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BT-4/M-22

44216

DATA SCIENCE R PROGRAMMING

Paper-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) Comment on the evolution of data science along with its life cycle. 7.5
(b) Write short notes on Hadoop and Spark. 7.5

2. (a) Discuss the various measures of central tendency using suitable examples. 7.5
(b) What is normal distribution? How can you find the mean and variance of normal distribution? State its major characteristics. 7.5

UNIT-II

3. (a) What are the various data types in R? Explain using suitable examples. 7.5
(b) Explain various types of loops in R using suitable examples. 7.5

4. (a) Discuss the various functions in R for data wrangling. 7.5

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- (b) How can you perform following in R?
- (i) Handling missing data.
 - (ii) Creating reports.
 - (iii) Reading from CSV files. 7.5

UNIT-III

5. What are the various type of graphs that can be drawn in R? Explain in detail along with each graph purpose and implementation in R using suitable examples. 15
6. How can you perform following in R?
- (i) Outlier detection.
 - (ii) PCA for dimensionality reduction.
 - (iii) Logistic Regression. 15

UNIT-IV

7. What is a Random Forest? Explain its significance along with its implementation in R using suitable examples. 15
8. (a) What is meant by linear regression? How can you implement linear regression in R? Explain in brief. 7.5
- (b) What is CART? How can you implement this model in R? Explain. 7.5
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INTELLIGENT COMMUNICATION SYSTEM

Paper-EC-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 do you understand by multiplexing? What are the differences between Time Division Multiplexing (TDM) and Frequency Division Multiplexing (FDM)? Explain.
(b) What is Nyquist-Shannon sampling theorem? What is quantization theorem? Discuss.
2. (a) What do you understand by ASK and FSK? What are the advantages of FSK over ASK? Discuss.
(b) What are the basic elements of communication system? Discuss.

UNIT-II

- 3 (a) What is Huffman coding? Is it lossy or lossless? Discuss the application of Huffman coding in digital communication.
(b) Write a note on channel coding theorem.

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4. (a) What is the trellis graph? What are its applications? Discuss.
- (b) Differentiate between block codes and convolutional codes. Also explain the use of Hamming code for error detection and correction.

UNIT-III

5. (a) What is OSI reference model? What are the different layers in it? Discuss in brief their functionalities.
 - (b) What is Asynchronous Transfer Mode (ATM)? Discuss the ATM cell format.
6. (a) What is ISDN? What are its advantages? What is the difference between ISDN and B-ISDN? Discuss the architecture of B-ISDN.
 - (b) What is the difference between TCP and UDP protocol? Discuss.

UNIT-IV

7. (a) What is Intelligent Communication System? What are its characteristic features? Discuss.
 - (b) What is a production? What can be the different applications of production rules to telecommunication? Discuss.
8. (a) What is Robinson's resolution principle? Explain using suitable example.
 - (b) What is a clause? Explain the procedure of converting a statement into a set of clauses.

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44218

INTERNET & WEB TECHNOLOGY

Paper – PC-CS-AIDS-208A/ES-SC-SYS-208A/

PC-SC-A-ML-208-A

Time : Three Hours]

[Maximum Marks : 75

Note : Students will be required to attempt *five* questions in all selecting at least *one* question from each Unit-I to Unit-IV. All questions carry equal marks.

UNIT-I

1. (a) Discuss the role of information architect in web engineering. Discuss organizational challenges for managing organizational information.
- (b) What are the different types of navigation systems and its integrated elements? How do you design an elegant navigation system? (8+7=15)
2. (a) Elaborate the steps for designing search interface for searching your web site. How do you search group content?
- (b) Draw a neat sketch and explore the components of high level architecture blueprint. (8+7=15)

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UNIT-II

3. (a) How is XHTML better than HTML? Why would you want to use XHTML? How to create table and design forms?
- (b) What do you understand by HTML tags? How many tags are required to create a web page in HTML5? (8+7=15)
4. (a) What is Box model in Cascading Style Sheet (CSS)? Discuss the limitations and advantages of CSS. Explain different types of selectors in CSS.
- (b) Discuss CSS font properties, alignment of text and conflict resolution. (8+7=15)

UNIT-III

5. (a) Explain the difference between :
- (i) Undefined and not defined in JavaScript.
- (ii) The await keyword and the yield keyword.
- (b) What do you understand by host objects and native objects? How objects are created and modified? (8+7=15)
6. (a) What is regular expression in JavaScript and how it can be used for pattern? Explain with suitable example.
- (b) What is meant by control statements? Discuss different kind of loops with suitable illustration. (8+7=15)

UNIT-IV

7. (a) Why do we use slicing in strings? State any eight built in functions on Strings in Python.
- (b) Give a comparison between lists, tuples, dictionaries and sets. (8+7=15)
8. (a) Discuss int(), float(), str(), float() and complex() type conversion functions with examples.
- (b) What do you mean by an operand and an operator? Illustrate your answer with relevant example. (8+7=15)
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44219

DATA BASE MANAGEMENT SYSTEMS

Paper – PC-CS-AIDS-210A/PC-CS-CYS-206A/

PC-CS-A/M/-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. Describe the main characteristics of the database approach and discuss how it differs from traditional file systems. Also sketch the three-Schema architecture of the DBMS and explain.
2. Answer the following questions in brief :
 - (a) What are the responsibilities of a DBA?
 - (b) Explain the basic E-R model concepts of entities and their attributes with the help of an example.
 - (c) What additional modelling concepts are included in the EER model apart from the ones that already exist in the ER model?

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UNIT-II

3. (a) Define relation, tuples, attributes and domain in the context of Relational Data base management system.
(b) Describe the PROJECT and JOIN operations of Relational Algebra with example.
4. Answer the following questions in brief :
 - (a) Describe Referential Integrity constraints using an appropriate example.
 - (b) Give an example of a query in SQL.
 - (c) How is a view described in SQL?

UNIT-III

5. Discuss insertion, deletion and modification anomalies and describe the normalization process up to third normal form and also including Boyce-codd normal form. Highlight the concept of functional dependency and transitive dependency wherever applicable in the normalization process.
6. (a) What is multi-valued dependency and how is it related to fourth normal form (4NF)?
(b) Define join dependencies and fifth normal form. Why is 5NF also called project-join normal form (PJNF)?

UNIT-IV

7. (a) Describe the properties of transactions that are used to maintain consistency in a database, before and after the transaction.

- (b) Why and how is the concept of serializability of schedules used?
8. Answer any *two* of the following :
- (a) Distinguish between binary locks and two phase locking.
 - (b) Discuss the time stamp ordering protocol for concurrency control.
 - (c) What is a deadlock? How can it be resolved?
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44220

OPERATING SYSTEMS
Paper-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. (a) How do you define an operating system? List out the functions of an operating system.
(b) What is the difference between Time-sharing, Real Time and Distributed operating systems?
2. (a) What are the various operating system structures that can be used to implement it? Describe the architecture of layered structure.
(b) What do system calls deal with? Give a categorization of system calls.

UNIT-II

3. What are the various criteria for comparing CPU scheduling? How will you describe preemptive and non-preemptive scheduling? Explain in brief the scheduling policies under both these categories.

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4. Answer the following questions in brief :
- (a) Describe the series of states in which a process can go.
 - (b) What is inter-process communication?
 - (c) How synchronization is performed using Semaphores?

UNIT-III

5. How do you characterize a deadlock? What are the conditions that must hold for a deadlock? How will you distinguish between deadlock prevention and avoidance?
6. (a) What is virtual memory? Explain the difference between logical and physical addresses. Describe how segmentation is related to virtual memory concept.
- (b) How does paging contribute in the management of memory? Explain demand paging with the help of a suitable example.

UNIT-IV

7. Compare the following :
- (a) Sequential, direct and indexed method for accessing files.
 - (b) FCFS and SSTF for disk scheduling.
8. Give an overview of the type of security threats and their possible consequences. What is the difference between program threats and system threats?

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44233

BAYESIAN DATA ANALYSIS

Paper-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) What is Bayesian Inference? What is the goal of Bayesian Inference? How does it work? Discuss.
(b) Write a note on Bayesian Modelling in data analysis.
2. (a) What is learning? How is it performed using Bayesian Network? Discuss.
(b) What is Dirichlet distribution? Write a note on Dirichlet process.

UNIT-II

3. (a) Differentiate between posterior distribution and posterior predictive distribution.
(b) What is Bayesian prediction? What is a posterior predictive check? Discuss.

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4. (a) What is the difference between personal and institutional decisions? Illustrate.
- (b) What is decision analysis? What are the different phases in it? Discuss.

UNIT-III

5. (a) What do you understand by Markov chain analysis? Discuss.
 - (b) Write the Hamiltonian Monte Carlo algorithm. What is NO U TURN sampler? Discuss.
6. What is Gibbs Sampling? What are its advantages? Discuss its implementation in R.

UNIT-IV

7. What is the use of Bayesian regression? Write a note on Frequentist Ordinary Least Square (OLS) Simple Linear Regression.
 8. What is causal inference? What are the Criteria for Inferring Causality? Discuss the causal inference using regression.
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