



DATA STRUCTURE AND ALGORITHM (DSA)

DCA-506

COURSE DESIGN, PREPARATION AND REVIEW TEAM

Prof. T.K. Jain Dr. Ankur Jain,

Director, Director,

CDOE SGVU Jaipur CIQA, SGVU Jaipur

Prof. P.K. Sharma Dr. Manish Sharma,

Rtd. Professor Professor,

VMOU Kota GVSET, SGVU Jaipur

Dr. Ajay Vardhan

Regional Director

IGNOU Aligarh(UP)

Dr. Kriti Shrivastav

Assistant Professor

CIQA SGVU Jaipur

Ms. Sonika Katta, Dr. Amit Sharma*
Assistant Professor, Associate Professor
GVSET, SGVU Jaipur CDOE SGVU Jaipur

Dr. Ranjan Upadhyaya, Professor, Mr. Ashok Kumar,
Department of Management Studies, Assistant Professor,
Vivekananda Global University, Jaipur GVSET, SGVU Jaipur

Dr. Vijay Sharma, HOD, Centre for Rural

Empowerment and Development, Assistant Professor,

Government Engineering College, Bikaner School of Law, SGVU Jaipur

Dr. Vishal Goar Dr. Lata Suresh,

Dean Research

Director, Indian Institute of Corporate

Bikaner Technical University, Bikaner .

Affairs, (Ministry of Corporate Affairs)

Gurugram

Ms. Kriti Sanadhya,

Program CoordinatorCourse Coordinator and editorDr. Sohit Agarwal*Dr. Aman Sharmar,Assistant ProfessorAssistant Professor,CDOE SGVU JaipurCDOE, SGVU

Acknowledgement : The persons marked with (*) are the authors

PRINT PRODUCTION

Mahendra Sharma Assistant Registrar SGVU Jaipur

Published in: November, 2024

ISBN (Awaited)

©SGVU. All rights reserved. No part of this work may be reproduced in any form, by mimeograph or any other means, without permission in writing from the SGVU.

Published by:

S. B. Prakashan Pvt. Ltd.

WZ-6, Lajwanti Garden, New Delhi: 110046 Tel.: (011) 28520627 | Ph.: 9625993408

Email: info@sbprakashan.com | Web.: www.sbprakashan.com

BLOCK 1	1
Introduction to Software Engineering	1
BLOCK 2	110
Software Requirement Specifications (SRS)	119
BLOCK 3	170
Testing Strategies	170
BLOCK 4	222
Software Project and Software Maintenance Management	222
BLOCK 5	264
Object Oriented Design	264

Learning Map

Course Credit- 4

Unit 1: Introduction to Data Structures & Abstract Data Type 2 Unit 2: Introduction to Array ADT & Linked List ADT 25 Unit 3: Stack ADT & Queue ADT 55 BLOCK 2 Sorting & Searching Algorithm 0.8 79 Unit 4: Introduction to Algorithms 80 Unit 5: Basic and Extended Algorithms 138 Unit 6: Search Algorithms 155 Unit 7: Basic Sorting Algorithms BLOCK 3 Tree Data Structures 0.8 170 Unit 8: Binary Tree ADT 171 Unit 9: Self-Balancing Binary Tree ADT 207 BLOCK 4 Analysis of Algorithms 0.8 222 Unit 11: Complexity Notations 213 Unit 12: Complexity Analysis Techniques Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms	Content	Course Credit	Page No
Unit 2: Introduction to Array ADT & Linked List ADT 25 Unit 3: Stack ADT & Queue ADT 55 BLOCK 2 Sorting & Searching Algorithm 0.8 79 Unit 4: Introduction to Algorithms 80 Unit 5: Basic and Extended Algorithms 138 Unit 6: Search Algorithms 155 Unit 7: Basic Sorting Algorithms BLOCK 3 Tree Data Structures 0.8 170 Unit 9: Self-Balancing Binary Tree ADT Unit 9: Self-Balancing Binary Tree ADT Unit 10: Trie ADT BLOCK 4 Analysis of Algorithms 0.8 222 Unit 11: Complexity Notations 223 Unit 12: Complexity Analysis Techniques Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List Unit 15: Shortest Path Algorithms 281	BLOCK 1 Introduction to Data Structure & Algorithm	0.8	1
BLOCK 2 Sorting & Searching Algorithm O.8 79 Unit 4: Introduction to Algorithms 80 Unit 5: Basic and Extended Algorithms 138 Unit 6: Search Algorithms 155 Unit 7: Basic Sorting Algorithms BLOCK 3 Tree Data Structures O.8 Unit 8: Binary Tree ADT Unit 9: Self-Balancing Binary Tree ADT Unit 10: Trie ADT BLOCK 4 Analysis of Algorithms 0.8 222 Unit 11: Complexity Notations 223 Unit 12: Complexity Analysis Techniques BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List Unit 15: Shortest Path Algorithms 281	Unit 1: Introduction to Data Structures & Abstract Data Type		2
BLOCK 2 Sorting & Searching Algorithm O.8 79 Unit 4: Introduction to Algorithms 80 Unit 5: Basic and Extended Algorithms 138 Unit 6: Search Algorithms 155 Unit 7: Basic Sorting Algorithms BLOCK 3 Tree Data Structures O.8 170 Unit 8: Binary Tree ADT 171 Unit 9: Self-Balancing Binary Tree ADT 187 Unit 10: Trie ADT BLOCK 4 Analysis of Algorithms 0.8 222 Unit 11: Complexity Notations 223 Unit 12: Complexity Analysis Techniques Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	Unit 2: Introduction to Array ADT & Linked List ADT		25
Unit 4: Introduction to Algorithms 138 Unit 5: Basic and Extended Algorithms 138 Unit 6: Search Algorithms 155 Unit 7: Basic Sorting Algorithms BLOCK 3 Tree Data Structures 0.8 170 Unit 8: Binary Tree ADT 171 Unit 9: Self-Balancing Binary Tree ADT 187 Unit 10: Trie ADT 180 BLOCK 4 Analysis of Algorithms 207 BLOCK 4 Analysis of Algorithms 223 Unit 11: Complexity Notations 223 Unit 12: Complexity Analysis Techniques 346 Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	Unit 3: Stack ADT & Queue ADT		55
Unit 5: Basic and Extended Algorithms 138 Unit 6: Search Algorithms 155 Unit 7: Basic Sorting Algorithms BLOCK 3 Tree Data Structures 0.8 170 Unit 8: Binary Tree ADT 171 Unit 9: Self-Balancing Binary Tree ADT 187 Unit 10: Trie ADT 207 BLOCK 4 Analysis of Algorithms 0.8 222 Unit 11: Complexity Notations 223 Unit 12: Complexity Analysis Techniques 246 Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	BLOCK 2 Sorting & Searching Algorithm	0.8	79
Unit 6: Search Algorithms Unit 7: Basic Sorting Algorithms BLOCK 3 Tree Data Structures Unit 8: Binary Tree ADT Unit 9: Self-Balancing Binary Tree ADT Unit 10: Trie ADT BLOCK 4 Analysis of Algorithms Unit 11: Complexity Notations Unit 12: Complexity Analysis Techniques Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms Unit 14: Adjacency Matrix and Adjacency List Unit 15: Shortest Path Algorithms 281	Unit 4: Introduction to Algorithms		80
Unit 7: Basic Sorting Algorithms BLOCK 3 Tree Data Structures O.8 170 Unit 8: Binary Tree ADT Unit 9: Self-Balancing Binary Tree ADT Unit 10: Trie ADT BLOCK 4 Analysis of Algorithms O.8 222 Unit 11: Complexity Notations Unit 12: Complexity Analysis Techniques Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms O.8 264 Unit 14: Adjacency Matrix and Adjacency List Unit 15: Shortest Path Algorithms 281	Unit 5: Basic and Extended Algorithms		138
BLOCK 3 Tree Data Structures Unit 8: Binary Tree ADT Unit 9: Self-Balancing Binary Tree ADT BLOCK 4 Analysis of Algorithms Unit 11: Complexity Notations Unit 12: Complexity Analysis Techniques Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List Unit 15: Shortest Path Algorithms 281	Unit 6: Search Algorithms		155
Unit 8: Binary Tree ADT Unit 9: Self-Balancing Binary Tree ADT Unit 10: Trie ADT BLOCK 4 Analysis of Algorithms 0.8 222 Unit 11: Complexity Notations 223 Unit 12: Complexity Analysis Techniques Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	Unit 7: Basic Sorting Algorithms		
Unit 9: Self-Balancing Binary Tree ADT Unit 10: Trie ADT BLOCK 4 Analysis of Algorithms Unit 11: Complexity Notations Unit 12: Complexity Analysis Techniques Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	BLOCK 3 Tree Data Structures	0.8	170
Unit 10: Trie ADT BLOCK 4 Analysis of Algorithms 0.8 222 Unit 11: Complexity Notations 223 Unit 12: Complexity Analysis Techniques 246 Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	Unit 8: Binary Tree ADT		171
BLOCK 4 Analysis of Algorithms Unit 11: Complexity Notations Unit 12: Complexity Analysis Techniques 246 Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	Unit 9: Self-Balancing Binary Tree ADT		187
Unit 11: Complexity Notations 223 Unit 12: Complexity Analysis Techniques 246 Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	Unit 10: Trie ADT		207
Unit 12: Complexity Analysis Techniques Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	BLOCK 4 Analysis of Algorithms	0.8	222
Unit 13: Time Complexity Bound for Searching & Sorting BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	Unit 11: Complexity Notations		223
BLOCK 5 Graph Algorithms 0.8 264 Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	Unit 12: Complexity Analysis Techniques		246
Unit 14: Adjacency Matrix and Adjacency List 265 Unit 15: Shortest Path Algorithms 281	Unit 13: Time Complexity Bound for Searching & Sorting		
Unit 15: Shortest Path Algorithms 281	BLOCK 5 Graph Algorithms	0.8	264
	Unit 14: Adjacency Matrix and Adjacency List		265
Unit 16: Minimum Spanning Tree 298	Unit 15: Shortest Path Algorithms		281
	Unit 16: Minimum Spanning Tree		298

Prior Learning

The Learner should have fundamental understanding of Mathematics and Computer Application