



MALLA REDDY UNIVERSITY

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Question Bank of Data Science COMPILER DESIGN- MR20-1CS0112

Unit I

1. a) Define the Finite Automata Model.
b) Differentiate DFA and NFA.
2. a) Define DFA in detail with an example.
b) Write a regular expression to denote a language L over Σ^* , where $\Sigma = \{a, b\}$ such that the third character from right end of the string is always a .
3. a) Define Context Free grammar and construct CFG for the regular expression $(0+1)^*$.
b) Optimize the CFG given below by reducing the grammar. S is a start symbol.
$$S \rightarrow A \mid 0C1$$
$$A \rightarrow B \mid 01 \mid 10$$
$$C \rightarrow \epsilon \mid CD$$
4. a) Define Derivation Tree and explain types of Derivation with examples.
b) Check whether the given grammar is ambiguous or not.
$$S \rightarrow iCtS$$
$$S \rightarrow iCtSeS$$
$$S \rightarrow a$$
$$S \rightarrow b$$
5. a) Convert the given grammar to Chomsky Normal Form-
$$S \rightarrow aaaaS$$
$$S \rightarrow aaaa$$

b) Define GNF. Explain two Lemmas with examples.

Unit-II

1. a) Define Compiler.
b) List out the differences between Compiler and Interpreter.
2. a) Explain the Phases of Compiler with a neat Diagram and an example.
3. Explain Boot Strapping with an example.
4. a) Explain the role and functions of Lexical Analyzer with a block diagram.
b) Explain the structure of LEX.
5. a) Define Lexeme, Token, Pattern with an example.
b) Discuss about Symbol Table and Error Handling.

Unit – III

1. What is Recursive descent Parser? Construct a recursive descent parser for the grammar $G: E \rightarrow E+T \mid T, E \rightarrow T^*F \mid F, F \rightarrow id$
2. Show that the following grammar is LL(1).
$$E \rightarrow TE^|$$
$$E^| \rightarrow +T E^| \mid \epsilon$$
$$T \rightarrow FT^|$$
$$T^| \rightarrow *FT^| \mid \epsilon$$
$$F \rightarrow (E) \mid id$$
3. Construct SLR parsing table for the grammar
 $G: E \rightarrow E+T \mid T, T \rightarrow T^*F \mid F, F \rightarrow (E) \mid id.$
Also parse the input string $id*id+id$.
4. Show that the following grammar is LALR(1).
$$S \rightarrow CC$$
$$C \rightarrow aC \mid d$$

Also parse the input $aadd$.
5. Construct CLR parsing table for the following grammar.
$$S \rightarrow CC$$
$$C \rightarrow aC \mid d$$

Also parse the input $aadd$.

Unit – IV

1. Explain different intermediate code forms in detail with examples.
2. Construct the expression: $a = b * - c + b * - c$ in the below listed forms.
 - i. Quadruples
 - ii. Triples
 - iii. Indirect Triples
3. a) Construct SDD for Simple desk calculator for the expression $2+3*4$.
b) Construct SDT to convert the expression $2+3*4$ from infix to postfix.
4. Discuss the translation of Boolean expressions and Flow of Control statements into Three Address Code.
5. a) Distinguish between synthesized attributes and inherited attributes.
b) Distinguish between S-attributed and L-attributed SDT.

Unit – V

1. a) Explain the role of code Optimizer in compiler.
b) Explain the rules for constructing Basic blocks and flow graphs with example.
2. Illustrate Principal Sources of Code Optimization with examples.
3. Illustrate loop optimization with suitable examples.
4. Explain the role of DAG in optimization with suitable examples.
5. Explain in detail about various peephole optimizations with suitable examples.

PROFESSIONAL ELECTIVE (PE-6)

Information Security MR20-1CS0429

Unit-1

1. Define Security attack. List and explain the types of Security attacks.
2. Explain about Security Mechanisms and Security Services.
3. With a neat diagram explain the model for network security.
4. Construct a Caesar cipher and convert plain text “pay more money” into cipher text with key $k=3$.
5. Implement play fair cipher to encrypt the message using the key "playfair " and plain text is “Hellothere”.

Unit-2

1. Explain Data Encryption Standard (DES) algorithm with a neat diagram.
2. List and explain the Block Cipher Modes of Operations with neat diagram.
3. What is Public key Encryption? How to design Secrecy and authentication using Public key Encryption?
4. Implement RSA algorithm to perform Encryption and Decryption using $p=17$, $q=11$, $e=7$, $M=88$?
5. . Apply Diffie-Hellman key exchange Scheme with a common prime $q=11$ and primitive root $a=2$
 - i. If user-A has public key $Y_A = 9$, what is A’s private key X_A ?
 - ii. If user-B has public key $Y_B = 3$, what is the shared secret key k ?

UNIT – 3

1. a) Write about different situations where use of a MAC is desirable
b) Write short notes on Hash Functions
2. Explain the MD5 message Digest algorithm
3. Explain the advantages of SECURE HASH ALGORITHM (SHA)
4. Discuss the HMAC Structure
5. Explain KNAPSACK ALGORITHM

Unit – 4

1. a) Explain the PGP provided services
b) Write short notes in traditional e-mail format RFC 822 and MIME
2. Discuss the general format for PGP messages (from Source to Source) with a neat diagram
3. a) List the S/MIME provided functions
b) Discuss the Problems with RFC 822 and SMTP in Email security
4. Write MIME header fields and discuss different MIME Content Types with their subtype along with their decryption
5. a) Write the IP SECURITY ARCHITECTURE and discuss its services
b) Explain Encapsulating Security Payload – ESP Format

Unit – 5

1. Write the different types of security threats faced about using the Web
2. a) Explain Secure Socket Layer Handshake Protocol
b) Discuss the TRANSPORT LAYER SECURITY Handshake Protocol
3. a) what are the services that provide SECURE ELECTRONIC TRANSACTION?
b) Discuss SET Transactions.
4. Discuss any Five of the following Viruses
 - a) Parasitic virus
 - b) Memory-resident virus
 - c) Boot sector virus
 - d) Stealth virus
 - e) Metamorphic virus
 - f) Polymorphic virus
5. Write short notes on Password Management

OPEN ELECTIVE (OE-2)

Intellectual Property Rights MR20-1BM0164

Unit – 1

1. Define Intellectual Property Rights (IPR). Explain various types of IPR in detail.
2. Briefly trace the history of IPR or Evolution of IP.
3. Discuss roles and responsibilities of various National and International organisations of IPR.
4. Write the importance of Intellectual Property Rights.
5. Write the issues which are affecting IPR.

Unit – 2

1. What is Trademark? Explain the different types of trademarks with examples.
2. What is the purpose and function of Trademark?
3. Enumerate the procedure for registration of trademark.
4. What are the procedures for selecting and evaluating Trademark?
5. Write short notes on:
 - a) Acquisition of Trade Mark Rights
 - b) Transfer of Rights
 - c) Protectable matter of trademark

Unit – 3

1. Describe Copyright and the works protected under copyright act. Explain the process of obtaining Copyright.
2. With neat Flow Chart diagram explain the Copyright Procedure in India.
3. Write a short note on Infringement of Copyright and discuss various remedies for copyright infringement.
4.
 - a) Explain What is Patent.
 - b) What are the essentials of patentable invention and which inventions are not patentable under Indian Patent Act.
5. Define Patent searching process and explain procedure for obtaining Patent in India.

Unit – 4

1. Define Trade secret. Explain procedure for determination of trade secret status in India.
2. What is protection for submission of Trade Secret? Give any famous example of trade secrets.
3. What is Unfair Competition? Write several examples of unfair competition practices in business.
4. What are the liabilities for misappropriation of trade secret?
5. Write short notes on:
 - a) Trade Secret Litigation
 - b) Misappropriation of trade secret

Unit – 5

1. Write the development in trade mark law.
2. What is copyright law, patent law? Explain in detail?
3. Write notes on international overview on intellectual propertyrights?
4. a) Discuss about intellectual property audits.
b) Write the Govt. schemes in IPR.
5. a) Write the steps taken by Govt. of India towards promotingIPR.
b) What are the career opportunities in IP.

PROFESSIONAL ELECTIVE (PE-5)

MERN Stack Web Development MR20-1IT0110

UNIT-1

- 1) A) What are the datatypes available in Typescript? Explain each datatype with example.
B) Explain implementation of classes and modules in typescript with examples.
- 2) Differentiate amongst ReactJS, AngularJS, VueJS and React Native
- 3) What is React? Write the steps to Create a React-app with a simple hello World program .Write the installation steps.
- 4) A) What are the features of React. Write its pros and cons. Briefly explain Data binding, React JSX .
B) Explain 1) React Components, 2) React State, 3) React Props, 4) React Forms
- 5) Summarize about component life cycle. support with suitable program
- 6) A) In typescript explain the following terms i) Arrow functions ii) interfaces
B) In react explain about i) React Constructor ii) React Component API

UNIT- 2

- 1) A) What is Code Splitting in React?
B) Explain in Detail about React Flux. Distinguish between React Flux and MVC model.
- 2) A) Explain React Events with suitable examples.
B) Write about React Redux. Explain with an example program.
- 3) A) Write about React Routes in detail with example. Write a sample program to create a NavBar and dependencies required.
B) Briefly write about 1) React CSS 2) react Animation 3) React Bootstrap
- 4) A) Explain in detail about Conditional Rendering in React
B) Briefly write about i) React Lists, ii) React Keys iii) React Refs iv) React fragments
- 5) A) Write about i) React Portals and ii) React Error Boundaries
B) What is the purpose of hooks in React
- 6) Explain 1) React Context 2) React Map 3) React Table 4) Higher-Order Components,

UNIT -3

- 1) Write the step by step procedure to install nodejs (NPM installation) in windows system. Write A Program to create a Node JS Application to connect to the server.
- 2) What is Modules in NodeJS? Support with suitable programs.
- 3) Write in detail about HTTP module/RESTful API. Specify the different HTTP methods.
- 4) Explain in detail about node js events.
- 5) How do you access database with nodejs. Write the steps to connect to the database using nodejs
- 6) What are the various command line operations in node js.

UNIT-4

- 1) What is database? Differentiate between sql and nosql database.Explain MongoDB.
- 2) Explain various data types in MongoDB.
- 3) How can you create and delete collections in MongoDB?
- 4) Explain in detail about finding, adding,updating and deleting a document in a collection with suitableexamples
- 5) What are the steps to install mongodb(build MongoDB environment).Explain in detail about the two typesof datamodel in MongoDB.
- 6) Write about 1) projections 2) sharding 3) limit 4)sorting

UNIT -5

- 1) Explain about express template engine supported by Express JS.Give example about pug or handlebar template used in express
- 2) Why do we use express framework? What are the distinctive features of express JS. Write a program tostart a server using express app.
- 3) With the help of a program explain about Routing in ExpressJS
- 4) What is Middleware in Express.js? What are the different types of Middleware?
- 5) Write about a)GET b)POST c)file upload d) request d) response with programs.
- 6) Briefly write about a)scaffolding b) body-parser c)multer d) cookie-parser

Artificial Intelligence MR20-1CS0201

Unit-1

1. a) Define Intelligence and explain how AI is different from Intelligence?
b) Discuss the applications of AI in detail?
2. a) What are Intelligent Agents? Explain Types of AI Agents.
B) Discuss about Problem solving agents?
3. Differentiate informed and uninformed search strategies?
4. Explain the concept of BFS and DFS with suitable example?
5. Explain about Brute Force and Greedy Techniques with suitable examples?
6. Explain A* search algorithm with example.

Unit-2

1. Explain Hill climbing search algorithm with example.
2. Write an algorithm to demonstrate the Simulated Annealing?
3. Explain searching with Non-Deterministic Actions and partial observations?
4. Explain Constraint Satisfaction Problem with suitable Applications?
5. a) Explain Backtracking search for CSP
b) Explain Local search for CSP.

Unit-3

1. a) What is a Knowledge Based System? Explain.
b) Explain the concept of wumpus world with its PEAS description?
2. a) What are the elements of propositional logic explain?
b) Explain the different types of Rules of Inference in AI with suitable example?
3. a) What is the use of Horn clause and Definite Clause?
b) Explain forward chaining and backward chaining with suitable example?
4. Explain the steps involved in Resolution with example and draw the Resolution graph?
5. Explain the propositional logic with suitable example and the Agents based on Propositional Logic?

Unit-4

1. Define the syntactic elements of first-Order logic and Illustrate the use of first-order logic to represent knowledge.
2. a) Explain the uses of First Order Logic?
b) Explain Knowledge Engineering in FOL and the steps involved in it?
3. a) Explain the Forward chaining and Backward chaining in AI with suitable example
b) List out the differences between Forward chaining and Backward chaining strategies?
4. a) Explain the concept of Unification in AI?
b) Write an algorithm to demonstrate Unification with an example?
5. a) List out the differences between Propositional and Predicate Logic?
b) Explain the steps involved in Resolution with a suitable example?

Unit-5

1. Discuss about Ontological Engineering? Explain the different types of Knowledge representation Techniques in AI?
2. a) Discuss about the events in knowledge representation
b) Explain semantic network representation with example?
3. Explain AI knowledge cycle and the approaches to knowledge representation?
4. Explain Probabilistic Reasoning and also Discuss the Bayes Rule in AI?
5. Explain the concept of Uncertainty in AI? Explain Bayesian Belief Network with suitable example?

Business Intelligence and Analytics MR20-1CS0305

UNIT – I

1. Explain Architecture of BI ?
2. (a) Explain the different types of BI Tools ?
(b) Explain the different Tableau Products ?
3. (a). Differences between OLTP and OLAP ?
(b). Differences between Business Intelligence and Business Analytics ?
4. Describe ETL process in detail ?
5. Differentiate Traditional BI and Self Service BI ?

UNIT – II

- 1.a) Analyse different types of joins in merge queries in Power BI ?
b) Explain Different ways to opening the Power Query Editor in Power BI ?
- 2.a) Explain about Filter a column using Text Filters ?
b) Explain about Inbuilt Row Transformations in Power BI?
- 3.a) Illustrate about Append Queries in Power BI ?
b) Explain about Filter a column using Number Filters ?
4. Explain about Power BI Architecture ?
5. Explain about Inbuilt Column Transformations in Power BI ?

UNIT – III

1. Define DAX ? Explain types of DAX operators ?
2. Explain the following DAX function's.
(a). Basic date and time functions (b). Logical Functions
- 3.a) Explain about Power Pivot and data modelling in Power BI ?
4. Describe the following.
(a). Fact Column (b). Dimension Column (c). Fact Table (d). Dimension Table
5. Explain the following ways in DAX Queries (i). Creating new column (ii). creating measure (iii). creating new table

UNIT – IV

1. (a).Explain the different Report view components ?
(b).Explain in Detail about Visualizing Categorical Data ?
2. Explain Ad-hoc filtering and drill through visual interactions in power BI?
- 3.(a). Describe the four types of filters in power BI service?
(b).Explain in Detail about Visualizing Tabular Data ?
4. Differentiate Drill-UP and Drill-Down Reports in Power BI?
5. Illustrate the following. (a).Pie and Donut Charts (b).Bar and Column Charts (c).Scatter Charts

UNIT – V

1. Define Power BI Service ?Explain publishing reports to the Power BI service ?
2. What are Power BI data gateways? How gateways works?
- 3.Illustrate about Power BI Dashboard Development ?
- 4.Explain Row level Security in Power BI ?
5. Explain the following. (a).Shared Datasets (b).Certified Datasets (c). Content Packs



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