



BMS COLLEGE OF ENGINEERING, BENGALURU-19
(Autonomous College under VTU)

**DEPARTMENT OF INFORMATION SCIENCE &
ENGINEERING**

SCHEME FOR 3RD AND 4TH SEMESTERS
2021-25



B.M.S. COLLEGE OF ENGINEERING, BENGALURU-19

(Autonomous Institute, Affiliated to VTU)

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

INSTITUTE VISION

Promoting Prosperity of mankind by augmenting Human Resource Capital through Quality Technical Education & Training.

INSTITUTE MISSION

Accomplish Excellence in the field of Technical Education through Education, Research and Service needs of society.

DEPARTMENT VISION

Promote Quality Human Resource Capital by inculcating in every student the art of Creativity and Productivity in the field of Information Technology.

DEPARTMENT MISSION

Offer High Quality Graduate, Post Graduate Programme in Information Technology to prepare students for higher studies and professional career in industry.

Provide good Teaching and Research environment for Quality Education in the field of Information Technology.



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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- PEO1:** Excel as IT Professional with Proficiency in designing solutions to Information Engineering problems.
- PEO2:** Pursue higher studies with the sound knowledge of basic concepts and skills in science and IT disciplines.
- PEO3:** Exhibit professionalism, team work and expose to current trends towards continuous learning.

PROGRAMME OUTCOMES (POs)

- PO1: Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, **and** an engineering specialization to the solution of complex engineering problems.
- PO2: Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4: Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5: Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6: The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.



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- PO7: Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and Team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11: Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12: Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAMME SPECIFIC OUTCOMES (PSOs)

- PSO1:** Apply and Analyze the concepts of Computer Networks to provide solution for evolving needs in Information Technology
- PSO2:** Demonstrate knowledge of Software Engineering with competence in programming languages to solve real-world problems.
- PSO3:** Apply principles of information systems in the field of engineering for proficient solutions

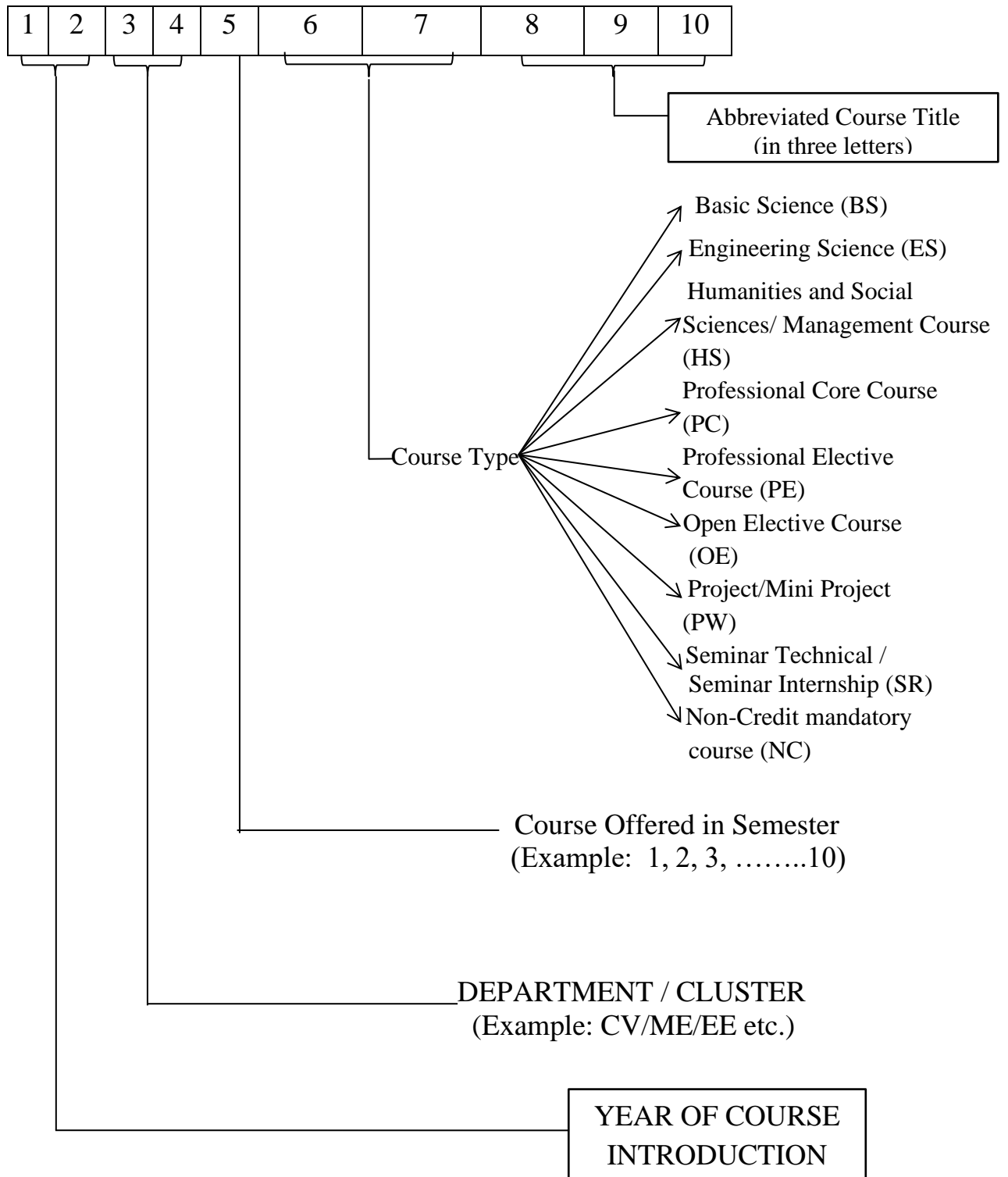


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NOMENCLATURE FOR THE COURSE CODE





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Scheme of Instructions

Semester – III

(With effect from the Academic Year 2018-2022)

Course Type	Course Code	Course Title	Credits			Total Credits	Marks		
			L	T	P		CIE	SEE	Total
BS-7	21MA3BSEM	Engineering Mathematics	2	1	0	3	50	50	100
PC-1	21IS3PCDLD	Digital Logic Design	3	0	0	3	50	50	100
PC-2	21IS3PCCOA	Computer Organization and Architecture	3	0	0	3	50	50	100
PC-3	21IS3PCDSC	Data Structures	3	0	1	4	50	50	100
PC-4	21IS3PCOOP	Object Oriented Programming Using C++	3	0	1	4	50	50	100
PC-5	21IS3PCWAD	Web Application Development	0	0	2	2	50	50	100
AE-3	21IS3AECPPG	Competitive Programming -1	0	0	1	1	50	50*	100
HS-3	21CV3HSEVS	Environmental Studies	1	0	0	1	50	50	100
HS-4	21MA3HSCPH	Constitution of India, Professional Ethics and Human Rights	1	0	0	1	50	50	100
NCMC-1	21XX3NCPYA	Physical Activity	-	-	-	-			
TOTAL			16	1	5	22	400	400	400

PC 5: Students should develop websites using modern web technologies. The course will be executed in two lab cycles and a project work. During Cycle 1, the students would be able to design responsive web portals using HTML, CSS and Bootstrap framework. In Cycle 2, both client and server side scripting will be used to build interactive websites using Session management and databases. In the Project work phase, student will design and develop complete end to end web portals based on requirements and design considerations.

* Subject to discussion

Note: HS: Humanities and Social Sciences/Management Course, BS: Basic Science Course, ES: Engineering Science Course, PC: Professional Core Course, PE: Professional Elective Course, OE: Open Elective Course; PW: Project/Mini Project Work, SR: Seminar Technical / Seminar Internship, NC: Non-credit mandatory course



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Scheme of Instructions

Semester – IV

(With effect from the Academic Year 2018-2022)

Course Type	Course Code	Course Title	Credits			Total Credits	Marks		
			L	T	P		CIE	SEE	Total
BS-8	21MA4BSEM4	Engineering Mathematics	2	1	0	3	50	50	100
PC-6	21IS4PCTFC	Theoretical Foundations of Computation	2	1	0	3	50	50	100
PC-7	21IS4PCDBM	Database Management System	3	0	1	4	50	50	100
PC-8	21IS4PCADA	Analysis and Design of Algorithms	3	0	1	4	50	50	100
PC-9	21IS4PCOPS	Operating System	3	0	1	4	50	50	100
INT-1	21IS4SRIN1	Seminar- Internship involving Social Activity	1	0	0	1	50	50	100
AE-4	21MA4AEUHV	Universal Human Values	0	1	0	1	50	50	100
AE-5	21IS4AECPPG	Competitive Programming -2	0	0	1	1	50	50*	100
HS-5	21MA4HCKN/ 21MA4HBKN	Samskrutika Kannada / Balake Kannada	1	0	0	1	50	50	100
NCMC-2	21IS4NCCLA	Cultural Activity				-			
TOTAL			15	3	4	22	400	400	800

***Subject to discussion**

Note: HS: Humanities and Social Sciences/Management Course, BS: Basic Science Course, ES: Engineering Science Course, PC: Professional Core Course, PE: Professional Elective Course, OE: Open Elective Course; PW: Project/Mini Project Work, SR: Seminar Technical / Seminar Internship, NC: Non-credit mandatory course



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Course Title	STATISTICS AND DISCRETE MATHEMATICS				
Course Code	22MA3BSSDM	Credits	3	L-T-P	2-1-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	3	Total Lecture Hours			40
Prerequisites: Basic concepts of Permutations, Combinations, probability, statistics, G.C.D., L.C.D.,divisors and primes.					
Course Objectives: To acquaint the student with various concepts of discrete mathematics, Probability,Statistics and Congruences in several streams of Computer/Information Science,					
UNIT 1					
GRAPH THEORY Basic concepts: Types of graphs, order and size of a graph, in-degree and out-degree, connected and disconnected graphs, Eulerian graph, Hamiltonian graphs, sub-graphs, isomorphic graphs. Matrix representation of graphs: adjacency matrix, incidence matrix. Trees: spanning tree, minimal spanning tree: Kruskal's algorithm, Prim's algorithm, shortest path-Dijkstra's algorithm.					
UNIT 2					
COMBINATORICS: Introduction, Binomial and multinomial theorems, Catalan numbers, the principle of inclusion andexclusion, Derangements, Rook Polynomials, Generating functions.					
UNIT 3					
CURVE FITTING AND PROBABILITY Curve fitting – Principle of least squares, fitting a straight line, fitting of a parabola, fitting of the exponential curve of the $y = ab^x$. Correlation and Regression Theoretical distributions: Poisson distribution, Exponential and Normal distributions.					
UNIT 4					
STATISTICAL INFERENCE Introduction, procedure for testing of hypothesis, level of significance. [Large sample] Test of significance for single mean, difference between two means, singleproportion,difference between two proportions. [Small sample] Test of significance for single mean, difference between two means, paired t-test, ratio of variances(F- distribution) and Chi-Square goodness of fit.					
UNIT 5					
CONGRUENCES AND ITS APPLICATIONS Introduction to Congruences, Linear Congruences, The Chinese Remainder Theorem, Solving Polynomials, System of Linear Congruences, Euler's Theorem, Willson's Theorem and Fermat's little Theorem (Statement Only) - Problems.					
Text Books: 1. Graph Theory and Combinatorics, D. S. Chandrasekharaiah, 4th edition, 2011-12, PrismEngineering Education Series. 2. Higher Engineering Mathematics, B. V. Ramana, 2007, Tata McGraw Hill.					



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3. Discrete Mathematics and its applications, Kenneth H. Rosen, 7th edition, McGraw Hill Publishers

4. Kenneth H. Rosen, Elementary number theory and its applications, 5th edition, Pearson publications.

Reference Books:

1. Discrete Mathematics, Kolman, Busby Ross, 5th edition, 2004, Prentice Hall.

2. Graph Theory with Applications to Engineering and Computer Science, Narsingh Deo, Eastern Economy Edition, PHI Learning Pvt., Ltd.

3. Mathematics for Machine Learning, Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, 2020, Cambridge University Press.

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Course Title	DIGITAL LOGIC DESIGN				
Course Code	21IS3PCDLD	Credits	3	L-T-P	3-0-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	3	Total Lecture Hours			40

UNIT 1	
Boolean Algebra and Simplification of Boolean Expressions	
Boolean Algebra: Definition of a Boolean Algebra, Boolean Formulas and Functions, Canonical Formulas, Manipulations of Boolean Formulas, Gates and Combinational Networks, Incomplete Boolean Functions and Don't Care Conditions, Additional Boolean operations and Gates	
(Text 1 – 3.1, 3.4 to 3.9)	
Simplification of Boolean Expressions: Formulation of the Simplification Problem, Prime Implicants and Irredundant Disjunctive Expressions, Prime Implicates and Irredundant Conjunctive Expressions, Karnaugh Maps, Using K-Maps to Obtain Minimal Expressions for Complete Boolean Functions and Incomplete Boolean Functions, The Quine-McCluskey Method of Generating Prime Implicants and Prime Implicates	
(Text 1 – 4.1 to 4.6, 4.8)	
UNIT 2	
Data Processing Circuits	
Binary Subtractors, Carry Lookahead Adder, Decimal Adders, Comparators, Decoders, Encoders, Multiplexers, Programmable Logic Devices-PROMs, PLAs, PAL	
(Text 1 – 5.1.1, 5.1.2, 5.2 to 5.10)	
UNIT 3	
Flip-Flops	
RS Flip-Flops, Gated Flip-Flops, Edge-triggered RS Flip-Flops, Edge Triggered D Flip-Flops, Edge-triggered JK Flip-Flops, JK Master-Slave Flip-Flops, Various Representations of Flip-Flops, Analysis of Sequential Circuits	
(Text 2 – 8.1 to 8.5, 8.8, 8.10, 8.11)	
UNIT 4	
Registers and Counters	
Registers: Types of Registers - SISO, SIPO, PISO, PIPO, Universal Shift Register, Applications of Shift Registers	
(Text 2 – 9.1 to 9.7)	
Counters: Binary Ripple Counters, Synchronous Binary Counters, Counters based on Shift Registers, Design of Synchronous Counters	
(Text 1 – 6.8, 6.9)	
UNIT 5	
Design of Synchronous and Asynchronous Sequential Circuits	
Design of Synchronous Sequential Circuits: Model Selection, State Transition Diagram, State Synthesis Table, Design Equations and Circuit Diagram, State Reduction Techniques	
(Text 2 – 11.1 to 11.4, 11.7)	



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Asynchronous Sequential Circuits: Analysis of Asynchronous Sequential Circuit, Problems with Asynchronous Sequential Circuits, Design of Asynchronous Sequential Circuit

(Text 2 – 11.8 to 11.10)

Text Books

1. Donald D Givone: Digital Principles & Design, Tata McGraw Hill, 2011.
2. Donald P Leach, Albert Paul Malvino & Goutam Saha: Digital Principles and Applications, 7th Edition, Tata McGraw Hill, 2010.

Reference Books

1. R D Sudhaker Samuel: Illustrative Approach to Logic Design, Sanguine-Pearson, 2010.
2. M Morris Mano: Digital Logic and Computer Design, 10th Edition, Pearson Education, 2008.

E-Books

1. <https://bit.ly/2YkwnRe>
2. <https://bit.ly/2YgpMHR>

MOOCs

1. https://swayam.gov.in/nd1_noc19_ee51/preview
2. <https://nptel.ac.in/courses/117105080/>

COURSE OUTCOMES (COs)

At the end of the course the student will be able to:



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Course Title	COMPUTER ORGANIZATION AND ARCHITECTURE				
Course Code	21IS3PCCOA	Credits	3	L-T-P	3-0-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	3	Total Lecture Hours			40

UNIT – 1	
<p>Basic Structures of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance.</p> <p>Machine Instructions and Programs: Numbers, Arithmetic Operations and Characters, Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Basic Input Output Operations.</p>	
UNIT – 2	
<p>Input/Output Organization: Accessing I/O Devices, Interrupts-Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access-Bus Arbitration, Buses-Synchronous and Asynchronous.</p>	
UNIT – 3	
<p>Arithmetic: Addition and Subtraction of Signed Numbers, Multiplication of Positive Numbers, Signed-Operand Multiplication, Fast Multiplication-Bit Pair Recoding Multipliers, Integer Division.</p>	
UNIT – 4	
<p>Basic Processing Unit: Some Fundamental Concepts-Register Transfers, Performing an Arithmetic or Logic Operation, Fetching a Word from Memory, Storing a Word in Memory, Execution of a Complete Instruction-Branch Instruction, Multiple-Bus Organization, Hardwired Control-A Complete Processor.</p> <p>Pipelining: Basic Concepts - Role of Cache Memory, Pipeline Performance.</p>	
UNIT – 5	
<p>Memory System: Some Basic Concepts, Semiconductor RAM memories, Read Only Memories, Speed, Size and Cost, Cache Memories - Mapping Functions, Replacement Algorithms.</p>	
Text Books :	
1.Carl Hamacher, Computer Organization, 5th Edition, McGraw Hill Publishers.	
Reference Books :	
1.William Stallings: Computer Organization & Architecture, 10th Edition, Pearson, 2015	
2.Computer Organization and Design. The Hardware/Software Interface by David A.Patterson and John L.Hennessy, fifth Edition, Morgan Kaufman Publishers	
e-Books :	



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| 1. http://home.ustc.edu.cn/~louwenqi/reference_books_tools/Computer%20Organization%20and%20Architecture%2010th%20-%20William%20Stallings.pdf |
| 2. https://sites.google.com/site/uopcog/ppts |
| 3. https://books.google.co.in/books?id=cp4eEAAQBAJ&printsec=copyright&redir_esc=y#v=onepage&q&f=false |

MOOCs

- | |
|--|
| 1. https://onlinecourses.nptel.ac.in/noc21_cs61/preview |
| 2. https://courses.edx.org/courses/course-v1:MITx+6.004.3x_2+1T2017/course/ |
| 3. https://www.udacity.com/course/high-performance-computer-architecture--ud007 |



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Course Title	DATA STRUCTURES				
Course Code	22IS3PCDSC	Credits	4	L-T-P	3-0-1
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours			40

UNIT 1
Introduction to Data Structures: Definition and its classification, Dynamic Memory allocation. Linked Lists: Definition, Basic Operations on Singly Linked List, Singly linked List with Header Nodes, Applications of Singly Linked Lists.
UNIT 2
Linked List: Doubly Linked Lists, Circular Linked List – Implementation and Applications Stacks: Definition, Operations, Implementation using Arrays and Linked list, Applications of Stack – Infix to postfix conversion, Evaluation of postfix expression.
UNIT 3
Recursion: Definition, Writing recursive programs, Efficiency of Recursion. Queues: Definition, Operations, Implementation using Arrays and Linked list, Types of queues – Circular queue, Deque and priority queue, Applications of queues.
UNIT 4
Binary Trees: Binary Tree properties and representations, traversals and other operations. Binary Search Trees: Definition, Operations on BST, Threaded binary trees, Applications.
UNIT 5
Balanced Trees: AVL Trees, Splay trees, Red- Black Trees – Definitions, Rotation and other basic operations.
Text Books
1. Data Structures using C and C++, Yedidyah, Augenstein, Tannenbaum, 2nd Edition, Pearson Education, 2007. 2. Data Structures using C, Reema Thareja, 2nd Edition, Oxford University Press, 2011
Reference Books
1. Fundamentals of Data Structures in C, by Horowitz, Sahni, Anderson-Freed, 2nd Edition, Universities Press, 2007. 2. Data Structures A Pseudocode Approach with C, Richard F. Gilberg and Behrouz A. Forouzan, Cengage Learning, 2005.
E-Books
1. https://tinyurl.com/y9kdozyq 2. https://tinyurl.com/z8wln87
MOOCs
1. https://www.edx.org/course/data-structures-an-active-learning-approach 2. https://www.coursera.org/specializations/data-structures-algorithms



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Course Title	OBJECT ORIENTED PROGRAMMING USING C++				
Course Code	21IS3PCOOP	Credits	4	L-T-P	3-0-1
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours			40

UNIT – 1	
<p>Introduction: Overview to Object Oriented Programming, Benefits and applications of Object Oriented Programming.</p> <p>Beginning with C++: Program structure, cin and cout objects, namespace, identifiers, variables, constants, operators, reference types, typecasting, control structures.</p> <p>Objects and Classes: Basics of object and class in C++, Private and public members, Specifying a class, C++ program with a class, arrays within a class, memory allocation to objects, array of objects.</p>	
UNIT – 2	
<p>Functions in C++: Functions, Inline function, function overloading, default arguments, friend functions, static data and function members, Objects as function arguments, returning objects, constant member functions and objects, this pointer.</p> <p>Constructors and Destructors: Constructors and its types – Default constructors, Parameterized constructors, multiple constructors in a class, Constructors with default arguments, dynamic initialization of objects, Copy constructor, Dynamic constructors, Destructors.</p>	
UNIT – 3	
<p>Operator overloading and Type conversion: Defining Operator overloading, Overloading Unary operators, Binary Operators using friend functions and Member functions, Overloading Special operators, Comma operator, new and delete operators, Rules for overloading operators, Type conversion.</p> <p>Inheritance : Concept of Inheritance, types of inheritance - single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class.</p>	
UNIT – 4	
<p>Polymorphism: Pointers, Pointers to Objects, pointers to members and member functions, Pointers to derived classes, virtual and pure virtual functions.</p> <p>I/O and File Management : Concept of streams, C++ stream classes, Unformatted and formatted I/O, manipulators, C++ File stream classes, File management functions, File modes, Binary and random Files.</p>	
UNIT – 5	
<p>Templates: Introduction to templates, function templates and class templates.</p> <p>Introduction to exception: try-catch throw, multiple catch, catch all, rethrowing exception, User defined exceptions. Introduction to Standard Template Library: Components of STL - Containers, Algorithms, Iterators, Application of Container classes</p>	
Text Books :	
1. Object Oriented Programming with C++ by E Balaguruswamy, 6th Edition, Tata McGraw Hill, 2013.	



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2. C++ - The Complete Reference by Herbert Schildt, 4th Edition, Tata McGraw Hill, 2015

Reference Books :

1. C++ Primer by Stanley B Lippman, Josee Lajoie, Barbara E Moo, 6th Edition, AddisonWesley Professional
2. Object-Oriented Programming in C++ by Robert Lafore, 4th Edition, Pearson Education.

e-Books :

1. <https://fac.ksu.edu.sa/sites/default/files/ObjectOrientedProgramminginC4thEdition.pdf>
2. <http://znc.es/Addison.Wesley.C++%20Primer.By.Stanley%20B.%20Lippman.pdf>

MOOCs

1. https://swayam.gov.in/nd1_noc19_cs38/preview
2. <https://www.edx.org/course/object-oriented-programming-2>



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Course Title	WEB APPLICATION DEVELOPMENT				
Course Code	21IS3PCWAD	Credits	2	L-T-P	0-0-2
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	4	Total Practical Hours			50

About the Course: The students should develop websites using modern web technologies. The course will be executed in two cycles and project work. During Cycle 1, the students would be able to design responsive web portals using HTML, CSS and Bootstrap framework. In Cycle 2, JavaScript, React.Js and Node.Js both client and server-side scripting will be used to build interactive websites using Session management and databases. In the Project work phase, student will design and develop complete end to end web portals based on requirements and design considerations.

Text Books :

1. Ben Frain, Responsive Web Design with HTML5 and CSS3, 2nd Revised Edition, Packt Publishing Limited, 2015.
2. Ethan Brown, Learning JavaScript, 3rd Edition, Oreilly Publishers, 3rd Edition, 2016.

Reference Books :

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, Internet & World Wide Web How to Program, 5/e , Prentice Hall, , 2013.
2. Elisabeth Robson, Eric Freeman, Head First Java Script Programming: A Brain- friendly Guide, Oreilly Publishers, 2014.
3. Robin Nixon, Learning PHP, MySQL & JavaScript with j Query, CSS & HTML5, Shroff Publishers & Distributers Private Limited, 4th Edition, 2015.

e-Books :

1. Elizabeth Castro, Bruce Hyslop, HTML5 and CSS3, 7 th Edition, Peach Pit Press, 2012. <http://ptgmedia.pearsoncmg.com/images/9780321719614/samplepages/0321719611.pdf>.
2. <https://nodejs.org/api/documentation.html>
3. <https://reactjs.org/docs/getting-started.html>

MOOCs

1. Mathew Yee King, Kate Devlin, Marco Gillies, Mic Grierson, Responsive Web Design, Coursera, University of London, Goldsmiths. <https://www.coursera.org/learn/responsive-web-design>.
2. John Purcell, Introduction to React and NodeJS, Udemy, Software Development trainer, UK. <https://www.udemy.com/course/learn-reactjs-nodejs/>
3. <https://www.udemy.com/course/the-complete-web-development-bootcamp/>



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Course Title	COMPETITIVE PROGRAMMING - 1				
Course Code	21IS3AEC PG	Credits	1	L-T-P	0-0-1
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	2	Total Practical Hours			2

About the Course

The course is designed to enhance programming and computational thinking skills of students. They would be enabled to develop solutions for non-trivial computing problems of real-world scenarios. The students are given exposure to coding platforms for practice to augment their higher order cognitive skills.

The course is taught in a problem driven fashion, where C language features and programming techniques are demonstrated. It includes basic programming idioms like arrays, elementary sorting & searching, strings, pointers, files, linked list, stack, queues and binary trees, which are widely used for problem solving.

Online Resources:

1. <https://www.hackerearth.com/getstarted-competitive-programming/>
2. <https://www.geeksforgeeks.org/competitive-programming-a-complete-guide/>

e-Books :

1. <https://cses.fi/book/book.pdf>
2. <https://www.pdfdrive.com/programming-challenges-the-programming-contest-training-manual-e167992721.html>

MOOCs :

1. <https://archive.nptel.ac.in/noc/courses/noc21/SEM2/noc21-cs99/>
2. <https://www.udemy.com/course/competitive-programming/>



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Course Title	ENVIRONMENTAL STUDIES				
Course Code	21HS3ICEVS / 21HS4ICEVS	Credits	1	L-T-P	1-0-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	1hour 30 minutes	Total Hours			15

COURSE OBJECTIVE:

1. To acquire the knowledge of environmental studies, it's need & importance.
2. To understand the concept, structure and function of different ecosystems.
3. To know about pollution problems and green technology.
4. To develop a sense of responsibility about the role of students in fostering the idea of learning to live in harmony with nature.
5. To aware the studies about current conditions of environment.
6. To give an opportunity to the student to experience the interdisciplinary nature of the environmental studies.
7. To create interest in students about the environment through a project work
8. To encourage student to prevent the environmental degradation.

UNIT – 1

Introduction to Environment - Definition, About Earth i.e Atmosphere, Hydrosphere, Lithosphere and Biosphere, Structure of Atmosphere, Internal structural of Earth.
Ecology & Ecosystem, balanced ecosystem, types of ecosystem.
Effect of Human activities on Environment – i) Agriculture ii) Housing iii) Industries iv) Mining and v) Transportation activities.

UNIT – 2

Natural Resources – Definition, i) Water resources – its availability, quality, water borne & water induced disease.
ii) Mineral resources
iii) Forest resources
iv) Energy resources – conventional & non - conventional energy resources, Hydroelectric, wind power, solar, Biogas. Fossil fuel based energy resources- Coal, Oil & Gas, Nuclear power.
Hydrogen as an alternate future source of energy.

UNIT – 3

Environmental pollution – Introduction, types, effects of pollutions
i) Water pollution – definition, types, sources, effects, control methods
ii) Land pollution - definition, types, sources, effects, Solid waste management
iii) Noise pollution - definition, sources, effects, control methods

UNIT – 4

Current environmental issues & importance – Population growth, effects & control, climatic changes, Global warming. Acid rain, ozone layer depletion & effects.
Environmental protection, Role of government, legal aspects

UNIT – 5



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Text Books :

1. Environmental studies by - Dr. Geetha Balakrishnan (Revised Edition)
2. Ecology by - Subramanyam (Tata McGraw Hill Publication)
3. Environmental studies by - Dr. J. P. Sharma (Third edition)
4. Environmental studies by - Smriti Srivastav

Reference Books :

1. Environmental studies by – Benny Joseph
2. Environmental studies by – Dr. D.L.Manjunath

LEARNING RESOURCES:

1. NPTEL (Open Sources / power point and visuals)
2. Ecological studies / IITR / Open Sources
3. Ministry of Environment and forest & wildlife.

SEE QUESTION PATTERN:

SEE Question paper consists of Two parts. Part-A consists of 20 mcq's covering all units, one mark each. Part-B consists of 4 main questions, 10 marks each. Student should answer Part-A compulsory and any three full questions from Part-B, covering all units.

COURSE OUTCOME:

CO1	Understand the components and impacts of human activities on environment.
CO2	Apply the environmental concepts for conservation and protection of natural resources.
CO3	Identify and establish relationship between social, economical and ethical values from environmental perspectives.



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DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

Course Title	CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND HUMAN RIGHTS				
Course Code	22MA3HSCPH / 22MA4HSCPH	Credits	1	L-T-P	1-0-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	1	Total Lecture Hours			15

Course Objectives:

- 1.To educate students about the country's highest law.
- 2.To respect human dignity and protect people's rights from discrimination.
- 3.To discuss about risk management, workplace safety, and increase understanding of concerns pertaining to the profession.

UNIT 1

Introduction to Indian Constitution

Framing of the Indian constitution: Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India, Fundamental Rights and its limitations. Fundamental Duties and their significance. Directive Principles of State Policy: Importance and its relevance. Case Studies

UNIT 2

Union Executive and State Executive

The Union Executive – The President and the Vice President, the Prime Minister and The Council of Ministers. The Union Parliament – Lok Sabha & Rajya Sabha.

The Supreme Court of India.

State Executive – The Governors, the Chief Ministers and the Council of Ministers. The State Legislature – Legislative Assembly and Legislative Council. State High Courts.

UNIT 3

Election Commission of India, Amendments and Emergency Provisions

Election Commission of India – Powers & Functions – Electoral Process in India. Methods of Constitutional Amendments and their Limitations.

Important Constitutional Amendments – 42nd, 44th, 61st, 74th, 76th, 77th, 86th and 91st. Emergency Provisions. Case Studies.

UNIT 4

Human Rights

Human Rights – Meaning and significance, Types Human Rights, Powers and Functions of National and State Human Rights Commission of India. Human rights in constitution of India.

UNIT 5

Professional Ethics

Scope and Aims of Engineering Ethics, Responsibilities of Engineers and impediments to Responsibilities. Honesty, Integrity and Reliability; Risks – Safety and Liability in Engineering. Case Studies.

Course Outcomes:

Students will:

1. Recognize the significance of the Indian Constitution as the supreme legal authority.
2. Analyse human rights theories and concepts.



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3. Apply the principles of moral obligations and duties to safeguard the public's welfare and safety.

At the end of the course, the student will have the ability to

CO1	Recognize the significance of the Indian Constitution as the supreme legal authority.	Remember	PO6, PO12
CO2	Analyse human rights theories and concepts.	Analyse	PO6, PO12
CO3	Apply the principles of moral obligations and duties to safeguard the public's welfare and safety.	Application	PO8, PO12

Text Books:

1. “An Introduction to Constitution of India and Professional Ethics” by Merunandan K.B. and B.R. Venkatesh, Meragu Publications, 3rd edition, 2011.
2. “Constitution of India & Professional Ethics & Human Rights” by Phaneesh K. R., SudhaPublications, 10th edition, 2016.

Reference Books:

1. “V.N. Shukla's Constitution of India” by Prof (Dr.) Mahendra Pal Singh (Revised), EasternBook Company, Edition: 13th Edition, 2017, Reprint 2019.
2. “Ethics in Engineering” by Martin, W. Mike., Schinzinger, Roland., McGraw-Hill Education; 4th edition (February 6, 2004) .

E-Book:

1. https://books.google.co.in/books/about/Constitution_of_India_and_Professional_E.htm?i d=VcvuVt-d88QC
Constitution of India and Professional Ethics, by G.B. Reddy and Mohd Suhaib, I.K. International Publishing House Pvt. Ltd., 2006.
2. <http://www.scribd.com/doc/82372282/Indian-Constitution-M-Raja-Ram-2009#scribd> Indian Constitution, by M. Raja Ram, New Age International Pvt. Limited, 2009.



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Course Outcomes and Programme outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						✓						✓
CO2						✓						✓
CO3								✓				✓

Correlation between programme outcome and course outcome:

Programme Outcome	Course Outcome	Blooms Taxonomy
<p>PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.</p> <p>PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and Life-long learning in the broadest context of technological change.</p>	<p>CO1 Recognize the significance of the Indian Constitution as the supreme legal authority.</p> <p>CO2 Analyse human rights theories and concepts.</p>	<p>Remember</p> <p>Analyse</p>
<p>PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.</p> <p>PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and Life-long learning in the broadest context of technological change.</p>	<p>CO3 Apply the principles of moral obligations and duties to safeguard the public's welfare and safety.</p>	<p>Application</p>



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Course Assessment and Evaluation:

Type of Assessment	Marks	Course outcome attained
Average of the two internal tests will be taken.		
Test 1,2 & 3 (Online Test) Multiple Choice Questions	Test 1 (20 Marks) Test 2 (20 Marks) Test 3 (20 Marks)	CO1 CO1 CO1
AAT-1 (Assessment) AAT-2 (Assessment)	AAT-1 (5 Marks) AAT-2 (5 Marks)	CO2 CO3

SEE Exam Question paper format

CO1,CO2 , CO3, CO4 & CO5			
SEE	Online Examination		
Pattern	50 Multiple Choice Questions	Total Marks	50X2=100



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Course Title	LINEAR ALGEBRA				
Course Code	22MA4BSLIA	Credits	3	L-T-P	2-1-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours			40

Course Objectives:

- Understand an intense foundational introduction to fundamental concepts in discrete mathematics.
- Interpret, identify, and solve the language associated with logical structure, sets, relations and functions, modular arithmetic.
- To develop probability distribution of discrete and continuous random variables. Joint probability distribution occurs in digital signal processing, design engineering and microwave engineering.

Teaching-Learning Process (General Instructions)

These are sample strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- Lecturer method (L) does not mean only traditional lecture method, but different types of teaching methods may be adopted to develop the outcomes.
- Show Video/animation film to explain functioning of various concepts.
- Encourage collaborative (Group Learning) Learning in the class.
- Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
- Topics will be introduced in a multiple representation.
- Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
- Discuss how every concept can be applied to the real world and when that's possible, it helps improve

UNIT-1
VECTOR SPACES Introduction, Vector spaces, Subspaces, Linear Combinations, Linear Spans, row space and column space of a Matrix, Linear Dependence and Independence, Basis and Dimension, Coordinates. Teaching-Learning Process: Chalk and Board, Problem based learning
UNIT-2
LINEAR TRANSFORMATIONS Introduction, Linear Mappings, Geometric linear transformation of R^2, Kernel and Image of a



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linear transformations, Matrix representation of linear transformations, Rank-Nullity Theorem (No proof), Singular and Nonsingular linear transformations, Invertible linear transformations. Teaching-Learning Process: Chalk and Board, Problem based learning
UNIT-3
EIGENVALUES AND EIGENVECTORS Introduction, Hessian Matrix, Method of steepest ascent/descent, Polynomials of Matrices, Applications of Cayley-Hamilton Theorem, eigen spaces of a linear transformation, Characteristic and Minimal Polynomials of Block Matrices, Jordan Canonical form. Teaching-Learning Process: Chalk and Board, Problem based learning
UNIT-4
INNER PRODUCT SPACES Inner products, inner product spaces, length and orthogonality, orthogonal sets and Bases, projections, Gram-Schmidt process, QR-factorization, least squares problem and least square error. Teaching-Learning Process: Chalk and Board, Problem based learning
UNIT-5
SYMMETRIC MATRICES AND QUADRATIC FORMS Diagonalization and Orthogonal diagonalization of real symmetric matrices, quadratic forms and its classifications, Singular value decomposition. Dimensionality reduction – PCA Teaching-Learning Process: Chalk and Board, Problem based learning
Course out comes (Course SkillsSet)
After successfully completing the course, the student will be able to understand the topics:

Course Code	CO	COURSE OUTCOME (CO)	PO	Strength
22MA4BSLIA	CO 1	Apply the concepts of Matrices and Vectors spaces in Computational Sciences.	1, 5, 9, 10	3, 1, 1, 1
	CO 2	Relate the concepts of Eigenvalues, Eigenvectors & functions to linear algebra.	1, 5, 9, 10	3, 1, 1, 1
	CO 3	Apply the concepts of inner products to matrix Decomposition and Dimensionality Reduction.	1, 5, 9, 10	3, 1, 1, 1

Assessment Details (both CIE and SEE)

Component	Type of assessment	Max. Marks	Total	50 % Weightage	Total
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CIE – Theory	Quiz	20	100	10	50
	Test 1	40		20	
	Test 2	40		20	
	Test 3	40		20	
SEE	End Exam	100		50	

Two best scores out of the three tests will be considered for CIE.

CIE methods/question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

SEMESTER END EXAMINATION:

- Each unit consists of one full question.
- Five full questions to be answered.
- To set one question each from Units 1, 2 & 5 and two questions each from Unit 3 and Unit 4.



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SUGGESTED LEARNING RESOURCES:

Text Books:

1. Linear Algebra and its applications, David C. Lay, Steven R. Lay, Judi J Mc. Donald, 5th Edition, 2015, Pearson Education.
2. Linear Algebra and its applications, Gilbert Strang, 4th edition, 2005, Brooks Cole.
3. Linear Algebra an Introduction, Richard Bronson & Gabriel B. Costa, 2nd edition.

Reference Books:

1. Schaum's outline series-Theory and problems of linear algebra, Seymour Lipschutz, 5th edition, 2012, McGraw-Hill Education.

E books and online course materials:

1. <https://ocw.mit.edu/courses/mathematics/18-06sc-linear-algebra-fall-2011/index.htm>
2. <https://www.math.ucdavis.edu/~linear/linear.pdf>

Online Courses and Video Lectures:

1. <https://www.coursera.org/learn/linear-algebra-machine-learning>
2. <https://nptel.ac.in/syllabus/111106051>



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Course Title	THEORETICAL FOUNDATIONS OF COMPUTATION				
Course Code	21IS4PCTFC	Credits	3	L-T-P	2-1-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	4	Total Lecture Hours			25

UNIT – 1	
Introduction to Finite Automata: Introduction to Finite Automata, Concepts of Automata Theory, Deterministic Finite Automata (DFA), Nondeterministic Finite Automata (NFA) and ϵ -NFA, ϵ -closures, Equivalence of ϵ -NFA, NFA and DFA, Minimization of DFA.	
UNIT – 2	
Regular Expressions and Regular Languages: Relation between Regular Expressions and Regular Languages, Pumping Lemma for regular languages, Conversion of finite automata to Regular expression using state elimination method, Regular Expression to ϵ -NFA	
UNIT – 3	
Context Free Grammars and Languages: Relation between Context Free Grammars and Context Free Languages, Parse trees, Ambiguity in Grammars, Simplification of Context Free Grammar, Chomsky Normal Form	
UNIT – 4	
Push Down Automata: Construction of PDA, Acceptance by final state, Acceptance by empty stack, Equivalence of PDA and CFG, Non- Deterministic and Deterministic PushDown Automata.	
UNIT – 5	
Turing Machines: Introduction to Turing Machine, Construction of Turing Machines as language acceptors and transducers, combining Turing machines for complicated tasks.	
Text Books :	
1. Introduction to Automata Theory, Languages and Computation by John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman: 3rd Edition, Pearson education, 2007. 2. An Introduction to formal Languages and Automata by Peter Linz, Jones & Bartlett Learning, 6 edition, 2016.	
Reference Books :	
1. Introduction to Languages and Automata Theory by John C Martin, 4th Edition, Tata McGraw-Hill, 2010. 2. Introduction to Theory of Computation, Michael Sipser, Cengage Learning, 3rd edition, 2014.	
e-Books :	
1. https://www.cs.utexas.edu/~ear/cs341/automatabook/AutomataTheoryBook.pdf 2. http://online.kmsdasuya.in/wp-content/uploads/2020/09/TOC-Theory-of-Computer-Science-Automata-Languages-and-Computation-3e-KLP-Mishra-N-Chandrasekaran.pdf	



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MOOCs :
1. https://www.udemy.com/course/fundamentals-of-automata-theory/
2. https://www.classcentral.com/course/stanford-openedx-automata-theory-376



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Course Title	DATABASE MANAGEMENT SYSTEM				
Course Code		Credits	4	L-T-P	3-0-1
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours			40

UNIT-1

Databases and Database Users- Introduction, An example, Characteristics of the Database Approach, Advantages of using the DBMS Approach, When Not to use a DBMS. **Database System Concepts and Architecture-** Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, The Database System Environment.

UNIT-2

Data Modeling Using the Entity-Relationship Model- Using High-Level Conceptual Data Models for Database design, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, ER Diagrams, Naming Conventions and Design issues, A Sample Database Application, Relationship Types of Degree Higher than Two. Relational Database Design Using ER-to Relational Mapping.

UNIT-3

The Relational Data Model and Relational Database Constraints- Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint, **Basic SQL-** SQL Data Definition and Data Types, Specifying Constraints in SQL, Basic Retrieval Queries in SQL, INSERT, DELETE and UPDATE Statements in SQL, Additional Features of SQL, More Complex SQL Retrieval Queries, Views, Schema Change Statements in SQL.

UNIT-4

The Relational Algebra- Unary Relational Operations: SELECT, PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations-JOIN, DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra.

Basics of Functional Dependencies and Normalization for Relational Databases- Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form.

UNIT-5

NoSQL Databases – Introduction to NoSQL Systems, The CAP Theorem, Document-Based NoSQL Systems & MongoDB.

Introduction to Transaction Processing Concepts and Theory- Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability, Transaction Support in SQL, Two-Phase Locking Techniques for Concurrency Control.

Text-Books

- Fundamentals of Database Systems, 7th Edition**, Ramez Elmasri & Shamkant B. Navathe, Published by Pearson India Education Services Pvt. Ltd., 2017.
- Professional NOSQL**, Shashank Tiwari, Published by John Wiley & Sons, Inc., 2017



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Reference-Books

1. Database System Concepts, Abraham Silberschatz, HenryF. Korth, S. Sudarshan, Sixth Edition, Tata McGraw-Hill, 2010
2. An Introduction to Database Systems, C.J.Date, A.Kannan, S.Swamynathan, 8 th Edition, Pearson Education, 2006
3. Database Management Systems, Ramakrishnan and Gehrke, 3rd Edition McGraw Hill 2014

E-Books

1. https://mrcet.com/downloads/digital_notes/ECE/III%20Year/DATABASE%20MANAGEMENT%20SYSTEMS.pdf
2. https://ebooks.lpude.in/management/mba/term_3/DCAP204_MANAGING_DATABASE_DCAP402_DATABASE_MANAGEMENT_SYSTEMS.pdf

MOOCs

1. <https://ocw.mit.edu/courses/6-830-database-systems-fall-2010/pages/lecture-notes/>
2. <https://www.udemy.com/topic/database-management>
3. <https://www.classcentral.com/course/swayam-data-base-management-system-9914> nptel



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Course Title	ANALYSIS AND DESIGN OF ALGORITHMS				
Course Code	21IS4PCADA	Credits	4	L-T-P	3-0-1
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours			40

UNIT – 1	
Fundamentals of Algorithm Analysis: Definition of algorithm, Algorithmic Problem Solving, Framework for Analysis of algorithm efficiency, Asymptotic Notations, Mathematical Analysis of Non recursive algorithms and Recursive algorithms, Master's Theorem	
UNIT – 2	
Brute Force: Bubble Sort, Selection Sort, String Matching, Exhaustive search Divide and Conquer: Merge sort, Quicksort. Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.	
UNIT – 3	
Decrease and conquer: Depth First Search (DFS), Breadth First Search (BFS), Applications of DFS and BFS, Topological Sorting, Algorithms for Generating permutations Space and Time Trade-offs: Horspool Algorithm, Hashing	
UNIT – 4	
Transform and Conquer: Pre-sorting, 2-3 Trees, Heaps and Heapsort Dynamic Programming: Computing a Binomial Coefficient, Floyd's Algorithm, Knapsack Problem and Memory functions.	
UNIT – 5	
Limitations of Algorithm Power: Decision Trees, P, NP and NP-Complete Problems. Backtracking: N queens problem, Sum of subset problem Branch and bound: Traveling Salesman problem, Assignment problem	
Text Books	
1. Introduction to the design and analysis of algorithms, by Anany Levitin, 3rd Edition, Pearson Education, 2011. 2. Computer Algorithms, by Horowitz E., Sahani S., Rajasekharan S., 2nd Edition, Universities Press, 2008.	
Reference Books	
1. Introduction to Algorithms, Cormen T.H, Leiserson C. E, Rivest R.L, Stein C, 3rd Edition, PHI 2010. 2. Introduction to Algorithms, Cormen T.H, Leisersonby Mark Allen Weiss, PHI, 2013.	
e-Books :	
1. https://www.cs.duke.edu/courses/fall08/cps230/Book.pdf 2. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/design_and_analysis_of_algorithms_tutorial.pdf	
MOOCs	



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| <ol style="list-style-type: none">1. https://www.coursera.org/course/algs4partI2. https://nptel.ac.in/courses/106106131 |
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Course Title	OPERATING SYSTEM				
Course Code	21IS4PCOPS	Credits	4	L-T-P	3-0-1
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	5	Total Lecture Hours			40

UNIT – 1	
Introduction: Operating System structure, Operating System operations, Process management, Memory management, Storage management, Protection and security, Kernel data structures, computing environments. Operating System structure: Operating System Services, User- Operating System interface.	
UNIT – 2	
Processes: Process Concept, Process Scheduling, Interprocess communication. Process Synchronization: The critical section problem, Peterson’s solution, Mutex locks, Semaphores, Classical problems of synchronization. Multithreaded Programming: Multithreading models.	
UNIT – 3	
CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms. Deadlocks: System Model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery from deadlock.	
UNIT – 4	
Main Memory: Background, swapping, Contiguous memory allocation, Segmentation, Paging, Structure of page table. Virtual Memory: Background, Demand paging, Copy on write, Page replacement algorithms, Allocation of frames, Thrashing.	
UNIT – 5	
Disk performance optimization: Introduction, Why disk scheduling is necessary, Disk scheduling strategies, rotational optimization. File and Database Systems: Free space management, File access control.	
Text Books :	
1. Operating System Concepts, by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 9th Edition, Wiley India, 2012.	
Reference Books :	
1. Operating Systems, A Concept-Based Approach, by DM Dhamdhere, 3rd Edition, Tata McGraw-Hill, 2012. 2. Modern Operating Systems, by Andrew S. Tanenbaum and Herbert Bos, 4th Edition, Pearson, 2014. 3. UNIX complete reference by Herbert Schildt, 2 nd edition McGraw-Hill2. 1. Sumitabha Das: UNIX Concepts and Applications, 4th Edition, Tata McGraw Hill, 2006.	



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e-Books
1. http://iips.icci.edu.iq/images/exam/Abraham-Silberschatz-Operating-System-Concepts9th2012.12.pdf
2. http://materias.fi.uba.ar/7508/MOS4/Operating.Systems.4th.Edi.pdf
MOOCs
1. https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/index.html
2. https://www.udacity.com/course/introduction-to-operating-systems--ud923



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Course Title	UNIVERSAL HUMAN VALUES				
Course Code	22MA3HSUHV/ 22MA4HSUHV	Credits	1	L-T-P	0-1-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	1	Total Lecture Hours			15

Course Objectives: To develop a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.

UNIT – 1

Human values for Self-excellence – What is value?, The values for human integration, Golden silence, Peace and non-violence in thought, Word and Deed, Thought culture, individual and group activities.

UNIT – 2

Integrating human values into life- Significant spiritual values - Health and Harmony with Nature, Truth and Wisdom, Love and Compassion, Creativity and Appreciation of Beauty, Peace and Justice, National Unity and Global Solidarity, Global Spirituality, Principles of communication -Heartful Communication, Principles of Self-management, individual and group activities.

UNIT – 3

Self-transformation – Discover the personality, Heart based living, Healthy Life Style, Peak Performance, Mapping core values with Sustainable Development Goals, individual and group activities.

UNIT – 4

Live light - Character vs. Personality, Dealing with Stress, Time management, The Power of Pause, Empathy vs Sympathy, individual and group activities.

UNIT – 5

Designing your destiny - Self-Awareness, Situational Awareness, Transforming Behaviour, Transformation Factors, Thoughts-Habits-Destiny, Science of Belief, Decision Making, individual and group activities.

At the end of the course, the student will have the ability to

CO1	Ability to understand and explain the values and their role in improving the quality of life and become global citizens
CO2	Ability to integrate spiritual values to lead a balanced life
CO3	Ability to apply the values to design their destiny

Reference Material

- <https://heartfulness.org/education/training-and-curriculum/>
- Conscious living content – available at: www.heartfulness.org/cmspublic
- https://fdp-si.aicte-india.org/5day_onlineUHV.php
The 4-Part Nonviolent Communication (NVC) Process Developed by Marshall
- B.Rosenberg, Ph.D, available at



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<http://www.nonviolentcommunication.com/aboutnvc/4partprocess.htm>

Course Title	SAMSKRUTIKA KANNADA /BALAKE KANNADA				
Course Code	21MA4HSKN/ 21MA4HBKN	Credits	1	L-T-P	1-0-0
CIE	50 Marks	SEE	100 Marks (50% Weightage)		
Contact Hours / Week	1	Total Lecture Hours			12



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