



# NPR College of Engineering & Technology

NPR Nagar, Natham, Dindigul - 624401, Tamil Nadu, India.  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.

An ISO 9001:2015 Certified Institution.

Phone No: 04544- 246 500, 246501, 246502.

Website : [www.nprcolleges.org](http://www.nprcolleges.org), [www.nprcet.org](http://www.nprcet.org), Email [nprcetprincipal@nprcolleges.org](mailto:nprcetprincipal@nprcolleges.org)



## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### COURSE INFORMATION SHEET

<b>PROGRAMME:</b> Computer Science & Engineering	<b>DEGREE:</b> B.E
<b>COURSE:</b> Discrete Mathematics	<b>SEMESTER:</b> 3 <b>CREDITS:</b> 4
<b>COURSE CODE:</b> MA8351 / C201	<b>COURSE TYPE:</b> ALLIED
<b>COURSE AREA/STREAM :</b> Logic and Proofs	<b>CONTACT HOURS:</b> 5+1 hours/Week.
<b>CORRESPONDING LAB COURSE CODE (IF ANY):</b>	<b>LAB COURSE NAME :</b> NIL
<b>COURSE COORDINATOR NAME :</b> Mrs. R. Muthukumari	

#### SYLLABUS:

MODULE	DETAILS	HOURS
I	<b>UNIT I LOGIC AND PROOFS</b> Propositional logic – Propositional equivalences – Predicates and quantifiers – Nested quantifiers – Rules of inference – Introduction to proofs – Proof methods and strategy.	12
II	<b>UNIT II COMBINATORICS</b> Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications	12
III	<b>UNIT III GRAPHS</b> Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.	12
IV	<b>UNIT IV ALGEBRAIC STRUCTURES</b> Algebraic systems – Semi groups and monoids – Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields.	12
V	<b>UNIT V LATTICES AND BOOLEAN ALGEBRA</b> Partial ordering – Posets – Lattices as posets – Properties of lattices – Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra.	12
<b>TOTAL HOURS</b>		<b>60</b>



**TEXT/REFERENCE BOOKS:**

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T1	Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
R1	Lipschutz, S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill
R2	Koshy, T. "Discrete Mathematics with Applications", Elsevier Publications, 2006. www.padeepz.net www.padeepz.net www.padeepz.net
R3	K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011. Tremblay, J.P. and Manohar.R, " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

**COURSE PRE-REQUISITES:**

C.CODE	COURSE NAME	DESCRIPTION	SEM
C201	Discrete Mathematics	The basic concepts of combinatorics and graph theory.	III

**COURSE OBJECTIVES:**

1	To extend student's <b>logical</b> and mathematical maturity and ability to deal with abstraction.
2	To introduce most of the <b>basic</b> terminologies used in computer science courses and application of ideas to solve practical problems.
3	To understand the <b>basic concepts</b> of combinatorics and graph theory.
4	To familiarize the <b>applications</b> of algebraic structures.
5	To <b>understand</b> the concepts and significance of lattices and boolean algebra which are widely used in computer science and engineering.

**COURSE OUTCOMES:**

SNO	DESCRIPTION	Level in Bloom's Taxonomy
C201.1	Summarize the concept of elementary mathematical logical arguments.	K2
C201.2	Apply basic counting techniques to solve combinatorial problems.	K2
C201.3	Associate the applications of Graph theory models and data structures.	K3
C201.4	Describe the concepts and properties of algebraic structures such as groups, rings and fields.	K3



C201.5	Extend the concepts of Boolean algebra in the area of lattices.	K3
C201.6	Apply the knowledge of argumental discrete mathematical problems.	K2

### CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C201.1	2	-	1	-	-	-	-	-	-	-	-	-
C201.2	2	1	1	-	-	-	-	-	-	-	-	-
C201.3	3	2	-	-	-	-	-	-	-	-	-	-
C201.4	3	-	-	-	-	-	-	-	-	-	-	-
C201.5	3	-	2	-	-	-	-	-	-	-	-	-
C201.6	2	-	2	-	-	-	-	-	-	-	-	-
C201	3	2	2	-	-	-	-	-	-	-	-	-

### CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

CO	PSO 1	PSO 2	PSO 3
C201.1	2	-	-
C201.2	2	-	-
C201.3	2	-	-
C201.4	2	-	-
C201.5	2	-	-
C201.6	2	-	-
C201	2	-	-

### GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

SNO	DESCRIPTION	Mapping to PO	PROPOSED ACTIONS
1	Operations on graphs	PO3	Assignment



2	Degree sequences	PO1, PO2	Study material distributed.
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**TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:**

Sl.No	Topic	Mapping to PO
1	Chordal lines	PO1, PO2, PO3
2	Multinomial Theorem	PO1, PO2, PO3
3	Combinations of multisets	PO1, PO2, PO3
4	Difference Sequences	PO1, PO2, PO3

**WEB SOURCE REFERENCES:**

1	<a href="https://nptel.ac.in/courses/111/106/111106052/">https://nptel.ac.in/courses/111/106/111106052/</a>	
2	<a href="https://nptel.ac.in/courses/111/106/111106086/">https://nptel.ac.in/courses/111/106/111106086/</a>	
3	<a href="https://nptel.ac.in/courses/106/102/106102013/">https://nptel.ac.in/courses/106/102/106102013/</a>	
4	<a href="https://nptel.ac.in/content/storage2/courses/111106086/Lecture3.pdf">https://nptel.ac.in/content/storage2/courses/111106086/Lecture3.pdf</a>	
5	<a href="https://nptel.ac.in/courses/111/106/111106087/">https://nptel.ac.in/courses/111/106/111106087/</a>	

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

✓ CHALK & TALK	✓ STUD. ASSIGNMENT	✓ WEB RESOURCES	✓ TUTORIAL
✓ LCD/SMART BOARDS	✓ STUD. SEMINARS		

**DELIVERY METHODS USED FOR EACH COURSE OUT COME**

SNO	DELIVERY METHODS
C201.1	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C201.2	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C201.3	CHALK & TALK, STUD.ASSIGNMENT, WEB RESOURCES
C201.4	CHALK & TALK, WEB RESOURCES, TUTORIAL
C201.5	CHALK & TALK, STUD. ASSIGNMENT,, WEB RESOURCES
C201.6	CHALK & TALK, STUD.SEMINARS



**ASSESSMENT METHODOLOGIES-DIRECT.**

✓ ASSIGNMENTS	✓ STUD. SEMINARS	✓ TESTS/MODEL EXAMS	✓ UNIV. EXAMINATION
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**ASSESSMENT METHODOLOGIES-INDIRECT.**

STUDENT FEEDBACK ON FACULTY (ONCE)	
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**ASSESSMENT METHODOLOGIES USED FOR EACH COURSE OUT COME**

SNO	ASSESSMENT METHODOLOGIES-DIRECT	ASSESSMENT METHODOLOGIES-INDIRECT
C201.1	Assignments, Univ. Examination, Stud. Seminars, Tests/Model Exams	Student Feedback On Faculty
C201.2	Univ. Examination, Tests/Model Exams,	Student Feedback On Faculty
C201.3	Univ. Examination, Tests/Model Exams, Assignments	Student Feedback On Faculty
C201.4	Univ. Examination, Tests/Model Exams	Student Feedback On Faculty
C201.5	Assignments, Univ. Examination, Tests/Model Exams	Student Feedback On Faculty
C201.6	Univ. Examination, Tests/Model Exams, Stud Seminars	Student Feedback On Faculty

**Prepared by**  
**(Course Coordinator)**

  
**Name and Signature**  
**Mrs. R. Muthukumari**

**Approved by**  
**(Programme Coordinator)**

  
**Name and Signature**  
**Dr. T. Priya**





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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### COURSE INFORMATION SHEET

<b>PROGRAMME:</b> Computer Science & Engineering	<b>DEGREE:</b> B.E
<b>COURSE:</b> Digital Principles and System Design	<b>SEMESTER:</b> 3 <b>CREDITS:</b> 4
<b>COURSE CODE:</b> CS8351 / C202	<b>COURSE TYPE:</b> CORE
<b>COURSE AREA/STREAM :</b> System Design	<b>CONTACT HOURS:</b> 5+1 hours/Week.
<b>CORRESPONDING LAB COURSE CODE (IF ANY):</b> CS8382	<b>LAB COURSE NAME :</b> Digital Systems Lab
<b>COURSE COORDINATOR NAME :</b> Prof. G. Eangovan	

#### SYLLABUS:

MODULE	DETAILS	HOURS
I	Number Systems - Arithmetic Operations - Binary Codes- Boolean Algebra and Logic Gates - Theorems and Properties of Boolean Algebra - Boolean Functions - Canonical and Standard Forms - Simplification of Boolean Functions using Karnaugh Map - Logic Gates – NAND and NOR Implementations.	12
II	Combinational Circuits – Analysis and Design Procedures - Binary Adder-Subtractor - Decimal Adder - Binary Multiplier - Magnitude Comparator - Decoders – Encoders – Multiplexers - Introduction to HDL – HDL Models of Combinational circuits.	12
III	Sequential Circuits - Storage Elements: Latches , Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters - HDL Models of Sequential Circuits.	12
IV	Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards.	12
V	RAM – Memory Decoding – Error Detection and Correction - ROM - Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices.	12
<b>TOTAL HOURS</b>		<b>60</b>



**TEXT/REFERENCE BOOKS:**

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T1	M. Morris R. Mano, Michael D. Ciletti, —Digital Design: With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, 6th Edition, Pearson Education, 2017.
R1	G. K. Kharate, Digital Electronics, Oxford University Press, 2010
R2	John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.
R3	Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013
R4	Donald D. Givone, Digital Principles and Design, Tata Mc Graw Hill, 2003.

**COURSE PRE-REQUISITES:**

C.CODE	COURSE NAME	DESCRIPTION	SEM
NIL			

**COURSE OBJECTIVES:**

1	To design digital circuits using simplified Boolean functions
2	To analyze and design combinational circuits
3	To analyze and design synchronous and asynchronous sequential circuits
4	To understand Programmable Logic Devices
5	To write HDL code for combinational and sequential circuits

**COURSE OUTCOMES:**

SNO	DESCRIPTION	Level in Bloom's Taxonomy
C202.1	Apply the Boolean functions using K-Map	K3
C202.2	Interpret Combinational circuits for a given functions using logic gates.	K3
C202.3	Recognise Synchronous Sequential circuits for the given condition	K3
C202.4	Recognise Asynchronous Sequential circuits for the given condition.	K3
C202.5	Apply Programmable Logic towards memory management	K3
C202.6	Solve codes for the design of digital circuits.	K2



## CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C202.1	3	3	1	1	-	1	1	1	-	-	-	-
C202.2	3	3	2	2	1	1	1	1	-	-	-	2
C202.3	3	3	2	2	1	1	1	1	-	-	-	1
C202.4	3	3	2	2	1	1	1	1	-	-	-	1
C202.5	3	3	2	2	-	1	1	1	-	-	-	2
C202.6	3	3	2	2	1	1	1	1	-	-	-	1
C202	3	3	2	2	1	1	1	1	-	-	-	1

## CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

CO	PSO 1	PSO 2	PSO 3
C202.1	3	1	-
C202.2	3	2	1
C202.3	3	2	1
C202.4	3	2	1
C202.5	3	2	-
C202.6	3	2	1
C202	3	2	1

### GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

SNO	DESCRIPTION	Mapping to PO	PROPOSED ACTIONS
NIL			

### TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:

Sl.No	Topic	Mapping to PO
1	Data Converters (ADC to DAC and DAC to ADC)	PO10 ,PO12



2	Homogenous IC Fabrication	PO10, PO12
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**WEB SOURCE REFERENCES:**

1	<a href="http://en.wikipedia.org/wiki/">en.wikipedia.org/wiki/</a>
2	<a href="https://nptel.ac.in/courses/106/105/106105183/">https://nptel.ac.in/courses/106/105/106105183/</a>
3	<a href="http://www.w3schools.com/">www.w3schools.com/</a>
4	<a href="http://www.cs.ccsu.edu/~stan/classes/CS490/Slides/DPSD-Ch4-4.pdf">http://www.cs.ccsu.edu/~stan/classes/CS490/Slides/DPSD-Ch4-4.pdf</a> 6
5	<a href="https://www.geeksforgeeks.org/basics-Digital-Principles/">https://www.geeksforgeeks.org/basics-Digital-Principles/</a>

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

✓ CHALK & TALK	✓ STUD. ASSIGNMENT	✓ WEB RESOURCES	✓ TUTORIAL
✓ LCD/SMART BOARDS	✓ STUD. SEMINARS		

**DELIVERY METHODS USED FOR EACH COURSE OUT COME**

SNO	DELIVERY METHODS
C202.1	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C202.2	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C202.3	CHALK & TALK , STUD.ASSIGNMENT, WEB RESOURCES
C202.4	CHALK & TALK, LCD/SMART BOARDS, WEB RESOURCES, TUTORIAL
C202.5	CHALK & TALK, STUD. ASSIGNMENT, LCD/SMART BOARDS, WEB RESOURCES
C202.6	CHALK & TALK, LCD/SMART BOARDS, STUD.SEMINARS

**ASSESSMENT METHODOLOGIES-DIRECT.**

✓ ASSIGNMENTS	✓ STUD. SEMINARS	✓ TESTS/MODEL EXAMS	✓ UNIV. EXAMINATION
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**ASSESSMENT METHODOLOGIES-INDIRECT.**

STUDENT FEEDBACK ON FACULTY (ONCE)	
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**ASSESSMENT METHODOLOGIES USED FOR EACH COURSE OUT COME**

SNO	ASSESSMENT METHODOLOGIES-DIRECT	ASSESSMENT METHODOLOGIES-INDIRECT
C202.1	ASSIGNMENTS, UNIV. EXAMINATION, STUD. SEMINARS, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C202.2	UNIV. EXAMINATION, TESTS/MODEL EXAMS,	STUDENT FEEDBACK ON FACULTY
C202.3	UNIV. EXAMINATION, TESTS/MODEL EXAMS, ASSIGNMENTS	STUDENT FEEDBACK ON FACULTY
C202.4	UNIV. EXAMINATION, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C202.5	ASSIGNMENTS, UNIV. EXAMINATION, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C202.6	UNIV. EXAMINATION, TESTS/MODEL EXAMS, STUD SEMINARS	STUDENT FEEDBACK ON FACULTY

**Prepared by  
(Course Coordinator)**

  
**Prof. G. Elangovan**  
**Name and Signature**

**Approved by  
(Programme Coordinator)**

  
**Mr. J. Viswanath**  
**Name and Signature**



	<p align="center"> <b>NPR College of Engineering &amp; Technology</b>          NPR Nagar, Natham, Dindigul - 624401, Tamil Nadu, India.          Approved by AICTE, New Delhi &amp; Affiliated to Anna University, Chennai.          An ISO 9001:2015 Certified Institution.          Phone No: 04544- 246 500, 246501, 246502.          Website : <a href="http://www.nprcolleges.org">www.nprcolleges.org</a>, <a href="http://www.nprcet.org">www.nprcet.org</a>, Email: <a href="mailto:nprcetprincipal@nprcolleges.org">nprcetprincipal@nprcolleges.org</a> </p>	
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**COURSE INFORMATION SHEET**

<b>PROGRAMME:</b> Computer Science & Engineering	<b>DEGREE:</b> B.E
<b>COURSE:</b> Data Structures	<b>SEMESTER:</b> 3 <b>CREDITS:</b> 3
<b>COURSE CODE:</b> CS8391 / C203	<b>COURSE TYPE:</b> CORE
<b>COURSE AREA/STREAM :</b> Programming	<b>CONTACT HOURS:</b> 5+1 hours/Week.
<b>CORRESPONDING LAB COURSE CODE (IF ANY):</b> CS8391 / C206	<b>LAB COURSE NAME :</b> Data Structures Lab
<b>COURSE COORDINATOR NAME :</b> Mr.J.Dinesh	

**SYLLABUS:**

MODULE	DETAILS	HOURS
I	<b>LINEAR DATA STRUCTURES – LIST</b> 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).	9
II	<b>LINEAR DATA STRUCTURES – STACKS, QUEUES</b> Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT – Operations - Circular Queue – Priority Queue - deQueue – applications of queues.	9
III	<b>NON LINEAR DATA STRUCTURES – TREES</b> 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.	9
IV	<b>NON LINEAR DATA STRUCTURES - GRAPHS</b> Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.	9
V	<b>SEARCHING, SORTING AND HASHING TECHNIQUES</b> Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing –	9



Extendible Hashing.	
<b>TOTAL HOURS</b>	<b>45</b>

**TEXT/REFERENCE BOOKS:**

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T1	Mark Allen Weiss, —Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education, 1997.
T2	Reema Thareja, —Data Structures Using C, Second Edition , Oxford University Press, 2011
R1	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, —Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
R2	Aho, Hopcroft and Ullman, —Data Structures and Algorithms, Pearson Education, 1983.
R3	Stephen G. Kochan, —" Programming in C", 3rd edition, Pearson Education.
R4	Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, —Fundamentals of Data Structures in C, Second Edition, University Press, 2008

**COURSE PRE-REQUISITES:**

C.CODE	COURSE NAME	DESCRIPTION	SEM
C114	Programming in C	Basics of C	2

**COURSE OBJECTIVES:**

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

**COURSE OUTCOMES:**

SNO	DESCRIPTION	Level in Bloom's Taxonomy
C203.1	Describe linear data structures using array and linked list.	C203.1
C203.2	Apply data structures like stacks, queues in linear data structure.	C203.2



C203.3	Discuss non-linear data structures tree and its application.	C203.3
C203.4	Apply various algorithms in graph.	C203.4
C203.5	Solve searching, sorting and hashing techniques in data structures.	C203.5
C203.6	Interpret sorting algorithms for a give problem.	C203.6

### CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C203.1	2	2	1	-	-	-	-	-	-	-	-	-
C203.2	2	2	1	-	-	-	-	-	-	-	-	-
C203.3	2	2	1	-	-	-	-	-	-	-	-	-
C203.4	3	2	2	1	-	-	-	-	-	-	-	-
C203.5	3	2	2	1	-	-	-	-	-	-	-	-
C203.6	3	2	2	1	-	-	-	-	-	-	-	-
C203	3	2	2		1	-	-	-	-	-	-	-

### CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

CO	PSO 1	PSO 2	PSO 3
C203.1	2	2	1
C203.2	2	2	1
C203.3	2	2	1
C203.4	2	2	1
C203.5	2	2	1
C203.6	2	2	1
C203	2	2	1

### GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

SNO	DESCRIPTION	Mapping to PO	PROPOSED ACTIONS
1	Circular Queue Learning Material provided. provided.	PO3,PO4 PO5	Seminar



2	Towers of Hanoi Problem (Example of recursion) Learning Material	PO7	Lecture
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**TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:**

Sl.No	Topic	Mapping to PO
1	Red-Black Trees	PO2, PO12
2	Splay Trees	PO10
3	Dijkstra's Algorithm	PO4, PO6
4	Tree Sort	PO5
5	Real World Applications of Hashing	PO10, PO11, PO12

**WEB SOURCE REFERENCES:**

1	<a href="https://www.javatpoint.com/data-structure-tutorial">https://www.javatpoint.com/data-structure-tutorial</a>
2	<a href="https://www.guru99.com/data-structure-algorithms-books.html">https://www.guru99.com/data-structure-algorithms-books.html</a>
3	<a href="https://nptel.ac.in">https://nptel.ac.in</a>
4	<a href="https://www.cs.cmu.edu">https://www.cs.cmu.edu</a>
5	<a href="https://tutorialspoint.com">https://tutorialspoint.com</a>

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

✓ CHALK & TALK	✓ STUD. ASSIGNMENT	✓ WEB RESOURCES	✓ TUTORIAL
✓ LCD/SMART BOARDS	✓ STUD. SEMINARS		

**DELIVERY METHODS USED FOR EACH COURSE OUT COME**

SNO	DELIVERY METHODS
C203.1	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C203.2	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C203.3	CHALK & TALK , STUD.ASSIGNMENT, WEB RESOURCES
C203.4	CHALK & TALK, LCD/SMART BOARDS, WEB RESOURCES, TUTORIAL



C203.5	CHALK & TALK, STUD. ASSIGNMENT, LCD/SMART BOARDS, WEB RESOURCES
C203.6	CHALK & TALK, LCD/SMART BOARDS, STUD.SEMINARS

**ASSESSMENT METHODOLOGIES-DIRECT.**

✓ ASSIGNMENTS	✓ STUD. SEMINARS	✓ TESTS/MODEL EXAMS	✓ UNIV. EXAMINATION
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**ASSESSMENT METHODOLOGIES-INDIRECT.**

STUDENT FEEDBACK ON FACULTY (ONCE)	
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**ASSESSMENT METHODOLOGIES USED FOR EACH COURSE OUT COME**

SNO	ASSESSMENT METHODOLOGIES-DIRECT	ASSESSMENT METHODOLOGIES-INDIRECT
C203.1	ASSIGNMENTS, UNIV. EXAMINATION, STUD. SEMINARS, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C203.2	UNIV. EXAMINATION, TESTS/MODEL EXAMS,	STUDENT FEEDBACK ON FACULTY
C203.3	UNIV. EXAMINATION, TESTS/MODEL EXAMS, ASSIGNMENTS	STUDENT FEEDBACK ON FACULTY
C203.4	UNIV. EXAMINATION, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C203.5	ASSIGNMENTS, UNIV. EXAMINATION, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C203.6	UNIV. EXAMINATION, TESTS/MODEL EXAMS, STUD SEMINARS	STUDENT FEEDBACK ON FACULTY

**Prepared by  
(Course Coordinator)**

*Mr. J. Dinesh*

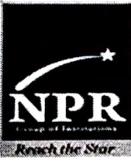
**Name and Signature**

**Approved by  
(Programme Coordinator)**

*Mr. J. Viswanath*

**Name and Signature**



	<h1 style="margin: 0;">NPR College of Engineering &amp; Technology</h1> <p style="margin: 0;">NPR Nagar, Natham, Dindigul - 624401, Tamil Nadu, India.          Approved by AICTE, New Delhi &amp; Affiliated to Anna University, Chennai.          An ISO 9001:2015 Certified Institution.          Phone No: 04544- 246 500, 246501, 246502.          Website : <a href="http://www.nprcolleges.org">www.nprcolleges.org</a>, <a href="http://www.nprcet.org">www.nprcet.org</a>, Email <a href="mailto:nprcetprincipal@nprcolleges.org">nprcetprincipal@nprcolleges.org</a></p>	
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**COURSE INFORMATION SHEET**

<b>PROGRAMME:</b> Computer Science & Engineering	<b>DEGREE:</b> B.E
<b>COURSE:</b> Object Oriented Programming	<b>SEMESTER:</b> 3 <b>CREDITS:</b> 3
<b>COURSE CODE:</b> CS8392 / 204	<b>COURSE TYPE:</b> CORE
<b>COURSE AREA/STREAM :</b> Programming	<b>CONTACT HOURS:</b> 5+1 hours/Week.
<b>CORRESPONDING LAB COURSE CODE (IF ANY):</b> CS8383	<b>LAB COURSE NAME :</b> Object Oriented Programming Lab
<b>COURSE COORDINATOR NAME :</b> Mr.D.Nagaraj	

**SYLLABUS:**

MODULE	DETAILS	HOURS
I	Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment - Java Source File - Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments.	10
II	Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces – Object cloning –inner classes, Array Lists - Strings	9
III	Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files	9



IV	Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.	8
V	Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes - actions - mouse events - AWT event hierarchy – Introducti-on to Swing – layout management - Swing Components – Text Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows – Menus – Dialog Boxes.	9
<b>TOTAL HOURS</b>		<b>45</b>

### TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T1	Herbert Schildt, —Java The complete referencel, 8 <sup>th</sup> Edition, McGraw Hill Education, 2011.
T2	Cay S. Horstmann, Gary cornell, —Core Java Volume –I Fundamentalsl, 9 <sup>th</sup> Edition, Prentice Hall, 2013.
R1	Paul Deitel, Harvey Deitel, —Java SE 8 for programmersl, 3 <sup>rd</sup> Edition, Pearson, 2015.
R2	Steven Holzner, —Java 2 Black bookl, Dreamtech press, 2011.
R3	Timothy Budd, —Understanding Object-oriented programming with Javal, Updated Edition, Pearson Education, 2000.

### COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
CS8251	PROGRAMMING IN C	BASIC KNOWLEDGE ABOUT THE PROGRAMMING CONCEPTS	2

### COURSE OBJECTIVES:

1	To understand Object Oriented Programming concepts and basic characteristics of Java
2	To know the principles of packages, inheritance and interfaces.
3	To define exceptions and use I/O streams
4	To develop a java application with threads and generics classes
5	To design and build simple Graphical User Interfaces



**COURSE OUTCOMES:**

SNO	DESCRIPTION	Level in Bloom's Taxonomy
C204.1	Develop Java programs using OOP principles	K3
C204.2	Develop Java programs with the concepts inheritance and interfaces	K3
C204.3	Build Java applications using exceptions and I/O streams	K2
C204.4	Relate Java applications with threads and generics classes	K6
C204.5	Develop interactive Java programs using swings	K3
C204.6	Demonstrate simple Graphical User Interfaces	K6

**CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME OUTCOMES**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C204.1	2	1	1	-	-	-	-	-	-	-	-	-
C204.2	2	1	1	-	-	-	-	-	-	-	-	-
C204.3	2	1	1	-	-	-	-	-	-	-	-	-
C204.4	2	1	1	-	-	-	-	-	-	-	-	-
C204.5	2	1	1	-	-	-	-	-	-	-	-	-
C204.6	2	1	1	-	-	-	-	-	-	-	-	-
C204	2	1	1	-	-	-	-	-	-	-	-	-

**CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES**

CO	PSO 1	PSO 2	PSO 3
C204.1	2	2	-
C204.2	2	2	-
C204.3	2	2	-
C204.4	2	2	-
C204.5	2	2	-
C204.6	2	2	-
C204	2	2	-



**GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:**

SNO	DESCRIPTION	Mapping to PO	PROPOSED ACTIONS
1	HTML	PO5, PO7	LAB SESSIONS

**TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:**

Sl.No	Topic	Mapping to P O
1	Familiarization of Eclipse	PO1, PO6,PO9

**WEB SOURCE REFERENCES:**

1	<a href="https://docs.oracle.com/javase/tutorial/">https://docs.oracle.com/javase/tutorial/</a>
2	<a href="http://www.javatpoint.com/java-tutorial">http://www.javatpoint.com/java-tutorial</a>
3	<a href="http://www.tutorialspoint.com/java/">http://www.tutorialspoint.com/java/</a>
4	<a href="https://www.youtube.com/channel/UC_c-e1vu4MBqOLY9WV1UrZw">https://www.youtube.com/channel/UC_c-e1vu4MBqOLY9WV1UrZw</a>
5	<a href="https://www.youtube.com/watch?v=_3XiiNZYpAw">https://www.youtube.com/watch?v=_3XiiNZYpAw</a>

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

✓ CHALK & TALK	✓ STUD. ASSIGNMENT	✓ WEB RESOURCES	✓ TUTORIAL
✓ LCD/SMART BOARDS	✓ STUD. SEMINARS		

**DELIVERY METHODS USED FOR EACH COURSE OUT COME**

SNO	DELIVERY METHODS
C204.1	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C204.2	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C204.3	CHALK & TALK , STUD.ASSIGNMENT, WEB RESOURCES
C204.4	CHALK & TALK, LCD/SMART BOARDS, WEB RESOURCES, TUTORIAL



C204.5	CHALK & TALK, STUD. ASSIGNMENT, LCD/SMART BOARDS, WEB RESOURCES
C204.6	CHALK & TALK, LCD/SMART BOARDS, STUD.SEMINARS

**ASSESSMENT METHODOLOGIES-DIRECT.**

✓ ASSIGNMENTS	✓ STUD. SEMINARS	✓ TESTS/MODEL EXAMS	✓ UNIV. EXAMINATION
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**ASSESSMENT METHODOLOGIES-INDIRECT.**

STUDENT FEEDBACK ON FACULTY (ONCE)	
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**ASSESSMENT METHODOLOGIES USED FOR EACH COURSE OUT COME**

SNO	ASSESSMENT METHODOLOGIES-DIRECT	ASSESSMENT METHODOLOGIES-INDIRECT
C204.1	ASSIGNMENTS, UNIV. EXAMINATION, STUD. SEMINARS, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C204.2	UNIV. EXAMINATION, TESTS/MODEL EXAMS,	STUDENT FEEDBACK ON FACULTY
C204.3	UNIV. EXAMINATION, TESTS/MODEL EXAMS, ASSIGNMENTS	STUDENT FEEDBACK ON FACULTY
C204.4	UNIV. EXAMINATION, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C204.5	ASSIGNMENTS, UNIV. EXAMINATION, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C204.6	UNIV. EXAMINATION, TESTS/MODEL EXAMS, STUD SEMINARS	STUDENT FEEDBACK ON FACULTY

**Prepared by**  
**(Course Coordinator)**

**Mr.D.Nagaraj**  
**Name and Signature**

**Approved by**  
**(Programme Coordinator)**

**Mr.J.Viswanath**  
**Name and Signature**





# NPR College of Engineering & Technology

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Website : [www.nprcolleges.org](http://www.nprcolleges.org), [www.nprcet.org](http://www.nprcet.org), Email: [nprcetprincipal@nprcolleges.org](mailto:nprcetprincipal@nprcolleges.org)

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### COURSE INFORMATION SHEET

<b>PROGRAMME:</b> Computer Science & Engineering	<b>DEGREE:</b> B.E
<b>COURSE:</b> Communication Engineering	<b>SEMESTER:</b> 3 <b>CREDITS:</b> 3
<b>COURSE CODE:</b> EC8395 / C205	<b>COURSE TYPE:</b> CORE
<b>COURSE AREA/STREAM :</b>	<b>CONTACT HOURS:</b> 5+1 hours/Week.
<b>CORRESPONDING LAB COURSE CODE (IF ANY):</b> NIL	<b>LAB COURSE NAME :</b> NIL
<b>COURSE COORDINATOR NAME :</b> Mr.S.Sudhakar	

#### SYLLABUS:

MODULE	DETAILS	HOURS
I	<b>UNIT I ANALOG MODULATION</b> Amplitude Modulation – AM, DSBSC, SSBSC, VSB – PSD, modulators and demodulators – Angle modulation – PM and FM – PSD, modulators and demodulators – Superheterodyne receivers	9
II	<b>UNIT II PULSE MODULATION</b> Low pass sampling theorem – Quantization – PAM – Line coding – PCM, DPCM, DM, and ADPCM And ADM, Channel Vocoder - Time Division Multiplexing, Frequency Division Multiplexing	9
III	<b>UNIT III DIGITAL MODULATION AND TRANSMISSION</b> Phase shift keying – BPSK, DPSK, QPSK – Principles of M-ary signaling M-ary PSK & QAM – Comparison, ISI – Pulse shaping – Duo binary encoding – Cosine filters – Eye pattern, equalizers	9
IV	<b>UNIT IV INFORMATION THEORY AND CODING</b> Measure of information – Entropy – Source coding theorem – Shannon-Fano coding, Huffman Coding, LZ Coding – Channel capacity – Shannon-Hartley law – Shannon's limit – Error control codes – Cyclic codes, Syndrome calculation – Convolution Coding, Sequential and Viterbi decoding	9
V	<b>UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS</b> PN sequences – properties – m-sequence – DSSS – Processing gain, Jamming – FHSS – Synchronisation and tracking – Multiple Access – FDMA, TDMA, CDMA	9



**TEXT/REFERENCE BOOKS:**

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T1	H Taub, D L Schilling, G Saha, "Principles of Communication Systems" 3/e, TMH 2007
T2	S. Haykin "Digital Communications" John Wiley 2005
R1	B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd edition, Oxford University Press, 2007
R2	H P Hsu, Schaum Outline Series – "Analog and Digital Communications" TMH 2006
R3	B.Sklar, Digital Communications Fundamentals and Applications" 2/e Pearson Education 2007.

**COURSE PRE-REQUISITES:**

C.CODE	COURSE NAME	DESCRIPTION	SEM

**COURSE OBJECTIVES:**

1	To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues
2	To study the various analog and digital modulation techniques
3	To study the principles behind information theory and coding
4	To study the various digital communication techniques

**COURSE OUTCOMES:**

SNO	DESCRIPTION	Level in Bloom's Taxonomy
C205.1	Ability to comprehend and appreciate the significance and role of this course in the present contemporary world	K1
C205.2	Apply analog and digital communication techniques.	K3
C205.3	Use data and pulse communication techniques.	K3



C205.4	Analyze Source and Error control coding.	K4
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### CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME OUTCOMES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C205.1	3	2	1	-	-	-	-	-	-	-	-	-
C205.2	3	2	1	-	2	-	-	-	-	-	-	-
C205.3	3	2	1	-	2	-	-	-	-	-	-	-
C205.4	3	2	1	-	2	-	-	-	-	-	-	-
C205.5	3	2	1	1	2	-	-	-	-	-	-	-
C205.6	-	-	-	-	-	-	-	-	-	-	-	-
C205	3	2	1	1	2	-	-	-	-	-	-	-

### CORELATION BETWEEN COURSE OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

CO	PSO 1	PSO 2	PSO 3
C205.1	2	1	1
C205.2	2	-	-
C205.3	2	1	-
C205.4	2	-	1
C205.5	2	1	1
C205.6	-	-	-
C205	2	1	1

### GAPS IN THE SYLLABUS - TO MEET INDUSTRY/PROFESSION REQUIREMENTS:

SNO	DESCRIPTION	Mapping to PO	PROPOSED ACTIONS
1	N/L		
2			

### TOPICS BEYOND SYLLABUS/ADVANCED TOPICS/DESIGN:



Sl.No	Topic	Mapping to PO
1	N/L	
2		

**WEB SOURCE REFERENCES:**

1	<a href="https://nptel.ac.in">https://nptel.ac.in</a>
2	<a href="https://tutorialspoint.com">https://tutorialspoint.com</a>

**DELIVERY/INSTRUCTIONAL METHODOLOGIES:**

✓ CHALK & TALK	✓ STUD. ASSIGNMENT	✓ WEB RESOURCES	✓ TUTORIAL
✓ LCD/SMART BOARDS	✓ STUD. SEMINARS		

**DELIVERY METHODS USED FOR EACH COURSE OUT COME**

SNO	DELIVERY METHODS
C205.1	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C205.2	CHALK & TALK, STUD. ASSIGNMENT, TUTORIAL
C205.3	CHALK & TALK , STUD.ASSIGNMENT, WEB RESOURCES
C205.4	CHALK & TALK, LCD/SMART BOARDS, WEB RESOURCES, TUTORIAL
C205.5	CHALK & TALK, STUD. ASSIGNMENT, LCD/SMART BOARDS, WEB RESOURCES

**ASSESSMENT METHODOLOGIES-DIRECT.**

✓ ASSIGNMENTS	✓ STUD. SEMINARS	✓ TESTS/MODEL EXAMS	✓ UNIV. EXAMINATION
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**ASSESSMENT METHODOLOGIES-INDIRECT.**

STUDENT FEEDBACK ON FACULTY (ONCE)	
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## ASSESSMENT METHODOLOGIES USED FOR EACH COURSE OUT COME

SNO	ASSESSMENT METHODOLOGIES-DIRECT	ASSESSMENT METHODOLOGIES-INDIRECT
C205.1	ASSIGNMENTS, UNIV. EXAMINATION, STUD. SEMINARS, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C205.2	UNIV. EXAMINATION, TESTS/MODEL EXAMS,	STUDENT FEEDBACK ON FACULTY
C205.3	UNIV. EXAMINATION, TESTS/MODEL EXAMS, ASSIGNMENTS	STUDENT FEEDBACK ON FACULTY
C205.4	UNIV. EXAMINATION, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY
C205.5	ASSIGNMENTS, UNIV. EXAMINATION, TESTS/MODEL EXAMS	STUDENT FEEDBACK ON FACULTY

**Prepared by  
(Course Coordinator)**

  
**Mr.S.Sudhakar**  
**Name and Signature**

**Approved by  
(Programme Coordinator)**

  
**Mr. J. Viswanath**  
**Name and Signature**

