



# **St. Michael's College, Cherthala**

**Alappuzha, Kerala-688 539**

**Affiliated to University of Kerala  
and Re-accredited by NAAC with 'A' Grade**



**ADD ON COURSE 2020-21**

**Name of the Programme : DATA STRUCTURES**

**Name of the Department : SOFTWARE DEVELOPMENT**

**Course Code : SD 362**





# St. Michael's College

**MAYITHARA P.O., CHERTHALA, ALAPPUZHA-688539**

An institution with Minority Status Affiliated to the University of Kerala and  
Re-accredited by NAAC with 'A' Grade

## Add on Course - 2020-21

### SOFTWARE DEVELOPMENT

Data Structures

### ENGLISH

(Certificate Course)

Essentials of English  
Language  
Fluency

### HINDI

(Certificate Course)

Hindi Grammar and  
Translation



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Add on Course 2020-2021

**NAME OF COURSE : DATA STRUCTURES**

**COURSE CODE : SD 362**

**NO OF STUDENTS ENROLLED : 45**

**CONTENTS**

- SYLLABUS**
- CLASS SCHEDULES**
- ATTENDANCE STATEMENT**
- QUESTION PAPER**
- MARK LIST**
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## **DATA STRUCTURES**

### **COURSE STRUCTURE**

**Module I (10 hrs): BASIC CONCEPTS OF DATA STRUCTURES**

**Module II (10 hrs): ARRAYS AND SEARCHING**

**Module III (10 hrs): LINKED LIST AND MEMORY MANAGEMENT**

### **Detailed syllabus of the course**

**Module 1 Basic Concepts of Data Structures:** System Life Cycle, Algorithms, Performance Analysis, Space Complexity, Time Complexity, Asymptotic Notation, Complexity Calculation of Simple Algorithms

**Module 2 Arrays and Searching:** Polynomial representation using Arrays, Sparse matrix, Stacks, Queues-Circular Queues, Priority Queues, Double Ended Queues, Evaluation of Expressions Linear Search and Binary Search

**Module 3 Linked List and Memory Management:** Self Referential Structures, Dynamic Memory Allocation, Singly Linked List-Operations on Linked List, Doubly Linked List, Circular Linked List, Stacks and Queues using Linked List, Polynomial representation using Linked List Memory allocation and de-allocation-First-fit, Best-fit and Worst-fit allocation schemes

### **Programme Objectives**

- Design an algorithm for a computational task and calculate the time/space complexities of that algorithm (Cognitive Knowledge Level: Apply)

- Identify the suitable data structure (array or linked list) to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the computational problem (Cognitive Knowledge Level: Apply)
- Write an algorithm to find the solution of a computational problem by selecting an appropriate data structure

**Duration of the programme:** 30hrs (either in the evening of regular working days or Saturdays)

### **Scope of the Course**

This course aims at moulding the learner to understand the various data structures, their organization and operations. The course helps the learners to assess the applicability of different data structures and associated algorithms for solving real world problem which requires to compare and select appropriate data structures to solve the problem efficiently. This course introduces abstract concepts for data organization and manipulation using data structures such as stacks, queues, linked lists, binary trees, heaps and graphs for designing their own data structures to solve practical application problems in various fields of Computer Science.

## Details of students enrolled

Discipline: BVoc Software Development

Course Title: DATA STRUCTURES

<b>NO</b>	<b>Name</b>	<b>Student enrolment number</b>
1	<b>ABHILASH MOHAN</b>	<b>35118136001</b>
2	<b>ABIN M M</b>	<b>35118136002</b>
3	<b>AKHIL LAWRENCE</b>	<b>35118136003</b>
4	<b>AKSHAY. S. NATH</b>	<b>35118136004</b>
5	<b>ANAND.S.S.</b>	<b>35118136005</b>
6	<b>ANANDU B</b>	<b>35118136006</b>
7	<b>ANJANA SABU</b>	<b>35118136007</b>
8	<b>ANJITHA.A.S</b>	<b>35118136008</b>
9	<b>ANTONY CARDOZ</b>	<b>35118136009</b>
10	<b>ANTONY. K.G</b>	<b>35118136010</b>
11	<b>ANUPAMA G RAVI</b>	<b>35118136011</b>
12	<b>APPU SANTHOSH</b>	<b>35118136012</b>
13	<b>ASEETH AJMAL</b>	<b>35118136013</b>
14	<b>ASHIN AUGUSTINE</b>	<b>35118136014</b>
15	<b>ASHTON FERNANDEZ .J</b>	<b>35118136015</b>
16	<b>BABITHA BABU</b>	<b>35118136017</b>
17	<b>BALUKRISHNA.S</b>	<b>35118136018</b>
18	<b>BIDHIN P.M</b>	<b>35118136019</b>
19	<b>BRISEENA P B</b>	<b>35118136020</b>
20	<b>DIVIN GEORGE KURIAN</b>	<b>35118136021</b>

21	<b>DIVYA A.L</b>	<b>35118136022</b>
22	<b>FREDDY NIXAL</b>	<b>35118136024</b>
23	<b>GANESH .H</b>	<b>35118136025</b>
24	<b>GEETHESH GOPAKUMAR NAIR</b>	<b>35118136026</b>
25	<b>GEO JOSEPH</b>	<b>35118136027</b>
26	<b>GOKUL.K.P</b>	<b>35118136028</b>
27	<b>HARIKRISHNAN.M.M</b>	<b>35118136029</b>
28	<b>HARIPRIYA B</b>	<b>35118136030</b>
29	<b>HEBSEEBA CYRUS</b>	<b>35118136031</b>
30	<b>JOSEPH JUSTIN</b>	<b>35118136032</b>
31	<b>JYOTHISH.A</b>	<b>35118136033</b>
32	<b>LIJO SEBASTIAN</b>	<b>35118136034</b>
33	<b>MANEESHA MANIYAPPAN</b>	<b>35118136035</b>
34	<b>NANDHU. S</b>	<b>35118136037</b>
35	<b>NEVIN ALBIN</b>	<b>35118136038</b>
36	<b>NOYAL NOAH V.O</b>	<b>35118136039</b>
37	<b>NOYAL.V.S.</b>	<b>35118136040</b>
38	<b>POORNIMA R NAIR</b>	<b>35118136041</b>
39	<b>SANOY GEORGE THOMAS</b>	<b>35118136042</b>
40	<b>SHAROON K S</b>	<b>35118136044</b>
41	<b>SHERIN SEBASTIAN</b>	<b>35118136045</b>
42	<b>SOURAV KRISHNA S</b>	<b>35118136046</b>
43	<b>SREELEKSHMI S</b>	<b>35118136047</b>
44	<b>VINCENT XAVIER</b>	<b>35118136050</b>
45	<b>VISMAYA DEVAN</b>	<b>35118136051</b>

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## Class schedule

Date	Day	Time	Faculty
11-11-2020	Wednesday	3.30-4.30 PM	Geethu Varghese
16-11-20	Monday	3.30-4.30 PM	Pimmi Mathews
18-11-20	Wednesday	3.30-4.30 PM	Lekshmi M
21-11-20	Saturday	10-12 AM	Pimmi Mathews
24-11-20	Tuesday	3.30-4.30 PM	Anisha Vineeth
27-11-20	Thursday	3.30-4.30 PM	Geethu Varghese
30-11-20	Monday	3.30-4.30 PM	Anisha Vineeth
01-12-20	Tuesday	3.30-4.30 PM	Lekshmi M
04-12-20	Friday	3.30-4.30 PM	Anisha Vineeth
08-12-20	Tuesday	3.30-4.30 PM	Pimmi Mathews
15-12-20	Tuesday	3.30-4.30 PM	Lekshmi M
17-12-20	Thursday	3.30-4.30 PM	Anisha Vineeth
01-01-21	Friday	3.30-4.30 PM	Geethu Varghese
04-01-21	Monday	3.30-4.30 PM	Anisha Vineeth
06-01-21	Wednesday	3.30-4.30 PM	Pimmi Mathews
09-01-21	Saturday	10-12 AM	Anisha Vineeth
11-01-21	Monday	3.30-4.30 PM	Lekshmi M
12-01-21	Tuesday	3.30-4.30 PM	Geethu Varghese
15-01-21	Friday	3.30-4.30 PM	Anisha Vineeth
18-01-21	Monday	3.30-4.30 PM	Pimmi Mathews
20-01-21	Wednesday	3.30-4.30 PM	Geethu Varghese
23-01-21	Saturday	10-12 AM	Lekshmi M
27-01-21	Wednesday	3.30-4.30 PM	Pimmi Mathews
28-01-21	Thursday	3.30-4.30 PM	Lekshmi M
01-02-21	Monday	3.30-4.30 PM	Geethu Varghese



04-02-21	Thursday	3.30-4.30 PM	Pimmi Mathews
05-02-21	Friday	3.30-4.30 PM	Lekshmi M

### Attendance Statement

NO	Name	Student enrolment number	Percentage of attendance	Attained required percentage
1	<b>ABHILASH MOHAN</b>	<b>35118136001</b>	<b>93</b>	<b>yes</b>
2	<b>ABIN M M</b>	<b>35118136002</b>	<b>87</b>	<b>yes</b>
3	<b>AKHIL LAWRENCE</b>	<b>35118136003</b>	<b>90</b>	<b>yes</b>
4	<b>AKSHAY. S. NATH</b>	<b>35118136004</b>	<b>93</b>	<b>yes</b>
5	<b>ANAND.S.S.</b>	<b>35118136005</b>	<b>97</b>	<b>yes</b>
6	<b>ANANDU B</b>	<b>35118136006</b>	<b>87</b>	<b>yes</b>
7	<b>ANJANA SABU</b>	<b>35118136007</b>	<b>97</b>	<b>yes</b>
8	<b>ANJITHA.A.S</b>	<b>35118136008</b>	<b>100</b>	<b>yes</b>
9	<b>ANTONY CARDOZ</b>	<b>35118136009</b>	<b>93</b>	<b>yes</b>
10	<b>ANTONY. K.G</b>	<b>35118136010</b>	<b>87</b>	<b>yes</b>
11	<b>ANUPAMA G RAVI</b>	<b>35118136011</b>	<b>93</b>	<b>yes</b>
12	<b>APPU SANTHOSH</b>	<b>35118136012</b>	<b>90</b>	<b>yes</b>
13	<b>ASEETH AJMAL</b>	<b>35118136013</b>	<b>93</b>	<b>yes</b>
14	<b>ASHIN AUGUSTINE</b>	<b>35118136014</b>	<b>87</b>	<b>yes</b>
15	<b>ASHTON FERNANDEZ .J</b>	<b>35118136015</b>	<b>100</b>	<b>yes</b>
16	<b>BABITHA BABU</b>	<b>35118136017</b>	<b>97</b>	<b>yes</b>
17	<b>BALUKRISHNA.S</b>	<b>35118136018</b>	<b>97</b>	<b>yes</b>
18	<b>BIDHIN P.M</b>	<b>35118136019</b>	<b>93</b>	<b>yes</b>
19	<b>BRISEENA P B</b>	<b>35118136020</b>	<b>93</b>	<b>yes</b>

20	<b>DIVIN GEORGE KURIAN</b>	<b>35118136021</b>	<b>100</b>	<b>yes</b>
21	<b>DIVYA A.L</b>	<b>35118136022</b>	<b>90</b>	<b>yes</b>
22	<b>FREDDY NIXAL</b>	<b>35118136024</b>	<b>97</b>	<b>yes</b>
23	<b>GANESH .H</b>	<b>35118136025</b>	<b>93</b>	<b>yes</b>
24	<b>GEETHESH GOPAKUMAR NAIR</b>	<b>35118136026</b>	<b>87</b>	<b>yes</b>
25	<b>GEO JOSEPH</b>	<b>35118136027</b>	<b>87</b>	<b>yes</b>
26	<b>GOKUL.K.P</b>	<b>35118136028</b>	<b>93</b>	<b>yes</b>
27	<b>HARIKRISHNAN.M.M</b>	<b>35118136029</b>	<b>90</b>	<b>yes</b>
28	<b>HARIPRIYA B</b>	<b>35118136030</b>	<b>93</b>	<b>yes</b>
29	<b>HEBSEEBA CYRUS</b>	<b>35118136031</b>	<b>97</b>	<b>yes</b>
30	<b>JOSEPH JUSTIN</b>	<b>35118136032</b>	<b>93</b>	<b>yes</b>
31	<b>JYOTHISH.A</b>	<b>35118136033</b>	<b>93</b>	<b>yes</b>
32	<b>LIJO SEBASTIAN</b>	<b>35118136034</b>	<b>97</b>	<b>yes</b>
33	<b>MANEESHA MANIYAPPAN</b>	<b>35118136035</b>	<b>90</b>	<b>yes</b>
34	<b>NANDHU. S</b>	<b>35118136037</b>	<b>93</b>	<b>yes</b>
35	<b>NEVIN ALBIN</b>	<b>35118136038</b>	<b>97</b>	<b>yes</b>
36	<b>NOYAL NOAH V.O</b>	<b>35118136039</b>	<b>90</b>	<b>yes</b>
37	<b>NOYAL.V.S.</b>	<b>35118136040</b>	<b>93</b>	<b>yes</b>
38	<b>POORNIMA R NAIR</b>	<b>35118136041</b>	<b>93</b>	<b>yes</b>
39	<b>SANOY                   GEORGE THOMAS</b>	<b>35118136042</b>	<b>90</b>	<b>yes</b>
40	<b>SHAROON K S</b>	<b>35118136044</b>	<b>93</b>	<b>yes</b>
41	<b>SHERIN SEBASTIAN</b>	<b>35118136045</b>	<b>93</b>	<b>yes</b>
42	<b>SOURAV KRISHNA S</b>	<b>35118136046</b>	<b>97</b>	<b>yes</b>

43	<b>SREELEKSHMI S</b>	<b>35118136047</b>	<b>87</b>	<b>yes</b>
44	<b>VINCENT XAVIER</b>	<b>35118136050</b>	<b>93</b>	<b>yes</b>
45	<b>VISMAYA DEVAN</b>	<b>35118136051</b>	<b>97</b>	<b>yes</b>

**BVoc Software Development**

**Add-On Course**

**DATA STRUCTURES**

Time:1hr

Marks:30

**PART A (Answer all questions)**

**10x1=10 Marks**

1. Define data structure.
2. What do you mean by non-linear data structure? Give example.
3. List the various operations that can be performed on data structure. 4.  
List out the areas in which data structures are applied extensively
5. Difference between arrays and lists
6. Which data structure is used for implementing recursion?
7. The data structure required to check whether an expression contains a balanced parenthesis is?
8. Which data structure is based on the Last In First Out (LIFO) principle?
9. What is the need for a circular queue?
10. In simple chaining, what data structure is appropriate?

**PART B (Answer any 5 questions)**

**2x5=10 Marks**

11. Define Linked Lists.
12. State the difference between arrays and linked lists.

13. What are the types of queues?
14. State the rules to be followed during infix to postfix conversions.
15. Define a priority queue.
16. Define a Deque
17. List out the basic operations that can be performed on a stack.
18. Define an Abstract Data Type (ADT)

**PART C (Answer any 1 question )**

**1x10=10 Marks**

19. Write algorithms for Linear Search and Binary Search and Compare their time complexities
20. Write algorithms to insert and delete elements from a double ended queue. Demonstrate with examples.

St. Michael's College Cherthala

Mark List

Discipline: BVoc software Development

Course title: DATA STRUCTURES

S.NO	Name	Candidate Code	Max. marks	Marks obtained
1	<b>ABHILASH MOHAN</b>	<b>35118136001</b>	<b>30</b>	<b>25</b>
2	<b>ABIN M M</b>	<b>35118136002</b>	<b>30</b>	<b>27</b>
3	<b>AKHIL LAWRENCE</b>	<b>35118136003</b>	<b>30</b>	<b>28</b>
4	<b>AKSHAY. S. NATH</b>	<b>35118136004</b>	<b>30</b>	<b>26</b>
5	<b>ANAND.S.S.</b>	<b>35118136005</b>	<b>30</b>	<b>18</b>

6	<b>ANANDU B</b>	<b>35118136006</b>	<b>30</b>	<b>16</b>
7	<b>ANJANA SABU</b>	<b>35118136007</b>	<b>30</b>	<b>25</b>
8	<b>ANJITHA.A.S</b>	<b>35118136008</b>	<b>30</b>	<b>22</b>
9	<b>ANTONY CARDOZ</b>	<b>35118136009</b>	<b>30</b>	<b>19</b>
10	<b>ANTONY. K.G</b>	<b>35118136010</b>	<b>30</b>	<b>23</b>
11	<b>ANUPAMA G RAVI</b>	<b>35118136011</b>	<b>30</b>	<b>20</b>
12	<b>APPU SANTHOSH</b>	<b>35118136012</b>	<b>30</b>	<b>20</b>
13	<b>ASEETH AJMAL</b>	<b>35118136013</b>	<b>30</b>	<b>AB</b>
14	<b>ASHIN AUGUSTINE</b>	<b>35118136014</b>	<b>30</b>	<b>23</b>
15	<b>ASHTON FERNANDEZ .J</b>	<b>35118136015</b>	<b>30</b>	<b>26</b>
16	<b>BABITHA BABU</b>	<b>35118136017</b>	<b>30</b>	<b>29</b>
17	<b>BALUKRISHNA.S</b>	<b>35118136018</b>	<b>30</b>	<b>27</b>
18	<b>BIDHIN P.M</b>	<b>35118136019</b>	<b>30</b>	<b>24</b>
19	<b>BRISEENA P B</b>	<b>35118136020</b>	<b>30</b>	<b>23</b>
20	<b>DIVIN GEORGE KURIAN</b>	<b>35118136021</b>	<b>30</b>	<b>21</b>
21	<b>DIVYA A.L</b>	<b>35118136022</b>	<b>30</b>	<b>23</b>
22	<b>FREDDY NIXAL</b>	<b>35118136024</b>	<b>30</b>	<b>21</b>
23	<b>GANESH .H</b>	<b>35118136025</b>	<b>30</b>	<b>32</b>
24	<b>GEETHESH GOPAKUMAR NAIR</b>	<b>35118136026</b>	<b>30</b>	<b>24</b>
25	<b>GEO JOSEPH</b>	<b>35118136027</b>	<b>30</b>	<b>21</b>
26	<b>GOKUL.K.P</b>	<b>35118136028</b>	<b>30</b>	<b>25</b>
27	<b>HARIKRISHNAN.M.M</b>	<b>35118136029</b>	<b>30</b>	<b>26</b>
28	<b>HARIPRIYA B</b>	<b>35118136030</b>	<b>30</b>	<b>23</b>
29	<b>HEBSEEBA CYRUS</b>	<b>35118136031</b>	<b>30</b>	<b>24</b>
30	<b>JOSEPH JUSTIN</b>	<b>35118136032</b>	<b>30</b>	<b>25</b>

31	<b>JYOTHISH.A</b>	<b>35118136033</b>	<b>30</b>	<b>18</b>
32	<b>LIJO SEBASTIAN</b>	<b>35118136034</b>	<b>30</b>	<b>30</b>
33	<b>MANEESHA MANIYAPPAN</b>	<b>35118136035</b>	<b>30</b>	<b>25</b>
34	<b>NANDHU. S</b>	<b>35118136037</b>	<b>30</b>	<b>24</b>
35	<b>NEVIN ALBIN</b>	<b>35118136038</b>	<b>30</b>	<b>23</b>
36	<b>NOYAL NOAH V.O</b>	<b>35118136039</b>	<b>30</b>	<b>26</b>
37	<b>NOYAL.V.S.</b>	<b>35118136040</b>	<b>30</b>	<b>19</b>
38	<b>POORNIMA R NAIR</b>	<b>35118136041</b>	<b>30</b>	<b>20</b>
39	<b>SANOY           GEORGE THOMAS</b>	<b>35118136042</b>	<b>30</b>	<b>21</b>
40	<b>SHAROON K S</b>	<b>35118136044</b>	<b>30</b>	<b>27</b>
41	<b>SHERIN SEBASTIAN</b>	<b>35118136045</b>	<b>30</b>	<b>25</b>
42	<b>SOURAV KRISHNA S</b>	<b>35118136046</b>	<b>30</b>	<b>23</b>
43	<b>SREELEKSHMI S</b>	<b>35118136047</b>	<b>30</b>	<b>21</b>
44	<b>VINCENT XAVIER</b>	<b>35118136050</b>	<b>30</b>	<b>28</b>
45	<b>VISMAYA DEVAN</b>	<b>35118136051</b>	<b>30</b>	<b>21</b>





**ST. MICHAEL'S COLLEGE**

**CHERTHALA, ALAPPUZHA - 688 539**

(Affiliated to University of Kerala and Re-accredited by NAAC with 'A' Grade)

## **ADD-ON COURSE CERTIFICATE**

*This is to certify that* **Mr. ABHILASH MOHAN (35118136001)** .....  
**B.Voc Software Development 2018 Admission** ..... *has completed*  
*Certificate/Add-on course in* **Data Structures (SD 362)** .....  
..... *offered by the Department of Software*  
*Development during the academic year 2020-2021. He/She is awarded with* ..... **A** *Grade.*

**Head of the Department**

**Course Coordinator**

**Principal**

### **Add-On Course (2020-21)**

#### **Subject: Data Structures**

In the academic year 2020-21, Bvoc Software Development orchestrated a transformative 30-hour Add-On Program focused on Data Structures, engaging 45 enthusiastic participants. The meticulously curated curriculum unfolded in three modules: Basic Concepts of Data Structures, Arrays and Searching, and Linked List and Memory Management. The program seamlessly blended theoretical concepts with hands-on learning, providing a comprehensive understanding of fundamental data organization principles. Through interactive sessions and practical exercises, participants not only grasped the intricacies of data structures but also honed their skills in St. Michael's College, Cherthala

Add on Course 2020-2021

applying these concepts. Bvoc's commitment to excellence was evident as the participants emerged with enriched knowledge and a practical skill set, equipping them to tackle real-world challenges in data management with confidence.



  
Principal  
St. Michael's College  
Cherthala