map reduce programming Model ? Where is it used and why? (7)

(b) Explain Map Reduce Word Count Process. Suppose HDFS Input file is Panipat Institute is affiliated by Kurkshetra University. Draw the diagram (8)

6. (a) Explain the architecture of HDFS. Justify all Daemons of HDFS. (7)

(b) Write short notes :

(i) Mapper.

(ii) Reducer.

(iii) Secondary Name Node.

(iv) Metadata. (2*4=8)

UNIT–IV

7. (a) What is Pig ? Explain architecture of Apache Pig. (7)

(b) What do you mean by the Schedulers in YARN? Draw the Architecture of YARN. (8)

8. (a) Write Five Differences between Hadoop 1.0 and Hadoop 2.0. Explain MRV1 and MRV2 in terms of Hadoop Version. (7)

(b) What is the Flume? Explain the Architecture of Flume. Explain the role of Data Channel in the Flume. Justify. (8)

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46293

BT–6/M-23

APPLIED MACHINE LEARNING

Paper–PC–CS–AIDS–308A

Time : Three Hours] [Maximum Marks : 75

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

UNIT–I

1. Elaborate the concept of machine learning in today's world. Discuss the various examples of applications of machine learning in diverse fields. (5+10=15)

2. Discuss the bayes theorem, naive classifier and bayesian belief network in detail. (15)

UNIT–II

3. Discuss the concept of supervised learning. Explain the concept of bias and variance in detail. Describe the confusion matrix as a parameter to evaluate performance. (5+5+5=15)

4. Discuss the linear and nonlinear regression using support vector machines. (15)

UNIT–III

5. Discuss the fundamental model of k-nearest neighbor (kNN) and principal component analysis in detail. (15)

6. Discuss the concept of classification. Differentiate between classification and regression problem. Discuss linear discriminant analysis (LDA) methods of dimension reduction. (5+3+7=15)

UNIT–IV

7. Discuss the feed forward and recurrent neural networks in detail. (15)

8. Discuss the principle of neuro fuzzy and genetic fuzzy system in detail. (15)

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BT–6/M–23 **46294**

SOFT SKILLS AND INTERPERSONAL COMMUNICATION

Paper–OE–CS–AIDS–302

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all. All questions carry equal marks.

1. 'Silence is also a mode of Communication'. Explain by giving suitable examples. (15)

2. What are the modes of inter-cultural and intra-cultural communication? What are the common barriers in achieving effective inter and intra cultural communication? (15)

3. Assume that you are Avinash Shukla, the Administrative Officer of Auro Consultancy, New Delhi. Write a letter to the Managing Director on the general inefficiency and neglect of duty by some members of the staff. Also suggest some recommendations to overcome the problem for better productivity. (15)

4. You are the DM of the Araria district and have been asked by the Secretary, Home Department, Bihar, to submit a report on the relief work that was under-taken after the devastating flood hit the area. The Ministry sanctioned around 50 crore INR for the relief operations in the district, which was to be spent on free distribution of food, water, medicine, etc. Now prepare an outline of this report. (15)

5. Prepare an outline of a presentation for the Sales Department informing them of the latest reports regarding the sales of the newly launched mobile phone by your company. (15)

6. What measures can be taken up to build strong teams? How can a team leader achieve trustworthiness, openness and transparency among his/her team members? (15)

7. Define leadership. What are the qualities of a successful leader? (15)

8. Write short notes on any *three* :
   (i) Problem solving skills.
   (ii) Interaction within family and interpersonal skills.
   (iii) Significance of self-awareness.
   (iv) Decision making skills. (5×3=15)

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46297

BT–6/M–23

SOFT COMPUTING

Paper–PC–CS–AIDS–310A

Time : 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) Classify the various types of soft computing techniques. (5)

   (b) What do you understand by soft computing? Explain its characteristics. (5)

   (c) Discuss major areas of soft computing. (5)

2. (a) Compare soft computing *vs.* hard computing. (7)

   (b) Explain the architecture of biological neuron. (8)

UNIT–II

3. (a) Explain the architecture of back-propagation neural network. Also explain their training algorithm. (8)

(b) Discuss in detail the various types of activation function used in neural network with aid of mathematical representation and its output. (7)

4. (a) Determine the weights of a single layer perceptron for implementing the AND function. Consider the inputs and targets to be bipolar and $\alpha = 1$. (8)

(b) Explain the training algorithm of Kohonen self organizing feature maps and with a neat diagram. (7)

UNIT–III

5. (a) Consider Two Fuzzy sets A1 = 0.2/x1 + 0.9/x2 and A2 = 0.3/y1 + 0.5y2 + 1/y3. Find the algebraic sum, algebraic product, bounded sum & bounded difference. (8)

(b) Name and explain different Fuzzy Membership Functions with a diagram. (7)

6. (a) Briefly discuss about following :

(i) Measure of Fuzziness.

(ii) Fuzzy Integral. (8)

(b) What is fuzzy logic? How is it different from binary logic? Discuss applications of fuzzy logic. (7)

UNIT–IV

7. (a) Mention four criteria, which you should consider to judge the efficiency of a selection strategy? (8)

(b) Summarize the sequential procedures involved in the cross over and reproduction phase of GA with typical examples. (7)

8. (a) What do you understand by Fitness function? Mention the importance of Fitness function in genetic algorithm. How can Fitness functions be found for any optimization problem? (8)

(b) Compare and Contrast traditional algorithm and Genetic algorithm. (7)
