B.Tech. 5th Semester (CSE) G-Scheme

Examination, December–2024

PROGRAMMING IN JAVA

Paper-PCC-CSE-309-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions selecting **one** question from each unit and **question no.1 is compulsory.***

1. Write a short note on :

(a) What is an Abstraction? Explain with example. 2.5

(b) How we can define a class in Java? How we can access class members? 2.5

(c) What do you mean by Java Virtual Machine? Explain. 2.5

(d) What is method overloading? 2.5

(e) What are wrapper classes? Explain. 2.5

(f) What are abstract classes and methods? 2.5

Unit-I

2. What is Java Virtual Machine? Explain the relation between JVM, JRE and JDK in detail. 15

3. Explain the Object-Oriented programming structure of Java. What are the major characteristics of JAVA? Explain in detail. 15

Unit-II

4. Explain the following : 15

   (a) Static vs Dynamic class loading

   (b) Argument passing mechanism

5. (a) Describe polymorphism with the help of a program in JAVA. 7.5

   (b) What is Interface? Why multiple inheritance is not possible in JAVA? Explain interface with writing a program in JAVA. 7.5

Unit-III

6. What are Packages? What is the need of packages in JAVA? Also explain some associating classes to Packages. 15

7. (a) How we declare a thread class in java? Explain with example program. 7.5

   (b) Differentiate between AWT and Swing programming with example program. 7.5

Unit-IV

8. Write a short note on following : 15

   (a) Comparable and Comparator Interfaces

   (b) Types of JDBC drivers

9. What is Callable Statement? Write a program in JAVA for creating callable statements. Also explain the difference between stored procedures and functions. 15

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B.Tech. 5th Semester (Artificial Intelligence & Data Science) G-Scheme Examination, December-2024

INTRODUCTION TO R PROGRAMMING

Paper : PCC-ADS-303-G

Time allowed : 3 hours] *[Maximum marks : 75*

***Note :** Attempt **five** questions in total, **first being compulsory** and selecting **one** from each unit.*

1. Explain following : 6×2.5=15

(a) Matrices in R

(b) Bar chart and line plot in R

(c) Data transformation

(d) Functions of GUI in R

(e) List name of five packages in R

(f) Benefits of packages in R

Unit–I

2. (a) Explain the control structures in the context of R with examples. 8

   (b) Discuss different functions used in R programming with examples. 7

3. (a) Write a R program to convert a given list (a1 = list(1,2,3), a2 = list(4,5,6)) to a vector. 8

   (b) Write a R program to find product of vector elements in R. 7

Unit–II

4. (a) Explain various statistical techniques used for data analysis in the context of R programming. 8

   (b) Discuss the role and scope of R programming in data visualization. 7

5. (a) Write a R program to merge two data frames by merging columns. 8

   (b) List and explain the steps of cleaning data in the R programming language. 7

Unit–III

6. List and explain the steps of connecting an application with the database using R programming. 15

7. Discuss different security considerations to be taken while connecting an application to a database. Explain the security evaluation metrics for the sensitive data. 15

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Unit–IV

8. Discuss the commands or tools used to build a package. Explain the importance of versioning in R package development. 15

9. Discuss the steps to install a locally built R package. Explain the significance of building R packages. 15

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B.Tech. (Artificial Intelligence and Data Science)

7th Semester (G-Schme)

Examination, December - 2024

NATURAL LANGUAGE PROCESSING AND SPEECH RECOGNITION

Paper - PCC-ADS-401G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : ***Question No. 1 is compulsory*** *having six parts and each part is of 2.5 marks total of 15 marks and the remaining questions are of 15 marks. And attempt* ***one*** *question from each unit.*

1. Write a short note on the following : 15

(a) Ambiguity in NLP

(b) Applications of machine translation

(c) N-gram language models

(d) Hidden Markov Models in speech recognition

(e) Features structures in context-free grammar

(f) Advantages of probabilistic parsing

Unit - I

2. Explain the significance of regular expressions in NLP. Discuss how finite state automata are used to match patterns in text. 15

3. Describe the process of raw text extraction and tokenization. Explain how terms are extracted from tokens for text processing. 15

Unit - II

4. What is Singular Value Decomposition (SVD)? Explain its application in topic modeling and text analysis. 15

5. Discuss the components of Text-to-Speech (TTS) system. Explain the role of prosody in TTS and how it enhances speech synthesis. 15

Unit - III

6. Describe the architecture of speech recognition systems. Explain how acoustic probabilities are computed to train a speech recognizer. 15

7. What is part-of-speech tagging? Compare stochastic tagging with rule-based tagging. Provide examples of their application. 15

Unit - IV

8. Explain the Earley algorithm for parsing context-free grammars. Discuss its advantages over basic top - down parsers. 15

9. What is probabilistic parsing? Explain its advantages and how it represents meaning and Deep Learning in NLP. 15

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B.Tech. 5th Semester (CSE-AI&ML) G-Scheme

Examination, December-2024

BIG DATA & ANALYTICS

Paper : PCC-DS-306-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : Question No. 1 is compulsory. *Attempt any **five** questions. All questions carry equal marks.*

1. (a) What is the difference between Data mining and Data warehouse?

   (b) Explain different types of Digital Data.

   (c) Why does Big Data use Distributed file systems?

   (d) Write the process of Mongo Import and Mongo Export.

   (e) What is the role of Big Data in Business Intelligence?

   (f) How could you create Arrays in No SQL?

Unit–I

2. What is Big Data? Write its characteristics, applications. Also, focus on the challenges with Big Data.

3. Write and explain the Data Science process steps.

Unit–II

4. What is BASE Concept? Also, explain CAP Theorem.

5. What is Hadoop? Write its Features. By drawing its architecture, write its components and why we use it instead of SQL.

Unit–III

6. What is MapReduce? Name the steps used in MapReducing. Write some usage of MapReduce.

7. What is NoSQL? When should NoSQL be used? Give the types of NoSQL Databases. Write its advantages and disadvantages.

Unit–IV

8. What is Cassandra? Write its features. What is the role of CQLSH? Discuss the CRUD operations.

9. Why do we use Hive? Give its Architecture. Write about HIVE Data Types. Also, explain the function used in it.

B.Tech. (CSE) 5th Semester G-Scheme

Examination, December–2024

COMPUTER NETWORKS

Paper-PCC-CSE-303-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : ***Question No.1 is compulsory.*** *Attempt* ***five*** *questions in total, the* ***first being compulsory*** *and select* ***one*** *from each unit.*

1. (i) What is distributed Processing? How does it relate to Computer Networks? 2.5

(ii) What is Multiplexing? 2.5

(iii) Difference between Physical Addressing and Logical Addressing. 2.5

(iv) What is a repeater?

(v) What is Domain Name space? 2.5

(vi) Describe Ciphers. 2.5

Unit-I

2. What is the OSI Reference Model? Differentiate between OSI and TCP/IP Reference Model. 15

3. Differentiate between : 3×5=15

(a) Half-duplex and full-duplex Transmission

(b) Modulation and Multiplexing

(c) Connectionless and Connection-Oriented Services

Unit-II

4. Explain Network layer functions and services in detail. 15

5. Explain the following : 3×5=15

(a) IPv4 classful and classless addressing

(b) Routers and Gateways

(c) ARP and RARP

Unit-III

6. What is Routing? Explain various routing algorithms in detail. 15

7. Write short note on the following : 2×7.5=15

(a) Transport Layer Functions and Services

(b) Application Layer Functions and Services

Unit-IV

8. Write short note on the following : 3×5=15

(a) ATM

(b) MAN Architecture

(c) QoS Improving Techniques

9. (a) Differeniate between Symmetric key ciphers and Asymmetric key ciphers. 7.5

(b) What is Firewall? Explain the various types of attacks in detail. 7.5

B.Tech. (CSE) 5th Semester

(G-Scheme) Examination, December-2024

MICROPROCESSOR

Paper -ESC-CSE-301-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions in all, selecting **one** question from each unit. **Question No. 1 is compulsory.***

1. Write short notes on the following:

(a) Interrupt

(b) EU

(c) S0, S1 pins of 8085

(d) HLT instruction

(e) 8259

(f) Directives

Unit-I

2. Draw and explain functional block diagram of 8085. 15

3. (a) Write an Assembly Language Program to find the largest number between two 8 bit numbers. 7.5

(b) Compare microprocessor and MPU with the help of diagram. 7.5

Unit-II

4. Explain the Architecture of 8086 microprocessor. 15

5. (a) Explain the concept of physical address computations with the help of suitable example. 7.5

   (b) Discuss various branch related addressing modes of 8086. 7.5

Unit-III

6. (a) Describe various data transfer Instructions of 8086. 7.5

   (b) Explain various shift and rotate Instruction of 8086. 7.5

7. Explain the following Instruction: 15

   (a) AAA

   (b) SBB

   (c) IMUL

   (d) TEST

   (e) SAHF

Unit-IV

8. Explain Direct Memory Access and 8237 DMA controller. 15

9. (a) Explain the working of 8255 clip. 7.5

   (b) Describe 8253 clip in detail. 7.5

B.Tech. 5th Semester (CSE) Examination,

December–2024

FORMAL LANGUAGES & AUTOMATA

Paper–PCC-CSE-305-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : ***Question No. 1 is compulsory.*** *Attempt* ***five*** *questions in total, selecting* ***one*** *question from each section.*

1. (a) Suppose you convert a Mealy machine into Moore machine and after conversion the first output of Moore machine (output of start state) becomes 1. Is it acceptable ? If yes, justify how it is correct. If no, then what you will do to correct the corresponding Moore machine ?

(b) Design a finite automata to accept the language L = {aa, aaab, aabaa, aabb, ...}, here aa is taken as a substring.

(c) Draw the FA for regular expression $(a^* + b^*)^*$.

(d) Write the left most and right most derivation for given CFG and generate the string abbbb.

$S \rightarrow aBC$

$B \rightarrow bCb$

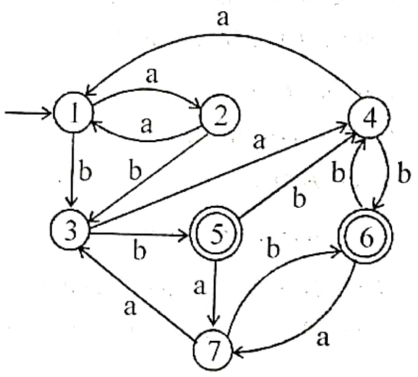
$C \rightarrow B \in$

(e) Design PDA (transition diagram only, no need to write explanation) to accept the language L = {aba, aabbbaa, aaabaaa, aaaabbaaaa, ...}

(f) Compare the heads of FA, PDA and Turing Machine (in tabular form only). Write atleast two comparisons. 6×2.5=15

Section–A

2. (a) Minimize the given Automata (by using equivalence method only i.e. π0, π1, π2 method). 8



(b) Design a Turing machine (transition diagram and table both) to increment decimal integer by 1. 3

(c) Design a Turing machine and perform the trace of machine (computation of strings) on given two strings which are "abba and ababa". 8

B.Tech. (CSE) 5th Semester G-Scheme

Examination, December–2024

DESIGN & ANALYSIS OF ALGORITHMS

Paper-PCC-CSE-307-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt **five** questions selecting **one** question from each section and **Question No. 1 is compulsory.***

1. (a) Explain Space and Time complexity briefly.

(b) Explain Bubble sort with example.

(c) Briefly explain Stack and its operations.

(d) Discuss the Queue and its operations.

(e) Sets and Disjoint Set Union

(f) Write the algorithm for linear search tree with the help of example.

15

Section-A

2. Explain the Asymptotic Notation (Big OH, Omega and Theta) and best, average and worst-case behavior in detail. 15

3. (a) Discuss Strassen's Matrix Multiplication algorithm with the help of example. 8

(b) Discuss the merge sort algorithm and Compare its time complexity with selection sort. 7

Section-B

4. (a) Solve the below problem of Job Sequencing with Deadlines: n=4, (p1,p2,p3,p4) = (100,10,15,27) and (d1,d2,d3,d4) = (2,1,2,1) 8

(b) What is minimum spanning tree? Explain Prim's and Kruskal's Algorithm in details. 7

5. (a) Define 0/1 Knapsack problem and solve using Dynamic programming method. 8

(b) Explain Travelling Salesperson problem using dynamic programming with the help of example. 7

Section-C

6. (a) Give an algorithm for graph coloring problem using Backtracking with example. 8

(b) Explain the 0/1 knapsack problem using branch & bound method taking suitable example. 7

7. (a) Explain Branch & Bound strategy to solve travelling salesperson problem for any graph. 8

(b) Write a short note on following : 7

(i) Hamiltonian Cycles

(ii) 8 Queen's problem

Section-D

8. (a) What is NP Hard and NP Complete Problems? Briefly explain. 8

(b) State and explain cook's theorem. 7

9. (a) Define the classes problem P, NP and NP Complete. How are they related to each other? Explain. 8

(b) What is NP hard graph and NP scheduling problems? Explain briefly. 7

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B.Tech. 5th Semester (Artificial Intelligence & Data Science) G-Scheme Examination, December-2024

INFORMATION RETRIEVAL

Paper : PCC-ADS-301-G

Time allowed : 3 hours] *[Maximum marks : 75*

Note : *Attempt* ***five*** *questions in total,* ***first being compulsory*** *and selecting* ***one*** *from each unit.*

1. Explain following : 6×2.5=15

(a) Define cosine similarity.

(b) What is stemming in information retrieval?

(c) What is recall in evaluation of information retrieval?

(d) What are markup languages in text representation?

(e) What are metacrawlers?

(f) What is ontology?

Unit–I

2. Define and explain various text-similarity metrics in the context of information retrieval with suitable examples. 15

3. (a) Explain the concept of ranked retrieval in information retrieval systems with examples. 8

   (b) Differentiate between the Boolean and vector-space retrieval models in information retrieval. 7

Unit–II

4. (a) Define tokenization. Explain the importance of tokenization in text processing. 8

   (b) Define sparse vectors. Discuss their significance in information retrieval. 7

5. Explain the concept and applications of inverted indices in information retrieval with examples. 15

Unit–III

6. (a) Discuss the concepts of relevance feedback and query expansion in information retrieval. 8

   (b) List and explain different query languages with their strengths and limitations in the context of information retrieval. 7

7. (a) Discuss the role of the Porter Stemmer and morphology in text representation. 8

   (b) Define web linking. Explain the use of thesauri in information retrieval with examples. 7

Unit–IV

8. (a) Explain Dexter model and its key features in the context of hypermedia architectures. 8

   (b) Explain the process of spidering and metacrawlers in the context of web search. 7

9. (a) Explain the concepts of browsing, navigation and orientation in the context of hypermedia. 8

(b) Discuss the role of XML, ontologies, and the semantic web in information extraction and integration. 7