



Indra Ganesan

COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'B+' Grade, 2(f) & 12B Status Institution by UGC

IG Valley, Madurai Main Road, Manikandam, Tiruchirappalli - 620012

NAAC DOCUMENTS

QUALITY INDICATOR FRAME WORK

CRITERION – 1

CURRICULAR ASPECTS

SUBMITTED BY

IQAC

INTERNAL QUALITY ASSURANCE CELL

INDRA GANESAN COLLEGE OF ENGINEERING





Indra Ganesan

COLLEGE OF ENGINEERING

Madurai Main Road (NH-45B), Manikandam, Tiruchirappalli - 620 012
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
NAAC Accredited, 2(F) Status Institution by UGC



| | | |
|-------------------|---------------------------|------------|
| Criteria 1 | Curricular Aspects | 100 |
|-------------------|---------------------------|------------|

1.1 Curricular Planning and Implementation (20)

1.1.1 The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

Table of Content

| S. No | Description |
|-------|------------------------------|
| 1. | Preface of the Course File |
| 2. | Review of Course File |
| 3. | Faculty Time Table |
| 4. | Course Plan |
| 6. | Content Beyond Syllabus |
| 7. | Rubrics Base Evaluation |
| 8. | Academic Audit Form |
| 9. | Student Feed Back on Faculty |
| 10. | Internal Assessment Schedule |
| 11. | Question Paper |
| 12. | Answer Key |
| 13. | Sample Answer Sheet |
| 14. | Co Based Mark Entry |

INDRA GANESAN COLLEGE OF ENGINEERING
IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

PREFACE OF THE COURSE FILE

Batch : 2018-2022

Academic Year : 2019-2020 / ODD

Program : COMPUTER SCIENCE AND ENGINEERING

Year & Semester : 2nd Year / 3rd Semester / 'A' Section

Course Code : CS3391 NBA Course Code: C203

Name of the Course : Data Structures

Faculty in-charge : Mrs. A. Ramya Asst.Prof/CSE


Signature of the Faculty in-charge


HoD / CSE



Dr. G. Balakrishnan, M.E., Ph.D.,
Principal

Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REVIEW OF COURSE FILE

(to be pasted on the inner side of the file-backside).(#-State Yes/No.)

| S.N | Details | Date: | R-I-* | R-II-*& | R-III-*& | R-IV-*&\$ | R-V-*&\$@ |
|-----|--|-------|--------------------|--------------------|--------------------|--------------------|--------------------|
| 1. | Preface of the course file | | ✓ | | | | |
| 2. | Vision, Mission, PEOs, POs, PSOs, Blooms taxonomy | | ✓ | | | | |
| 3. | Subject handlers of yesteryears | | ✓ | | | | |
| 4. | Timetable/Workload of the staff – Distribution of teaching load – Roles and Responsibilities | | ✓ | | | | |
| 5. | Syllabus signed by staff & HoD | | ✓ | | | | |
| 6. | Lecture Schedule signed by staff & HoD | | ✓ | | | | |
| 7. | Course Committee meeting circular and minutes | | ✓ | | | | |
| 8. | Identification of Curricular gap and Content Beyond the syllabus | | ✓ | | | | |
| 9. | Self-study topics | | ✓ | | | | |
| 10. | Previous AU Question papers | | ✓ | | | | |
| 11. | Unit wise Q&A and Objective type questions | | ✓ | | | | |
| 12. | Unit wise course material | | ✓ | | | | |
| 13. | Assignment question paper with sample answer sheets and mark entry | | ✓ | | | | |
| 14. | Tutorial question paper with key and mark entry | | ✓ | | | | |
| 15. | Class test/IA test Q Paper with Key, sample answer papers and mark entry | | ✓ | | | | |
| 16. | IA Test- result analysis-CAP-evidence-root cause analysis. | | ✓ | | | | |
| 17. | Retest –Q paper-Attendance-marks | | | ✓ | ✓ | ✓ | |
| 18. | AU Web portal entry sheet | | | ✓ | ✓ | ✓ | |
| 19. | Very poor performance in first two tests-action taken.-communication to parents-evidence | | | ✓ | ✓ | ✓ | |
| 20. | Absence for two tests-action taken-communication to parents-evidence. | | | ✓ | ✓ | ✓ | |
| 21. | Indiscipline of student reported, if any | | | ✓ | ✓ | ✓ | |
| 22. | Special class/coaching class/remedial class/attendance-CAP | | | ✓ | ✓ | ✓ | |
| 23. | Conduct of Seminar, Quizzes - proof | | | ✓ | ✓ | ✓ | |
| 24. | Content beyond the syllabus - proof | | | ✓ | ✓ | ✓ | |
| 25. | Student feedback on faculty | | | ✓ | ✓ | ✓ | |
| 26. | Course end survey | | | ✓ | ✓ | ✓ | |
| 27. | Internal Assessment sheet | | | ✓ | ✓ | ✓ | |
| 28. | AU question paper with students feedback | | | ✓ | ✓ | ✓ | |
| 29. | Discrepancy of the question paper and correspondence, if any | | | ✓ | ✓ | ✓ | |
| 30. | AU result analysis-Details of arrear students. | | | | ✓ | ✓ | |
| 31. | AU grade sheet | | | | ✓ | ✓ | |
| 32. | CO – PO & PSO attainment sheet | | | | ✓ | ✓ | |
| | Signature of Course handling faculty | | <i>[Signature]</i> | <i>[Signature]</i> | <i>[Signature]</i> | <i>[Signature]</i> | <i>[Signature]</i> |
| | Signature of HoD | | <i>[Signature]</i> | <i>[Signature]</i> | <i>[Signature]</i> | <i>[Signature]</i> | <i>[Signature]</i> |

Dr. G. Balakrishnan, M.E., Ph.D.,

Principal

Indra Ganesan College of Engineering

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Manikandam, Trichy-620 012.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Faculty Time Table

| Mrs.A.Ramya | | | | | | | | |
|-----------------|-----------------|----|---|---------------|--------|--------|-------|---|
| Day Order | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| I | | | | | | | | |
| II | DS | | | | DS | | | |
| III | | DS | | | | | | |
| IV | | | | DS LAB | DS LAB | DS LAB | DSLAB | |
| V | | DS | | | | | | |
| S.Code | Title | | | Year / Branch | | Hours | | |
| CS8391 | Data Structures | | | II /B.E(CSE) | | 4 | | |
| TOTAL - 4 hours | | | | | | | | |




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Indra Ganesan College of Engineering

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Manikandam, Trichy-620 012.


Signature of the Faculty


Hod/CSE

OBJECTIVES:

- To understand the concepts of ADTs
- To Learn linear data structures – lists, stacks, and queues
- To understand sorting, searching and hashing algorithms
- To apply Tree and Graph structures

UNIT I LINEAR DATA STRUCTURES – LIST

9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation—singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES

9

Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT – Operations - Circular Queue – Priority Queue - deQueue – applications of queues.

UNIT III NON LINEAR DATA STRUCTURES – TREES

9

Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree - Heap – Applications of heap.

UNIT IV NON LINEAR DATA STRUCTURES - GRAPHS

9

Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES

9

Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort. Hashing- Hash Functions –Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL: 45 PERIODS**OUTCOMES:**

At the end of the course, the student should be able to:

1. Define linear and non-linear data structures
2. Implement abstract data types for linear data structures.
3. Implement linear and non-linear data structure operations.
4. Apply the different linear/non-linear data structure operations for solving a given problem.
5. Apply appropriate graph algorithms for graph applications

TEXT BOOKS:

6. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 1997.
7. Reema Thareja, “Data Structures Using C”, Second Edition, Oxford University Press, 2011

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, Second Edition, Mcgraw Hill, 2002.
2. Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education, 1983.
3. Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Ref: SBECW/ CSE/ Course committee meeting / DS-I/ 2019-20 (Odd)

DATE: 12.08.19

COURSE COMMITTEE MEETING- CS8391 –Data Structures

ACADEMIC YEAR: 2019-2020 (ODD) SEM: 03 REGULATION: 2017
PROGRAM: CSE DATE OF MEETING: 12.08.19 TIME : 10.00AM Venue: WEB TECHNOLOGY LAB

Members Present

Table.1 Course committee members

| S.No. | Name of the faculty & Designation, Program | Sem/Sec/Program | Signature |
|-------|--|-----------------|-----------|
| 1. | Mrs. A. Ramya AP/CSE | III SEM// CSE | |
| 2. | MS.PUSPALATHA AP/IT | III SEM// IT | |

HOD welcomed all the members present

- Content of syllabus, unit wise discussed. Nature of qualitative, quantitative, problematic, theoretical concepts etc. have been discussed
- With reference to the R-2017 regulation, Number of periods per unit = 09, total number of periods = 45 periods. 10 periods allotted for tutorials.
- Vision and mission of the college, department discussed. POs, PEOs, PSOs discussed.
- Course outcomes defined for each units, considering learning outcomes.

Table.2 Course Outcomes

| CO | Course Outcomes | POs | PSOs |
|--------|--|----------------------------|-------|
| C203.1 | Define linear and non-linear data structures. | 1,2,3,4,5,6,7,8,9,10,11,12 | 1,2,3 |
| C203.2 | Implement abstract data types for linear data structures. | 1,2,3,4,5,6,7,8,9,10,11,12 | 1,2,3 |
| C203.3 | Implement linear and non-linear data structure operations. | 1,2,3,4,5,6,7,8,9,10,11,12 | 1,2,3 |
| C203.4 | Use appropriate linear/non-linear data structure operations for solving a given problem. | 1,2,3,4,5,6,7,8,9,10,11,12 | 1,2,3 |
| C203.5 | Apply appropriate graph algorithms for graph applications. | 1,2,3,4,5,6,7,8,9,10,11,12 | 1,2,3 |
| C203.6 | Analyze the various searching and sorting algorithms. | 1,2,3,4,5,6,7,8,9,10,11,12 | 1,2,3 |

- Mapping of COs with POs and PSOs is done with suitable correlation levels(1 for low, 2 for medium, 3 for high,“-” for no correlation, before content beyond syllabus)

Table.3 Mapping of COs, C, PSOs with POs- before CBS.

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| C203.1 | 2 | 2 | 3 | 3 | 1 | 2 | 1 | | 2 | 1 | 2 | 2 | 2 | 2 |
| C203.2 | 1 | 3 | 2 | 1 | * | 1 | * | | 3 | 1 | 2 | 3 | 2 | 2 |
| C203.3 | 2 | 1 | * | 1 | 3 | 2 | 3 | | 2 | * | 2 | 1 | 2 | 2 |
| C203.4 | 1 | 2 | 2 | 3 | 3 | 1 | 3 | | 2 | 1 | 2 | 2 | 2 | 2 |
| C203.5 | 3 | 3 | 1 | 2 | 3 | 3 | 3 | | 3 | 1 | 2 | 3 | 2 | 2 |
| C203.6 | 3 | 1 | 2 | 2 | 2 | 3 | 2 | | * | 2 | 2 | 1 | 2 | 2 |

- Identification of content beyond syllabus- curricular gaps are identified considering industry needs, employers feedback, alumni feedback, government policy on industrialization, new investments by private/ public sectors, societal needs and level of correlation of COs with POs and PSOs. Accordingly the details of CBS added and its correlation is given below.

Table.4 Identification of content beyond syllabus

| Content beyond syllabus added | POs strengthened/Vacant filled | CO/Unit |
|--|--------------------------------|--------------------------|
| Application of Lists: Sparse Matrix, P | PO3 Vaccant Filled | C302.3 & C302.5/II & III |

- Mapping of COs with POs, PSOs- after CBS.

Table.5 Mapping of COs, C, PSOs with POs- after CBS.

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| | | | | | | | | | | | | | | |

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal

Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

| | | | | | | | | | | | | | | |
|--------|---|---|---|---|---|---|---|--|---|---|---|---|---|---|
| C302.1 | 2 | 2 | 3 | 3 | 1 | 2 | 1 | | 2 | 1 | 2 | 2 | 2 | 2 |
| C302.2 | 1 | 3 | 2 | 1 | * | 1 | * | | 3 | 1 | 2 | 3 | 2 | 2 |
| C302.3 | 2 | 1 | 2 | 1 | 3 | 2 | 3 | | 2 | * | 2 | 1 | 2 | 2 |
| C302.4 | 1 | 2 | 2 | 3 | 3 | 1 | 3 | | 2 | 1 | 2 | 2 | 2 | 2 |
| C302.5 | 3 | 3 | 1 | 2 | 3 | 3 | 3 | | 3 | 1 | 2 | 3 | 2 | 2 |
| C302.6 | 3 | 1 | 2 | 2 | 2 | 3 | 2 | | * | 2 | 2 | 1 | 2 | 2 |

8. Content beyond syllabus is thus identified based on the above. Plan for handling of CBS by internal/external resource person/ industrial visits are decided. This will be included in the class log book.
9. Lecture schedule should be prepared unit wise, as in the syllabus. Number of periods per unit and total number of periods planned should not be less than, periods allotted in the syllabus of Anna University.
10. Plan for additional Periods for IA tests, CBS, NPTEL delivery, Seminar, Quiz etc are to be incorporated in the lecture schedule. These periods are added exclusive of number of periods prescribed in the syllabus.
11. Plan for at least three assignments (with level of correlation), seminar topic, quiz questions discussed.
12. Separate tutorial sheets should be prepared and supplied to all students. Minimum two periods per unit to be planned, totally 10 tutorial periods. Minimum 2 tutorial questions should be set per unit, totally 10 tutorial questions.
13. Bright students and slow learners are to be identified, immediately after IA test - I. such students may be counselled suitably and the evidence for counselling to be recorded in the attendance cum assessment record. (Sign of students with date and time of counselling, to be strictly recorded and to be attached in the course file). Such counselling may be conducted after college hours.
14. For those students secured less than 60% in the IA Test, Makeup test should be conducted. Correspondingly root cause analysis for reasons of failure, corrective and preventive action, and follow up action taken should be filed properly.
15. Contents of course file to be reviewed periodically.
16. Lecture schedule, assignment questions, tutorial questions, course materials, AU questions (at least 5) should be supplied within one week after the commencement of classes.
17. Course material should be uploaded in the college website for student's reference.
18. Discrepancy in question paper, if any to be informed to the controller of examinations through web portal entry, after getting approval from the HoD & the Principal. Critically asked questions, if any to be discussed with the students of the next batch.
19. Immediately after the publication of the results, analysis are to be carried out and follow up action to be taken for the failures.
20. IA test question papers should be set as per the norms of the college, incorporating marks for learning outcomes and course outcomes. Common question papers should be set.
21. Certificate courses/Workshop/guest lectures may be planned inviting experts from industry/higher learning institutions.
22. After IA test, an objective type tests may be conducted (3 times in a semester-30 minutes duration-maximum 10 questions). Questions asked in GATE, TANCET, IES or any other Competitive examination can be taken as a reference. This is to facilitate the bright students to prepare for higher level of thinking and to enhance placement and higher studies opportunities.
23. IA test papers, assignment papers or any other papers submitted by the students, should be returned to the students within 5 days after correction. Sample paper should be suitably filed.
24. Long absentees of students if any to be informed to the parents through class coordinator, if such students attendance less than 75%.


Course coordinator




HoD/CSE

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| S.No | Date | Period | Topics to be Covered | Book & Page. No. |
|--|---------|--------|--|------------------|
| UNIT -I -LISTS | | | Target periods :9 | |
| 1 | 7.8.19 | 3 | Abstract Data Types (ADTs) ,List ADT | T1 |
| 2 | 8.8.19 | 2 | Array-based implementation | T1 |
| 3 | 9.8.19 | 4 | Linked list implementation | T1 |
| 4 | 12.8.19 | 1 | Singly linked lists | |
| 5 | 13.8.19 | 2 | Circularly linked lists | T1 |
| 6 | 14.8.19 | 3 | Doubly-linked lists | T1 |
| 7 | 16.8.19 | 2 | Applications of lists | T1 |
| 8 | 19.8.19 | 3 | Polynomial ADT | T1 |
| 9 | 20.8.19 | 2 | Radix Sort – Multilists. | T1 |
| Unit –II STACKS AND QUEUES | | | | |
| 10. | 21.8.19 | 4 | Stack ADT ,Operations | T1 |
| 11. | 22.8.19 | 1 | Applications ,Balancing Symbols | T1 |
| 12. | 23.8.19 | 2 | Evaluating arithmetic expressions- Infix to Postfix conversion | T1 |
| 13. | 26.8.19 | 3 | Function Calls | T1 |
| 14. | 27.8.19 | 2 | Queue ADT | T1 |
| 15. | 28.8.19 | 3 | Operations | T1 |
| 16. | 29.8.19 | 2 | Circular Queue | T1 |
| 17. | 30.8.19 | 3 | DeQueue | T1 |
| 18. | 2.9.19 | 2 | Applications of Queues. | T1 |
| UNIT III -TREES | | | Target periods :9 | |
| 19. | 3.9.19 | 4 | Tree ADT | |
| 20 | 4.9.19 | 1 | Tree Traversals Binary | |
| 21 | 5.9.19 | 2 | Tree ADT | |
| 22. | 6.9.19 | 3 | Expression trees | T1 |
| 23. | 9.9.19 | 2 | Binary Search Tree | T1 |
| 24. | 10.9.19 | 3 | ADT | T1 |
| 25. | 11.9.19 | 3 | AVL Trees | T1 |
| 26. | 12.9.19 | 2 | Priority Queue (Heaps) | T1 |
| 27. | 13.9.19 | 3 | Binary Heap. | T1 |
| UNIT IV -MULTIWAY SEARCH TREES AND GRAPHS | | | Target periods :9 | |
| 28 | 16.9.19 | 4 | B-Tree , B+ Tree | T1 |
| 29 | 17.9.19 | 1 | Graph Definition – Representation of Graphs | T1 |
| 30. | 18.9.19 | 2 | Types of Graph - Breadth-first traversal | T1 |
| 31. | 19.9.19 | 3 | Depth-first traversal — Bi-connectivity | T1 |
| 32 | 20.9.19 | 2 | Euler circuits – Topological Sort Dijkstra's algorithm | |
| 33. | 23.9.19 | 3 | Minimum Spanning Tree | T1 |
| 34 | 24.9.19 | 2 | Prim's algorithm | |
| 35 | 25.9.19 | 3 | Kruskal's algorithm | |
| UNIT V -SEARCHING, SORTING AND HASHING TECHNIQUES | | | Target Periods:9 | |
| 36 | 26.9.19 | 4 | Searching – Linear Search | T1 |
| 37 | 27.9.19 | 1 | Binary Search. Sorting | T1 |



Dr. G. Balakrishnan, M.E., Ph.D.,

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| | | | | |
|-----|----------|---|-------------------------------------|----------------|
| 38. | 1.10.19 | 2 | Bubble sort – Selection sort | T1 |
| 39. | 2.10.19 | 3 | Insertion sort – Shell sort | |
| 40. | 3.10.19 | 2 | Merge Sort – Hashing | T1 |
| 41. | 8.10.19 | 3 | Hash Functions | T1 |
| 42. | 9.10.19 | 2 | Separate Chaining – Open Addressing | T1 |
| 43. | 10.10.19 | 4 | Rehashing | T1 |
| 44. | 14.10.19 | 1 | Extendible Hashing | T1 |
| 45. | 17.10.19 | 1 | Space Matrix | R ₁ |

Book Reference - Text Books


| Sl. No. | Title of the Book | Author | Publisher | Year |
|---------|---|-----------------|-------------------|------|
| 1. | Data Structures and Algorithm Analysis in C | Mark Allen Weis | Pearson Education | 2005 |
| 2. | Introduction to Data Structures in C | Kamthane, | Pearson Education | 2007 |

Book Reference - Reference Books

| Sl. No. | Title of the Book | Author | Publisher | Year |
|---------|----------------------------------|---|-------------------------|------|
| 1. | Data Structures Using C and C++. | Langsam, Augenstein and Tanenbaum. | Pearson Education, | 2015 |
| 2. | Introduction to Algorithms | Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein. | Mcgraw Hill/ MIT Press, | 2022 |
| 3. | Data Structures | Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft. | Pearson Education, | 2002 |
| 4. | Data Structures | Kruse. | Pearson Education, | 2006 |

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Signature of the Faculty in-charge


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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CBS-PROOF

ACADEMIC YEAR: 2019-2020(ODD)

SEM: 03

REGULATION: 2017

PROGRAM: CSE

Name of the Faculty: Mrs. A. Ramya

TOPIC: SPARCE MATRIX



(Handwritten signature)

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Assignment Answer Sheet

Name of the Student: P. Ajith Kumar

AU Register Number: 811218104002

| | | | | | |
|-----------------|--------|------------------|----------------|---------------------|---------|
| Assignment – 01 | | Date of Issue: | 11.8.2019 | Marks | 10 |
| Course code | CS8391 | Course Title | Data Structure | | |
| Year | II | Semester/Section | III/A | Date of Submission: | 21.8.19 |

| Q.No | Questions | CO |
|------|---|--------|
| 1 | Explain Array based implementation of element | C203,2 |
| 2 | Explain the various operation on singly list | C203,2 |

Mark Allocation

| Rubrics | Marks Allocated | Marks obtained |
|----------------------|-----------------|----------------|
| Content Quality | 6 | 5 |
| Presentation Quality | 2 | 2 |
| Timely submission | 2 | 1 |
| Total marks | 10 | 8 |

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Name and Signature of the Faculty Incharge

HoD/CSE



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IQAC Academic Audit Form

ACADEMIC YEAR: 2019-2020 ODD SEMESTER

Name of Department : CSE Year / Sem / Sec : 11 / 111 No. of Students Registered :

Details of Examination : IA Test -1

| S.No. | Course Code | List of Reg.No Verified | Course Log Book Verified (Y/N) | Course File Verified (Y/N) | No of students Attended | No of Absentees | No of Failures | Pass % | Remarks |
|-------|-------------|-------------------------------|--------------------------------|----------------------------|-------------------------|-----------------|----------------|--------|---------|
| 1.) | HA8351 | 811218104001, 811218104002 | Y | Y | 32 | 1 | 3 | 90% | - |
| 2.) | CS8351 | 811218104001, 811218104002 | Y | Y | 32 | 1 | 2 | 93% | - |
| 3.) | CS8391 | 811218104001, 811218104002 | Y | Y | 32 | 1 | 2 | 93% | - |
| 4.) | CS8392 | 811218104001, 811218104002 | Y | Y | 32 | 1 | 4 | 87% | - |
| 5.) | EC8395 | 811218104001, 811218104002 | Y | Y | 32 | 1 | 2 | 93% | - |

Verified by

External Member Name and Signature:

Internal Member Name and Signature:

Overall Remarks:

HoD/ CSE

IQAC Co-ordinator

Principal

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Register Number:



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| | | | | |
|-------------------------------------|---------------|---------------------|------------------------|---------------------------------------|
| Internal Assessment Exam - I | | Date/Session | Marks | 60 |
| Course code | CS8391 | Course Title | Data Structures | |
| Regulation | 2017 | Duration | 90 minutes | Academic Year 2019-2020 |
| Year | 2020 | Semester | III | Department CSE |

COURSE OUTCOMES

| | |
|-------------|--|
| CO1: | Define linear and non-linear data structures. |
| CO2: | Implement abstract data types for linear data structures. |
| CO3: | Implement linear and non-linear data structure operations. |
| CO4: | Apply the different linear/non-linear data structure operations for solving a given problem. |
| CO5: | Apply appropriate graph algorithms for graph applications. |
| CO6: | Critically analyze the various sorting algorithms. |

| Q.No. | Question | CO | BTS |
|---|--|----|-----|
| PART A | | | |
| (Answer all the Questions 9x 2 = 18 Marks) | | | |
| 1 | Define: Data Structure. | 1 | 1 |
| 2 | List out the disadvantages of Arrays. | 2 | 1 |
| 3 | List out the advantages of using a linked list. | 2 | 1 |
| 4 | Differentiate: Arrays and Linked Lists. | 2 | 2 |
| 5 | Define: Linked List. | 1 | 1 |
| 6 | List out the applications of a linked list. | 2 | 2 |
| 7 | List the various types of queues. | 2 | 2 |
| 8 | List the applications of stacks | 2 | 2 |
| 9 | List out the basic operations that can be performed on a stack. | 2 | 2 |
| PART B | | | |
| (Answer all the Questions 2 x 14 = 28 Marks) | | | |
| 11a | Explain Array based implementation of elements. | 2 | 2 |
| OR | | | |
| 11b | Elaborate the various operations on Singly Linked List. | 2 | 2 |
| 12a | Describe the various operations on Circularly Linked List. | 2 | 2 |
| OR | | | |
| 12b | Explain the Various Operations of stack using array. | 2 | 2 |
| PART C | | | |
| (Answer all the Questions 1 x 14 = 14 Marks) | | | |
| 13a | Explain Polynomial manipulation in detail. | 2 | 2 |
| OR | | | |
| 13b | Outline, how to convert Infix to Postfix expression with an example. | 2 | 3 |

Course Faculty
(Name / Sign / Date)

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

HoD
(Name / Sign / Date)

| | | | |
|--|---|---|---|
| | Linked list consist of a series of structures which are not necessarily adjacent in memory each structure contains the element and a pointer to a structure containing its successor we call this the next pointer The last cell's next pointer points to NULL | | |
| 6 | List out the applications of a linked list. Some of the important applications of linked lists are manipulation of polynomials, sparse matrices, stacks and queues. | 2 | 2 |
| 7 | List the various types of queues. Linear Queues Circular Queues Double-Ended-Queue | 2 | 2 |
| 8 | List the applications of stacks Towers of Hanoi Reversing a string Balanced parenthesis Recursion using stack Evaluation of arithmetic expressions | 2 | 2 |
| 9 | List out the basic operations that can be performed on a stack. Basic operations that can be performed on a stack are <ul style="list-style-type: none"> • push operation • pop operation • empty check • fully occupied check | 2 | 2 |
| PART B (Answer all the Questions 2 x 14 = 28 Marks) | | | |
| 11a | Explain Array based implementation of elements. <ul style="list-style-type: none"> - What is Array? - Operations on Array. - Insertion - Deletion - Print - Find - Advantages - Disadvantages | 2 | 2 |
| OR | | | |
| 11b | Elaborate the various operations on Singly Linked List. <ul style="list-style-type: none"> - Insertion - Deletion - Find - IsLast - IsEmpty - Advantages - Disadvantages | 2 | 2 |
| 12a | Describe the various operations on Circularly Linked List. <ul style="list-style-type: none"> - Creation - Insertion - Deletion - Traversing | 2 | 2 |

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Principal


Indra Ganesan College of Engineering


IG Valley, Madurai Main Road

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| | | | |
|--|--|---|---|
| | <ul style="list-style-type: none"> - Advantages - Disadvantages | | |
| OR | | | |
| 12b | <p>Explain the Various Operations of stack using array.</p> <ul style="list-style-type: none"> - Push() - Pop() - IsFull() - IsEmpty() | 2 | 2 |
| PART C (Answer all the Questions 1 x 14 = 14 Marks) | | | |
| 13a | <p>Explain Polynomial manipulation in detail.</p> <ul style="list-style-type: none"> - What is polynomial? - Polynomial ADT - Creation of the polynomial - Addition of two polynomial - Subtraction of two polynomial | 2 | 2 |
| OR | | | |
| 13b | <p>Outline, how to convert Infix to Postfix expression with an example.</p> <ul style="list-style-type: none"> - Steps - Program - Example | 2 | 3 |


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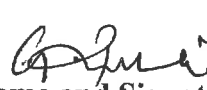

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 (Name / Sign / Date)



INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 622 012, India
(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

Internal Assessment Test Answer Book

| | | | | | |
|---|---|--------------------------------|--------------------------------|------------------------|--------------------------|
| Name | R. Ajiith Kumar | | | Year/ Semester/Section | ii / iii |
| Batch No. | 811213104002 | Date/Session | 2/9/19 | Department | CSA |
| Course code | CS8891 | Course Title | Data Structure | | |
| Internal Assessment Test | IAT 1 <input checked="" type="checkbox"/> | IAT 2 <input type="checkbox"/> | IAT 3 <input type="checkbox"/> | Model | <input type="checkbox"/> |
| Name and Signature of the Invigilator with date | G. REVATHI | | | | |

| Instruction to the Student: Put tick mark to the question attended in the column against question. | | | | | | | |
|--|---|-------|--------------------|---|-------|--|-------------|
| Part A | | | Part B / Part C | | | | Total Marks |
| Q. No. | ✓ | Marks | Q. NO. | ✓ | a | b | |
| | | | | | Marks | Marks | |
| 1 | ✓ | 2 | 11 | | | 12 | 12 |
| 2 | ✓ | 2 | 12 | | 11 | | 11 |
| 3 | ✓ | 1 | 13 | | 13 | | 13 |
| 4 | / | 2 | 14 | | | | |
| 5 | / | 2 | 15 | | | | |
| 6 | / | 1 | 16 | | | | |
| 7 | / | 2 | Total | | | 36 | |
| 8 | / | 2 | 52 | | |  Name and Signature of the Examiner with date | |
| 9 | / | 2 | | | | | |
| 10 | x | | | | | | |
| Total | | 16 | Grand Total | | | | |

| To be filled by the examiner | | | | | | | |
|---|----|----|---|---|---|---|---|
| Course Outcomes | 1 | 2 | 3 | 4 | 5 | 6 | Total |
| Marks allotted | 30 | 30 | | | | | |
| Marks Obtained | 26 | 27 | | | | | |
| IQAC Audit - Remarks | | | | | | | |
|  Dr. G. Balakrishnan, M.E., Ph.D. Principal Indra Ganesan College of Engineering IG Valley, Madurai Main Road Manikandam, Trichy-620 012. | | | | | | |  Name and Signature of the IQAC member |

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India (Approved by AICTE, New Delhi, Affiliated to Anna
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ACADEMIC YEAR 2019 – 2020 (ODD SEMESTER)

STUDENTS MARK STATEMENT-CO BASED

Internal Exam 1

SUBJECT CODE & TITLE: CS8391 & Data Structures

YEAR/SEM: II/III

MONTH & YEAR: AUG&2019

| S.NO | REG NO | STUDENT NAME | COX (Y) | COX (Y) | TOTAL (60) |
|------|--------------|---------------------|------------|------------|---------------|
| 1 | 811218104001 | Aishwarya M | 20 | 21 | 41 |
| 2 | 811218104002 | Ajith Kumar R | 21 | 12 | 33 |
| 3 | 811218104003 | Aravindh Samy P | 4 | 7 | 11 |
| 4 | 811218104004 | Arjun V | 24 | 13 | 37 |
| 5 | 811218104005 | Dharshini A | 28 | 20 | 48 |
| 6 | 811218104006 | Dinesh Kumar K | 21 | 19 | 40 |
| 7 | 811218104007 | Gowtham K | 16 | 28 | 44 |
| 8 | 811218104008 | Hariharan N | 19 | 17 | 36 |
| 9 | 811218104009 | Hema Latha B | 18 | 22 | 40 |
| 10 | 811218104010 | Jegathiswari.D | 19 | 11 | 30 |
| 11 | 811218104011 | Joshi Dayana K | 25 | 23 | 48 |
| 12 | 811218104012 | Kanagaraj K S | 17 | 13 | 30 |
| 13 | 811218104013 | Kiruthiga V | 22 | 24 | 46 |
| 14 | 811218104014 | Madhavan S | 26 | 24 | 50 |
| 15 | 811218104015 | Mahendran S | 10 | 21 | 33 |
| 16 | 811218104017 | Muthaiya P | 19 | 12 | 31 |
| 17 | 811218104018 | Neethimozhi A | 23 | 10 | 33 |
| 18 | 811218104019 | Nithya P | 17 | 14 | 31 |
| 19 | 811218104020 | Nivedha S | 25 | 26 | 51 |
| 20 | 811218104021 | Priyanga.G | 20 | 23 | 43 |
| 21 | 811218104022 | Ramya R | AB | AB | AB |
| 22 | 811218104023 | Sharvesh Charan.S.A | 13 | 21 | 34 |
| 23 | 811218104024 | Sathasivam P | 31 | 12 | 43 |
| 24 | 811218104026 | Shalini P | 19 | 21 | 40 |
| 25 | 811218104027 | Shanmuganathan P | 21 | 13 | 34 |
| 26 | 811218104028 | Sheela.S | 26 | 11 | 37 |
| 27 | 811218104029 | Sudhakaran C | 17 | 16 | 33 |
| 28 | 811218104030 | Sugasini.G | 15 | 15 | 30 |
| 29 | 811218104031 | Vaishnavi G | 24 | 21 | 45 |
| 30 | 811218104032 | Vigna Sri S | 28 | 24 | 52 |

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Principal

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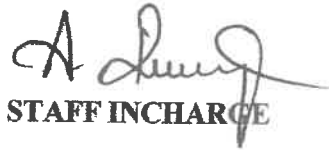
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Manikandam, Trichy-620 012.

| | | | | | |
|----|--------------|------------------|----|----|----|
| 31 | 811218104033 | Vijaya Dharani K | 19 | 11 | 30 |
| 32 | 811218104034 | Vinothini S | 12 | 11 | 23 |
| 33 | 811218104501 | Sivasangari C | 18 | 16 | 34 |
| | | | 20 | 21 | 41 |

| <20 | 20-30 | 31-40 | 41-50 | 51-60 |
|-----|-------|-------|-------|-------|
| 1 | 1 | 16 | 11 | 2 |

| | |
|--------------------------------|-------|
| Total No.of Candidates Present | 31 |
| Total No.of Candidates Absent | 1 |
| Total No.of Students Pass | 30 |
| Total No. of Students Fail | 2 |
| Percentage of Pass | 93.7. |


STAFF INCHARGE


HoD/CSE


PRINCIPAL


Dr. G. Balakrishnan, M.E., Ph.D.,
Principal

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ROOT CAUSE ANALYSIS

Name of the Faculty : Mrs. A. Ramya AP/CSE
 Degree & Program : B.E / CSE
 IA Test : I/II/III/Model
 Target : 95
 Course Code & Name : CS8371 & Sava structure
 Semester & Section : II / A
 University Exam/Month & Year: DEC/2019
 Achieved : 93

| S.NO | BATCH NO | NAME OF THE STUDENT | CAUSES FOR FAILURE | SIGNATURE OF THE STUDENT WITH DATE | CORRECTIVE ACTION TAKEN | PREVENTIVE ACTION TAKEN | FOLLOWUP STATUS | REMARKS OF THE HOD |
|------|-------------------|---------------------|--------------------|------------------------------------|-------------------------|-------------------------|-----------------|--------------------|
| 1. | 811218104 003 | Arjun. V | fever | | Retest | Special coaching | Yes | - |
| 2. | 811218109 034 | Vinodhini. S | Stomach pain | | Retest | Special coaching | Yes | - |
| 3. | 811218110 4022 | Ramya. R | Allergy | | Retest | Special coaching | Yes | - |
| 4. | | | | | | | | |



A. Ramya
 Signature of the Faculty member

P. R. Sudd
 Signature of the HoD/CSE

Dr. G. Balakrishnan, M.E., Ph.D.,
 Principal
 Indra Ganesan College of Engineering
 IG Valley, Madurai Main Road
 Manikandam, Trichy-620 012.