NIRMA UNIVERSITY
Integrated B. Tech. (CSE)-MBA programme
Term - III

L	T	P	C
2	0	4	4

Course Code	CSI0301
Course Title	Object Oriented Programming

Course Outcomes:

At the end of the course, students will be able to –

1. explain difference between structured programming and object oriented programming with basic principles of these two
2. use basic constructs of object oriented programming language for programming
3. apply inheritance, polymorphism and encapsulation properties to develop object oriented program

Syllabus:

Teaching Hours:20

Unit I **2**

Introduction: A Review of programming paradigms, Introduction to Object Oriented Programming, Comparison of Object Oriented approach with other programming approaches.

History and overview of Java: Creation of Java, , Evolution of Java,features of Java, byte code, Java Development Kit (JDK), Java Virtual Machine (JVM) ,Introduction to three OOP principles (Inheritance, Polymorphism, Encapsulation), Introduction to Classes and Methods.

Unit II **6**

Data types, variables, Operators in Java

Control Statements: Selection statements (i.e. if, switch etc.), iteration statements (i.e. while, do-while, the for-each version of the for Loop, Nested Loops etc.) , jump statements (i.e. break, continue).

Arrays: one dimensional array, multi-dimensional array, alternative array declaration statements.

Unit III **12**

Classes and Methods: class fundamentals, declaring objects, assigning object reference variables, adding methods to a class, returning a value, constructors, this keyword, overloading methods, argument passing, object as parameter, returning objects, access control, static, final, command line arguments, variable-length arguments.

Inheritances: Basics, member access and inheritance, super class references,

using super, multilevel hierarchy, constructor call sequence, method overriding, dynamic method dispatch, abstract classes

Packages and Interfaces: defining and creating package, access protection, importing packages, basics of interfaces, variables in interfaces, extending interfaces

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 8 experiments to be incorporated that will be considered for evaluation.

Suggested Readings^:

1. Herbert Schildt, Java – The Complete Reference, Tata McGraw Hill.
2. Balaguruswamy, Programming with Java – A primer, Tata McGraw Hill.
3. Student Workbook Java in a Nutshell- David Flanagan.
4. Core Java(TM), Volume I—Fundamentals- Cay S. Horstmann.
5. Teach Yourself Java in 21 Days - Sams.net Publishing and its licensor- Laura Lemay, Charles L. Perkins.

L=Lecture, T=Tutorial, P=Practical, C=Credit

^this is not an exhaustive list

NIRMA UNIVERSITY
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L	T	P	C
3	1	0	4

Course Code	CSI0302
Course Title	Differential Equations

Course Outcomes:

At the end of the course, students will be able to-

1. apply techniques of differential equations in modeling to solve engineering problems
2. recognize and use the appropriate method to solve second order ordinary differential equations
3. use power series to solve differential equations related to engineering filed
4. classify partial differential equations and apply appropriate analytic method to solve it

Syllabus:

Teaching Hours:30

Unit I 12

Ordinary Differential Equations: Introduction, Formation of ordinary differential equation, First order and first degree differential equations, Linear differential equations of higher order with constant coefficients, Complementary function, Particular integral, Method of undetermined coefficients, Method of variation of parameters, Higher order linear differential equations with variable coefficients (Cauchy's and Legendre's forms), Simultaneous linear differential equations and related applications,

Unit II 10

Series Solution of Ordinary Differential Equations: Power series solutions near an ordinary point, Legendre polynomials, Regular singular points, Power series solutions near a Regular singular point, Bessel functions of the first kind and their properties

Unit III 8

Partial Differential Equations: First order partial differential equations and its formation, solutions of first order linear and non-linear partial differential equations, Method of separation variables and solution of heat equation.

Tutorials:

This shall consist tutorials based on the syllabus.

Self-Study:

Self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from the self-study contents.

Suggested Readings^:

1. W E Boyce and R C DiPrima, Elementary Differential Equations and Boundary Value Problems; Wiley India.
2. E Kreyszig, Advanced Engineering Mathematics; John Wiley & Sons.
3. T Veerarajan, Engineering Mathematics; McGraw Hill.
4. B V Ramana, Higher Engineering Mathematics; McGraw Hill.
5. N P Bali and M Goyal, A text book of Engineering Mathematics; Laxmi Publications.
6. B S Grewal, Higher Engineering Mathematics; Khanna Publishers.
7. S L Ross, Differential Equations; Wiley India.
8. E A Coddington, An Introduction to Ordinary Differential Equations; Prentice Hall India.
9. E L Ince, Ordinary Differential Equations; Dover Publications.
10. G F Simmons and S G Krantz, Differential Equations; McGraw Hill.

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NIRMA UNIVERSITY
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L	T	P	C
3	0	2	4

Course Code	CSI0303
Course Title	Digital Electronics

Course Outcomes:

At the end of the course, students will be able to -

1. describe the basic building blocks of various digital circuits
2. design combinational logic and sequential logic circuits using basic components
3. identify digital components in computer organization
4. analyze digital circuits and its applications

Syllabus:

Teaching hours:30

Unit I **4**

Overview of Binary Systems and Logic Gates: Introduction, Binary numbers, conversions, Octal, Hexadecimal Numbers, Complements, Binary Codes, binary storage, registers, Binary Logic
Boolean Algebra and Logic Gates, Boolean algebra, theorems and properties, Boolean functions simplification, canonical and standard forms, other logic operations, Digital logic gates, IC logic families.

Unit II **5**

Boolean Function Simplification: The K-Map method, SOP/POS Simplification with don't care conditions using basic and universal gates, Tabulation method

Unit III **6**

Combinational Logic: Introduction, analysis and design of various combinational circuits such as Adders, Subtractors, Code Convertors, Comparators, Binary Parallel Adder, Decimal Adder, magnitude comparators, ROMS, decoders, multiplexers, PLA.

Unit IV **10**

Sequential Logic: Introduction, flip-flops, triggering of flip-flop, analysis and design of clocked sequential circuits, design with state equations, registers, shift registers, ripple counters, synchronous counters.

Unit V **5**

Digital Integrated Circuits: Introduction, BJT characteristics, RTL and DTL logic. IIL and TTL Logic. ECL and MOS Logic CMOS Logic, ADC, DAC

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 8 experiments to be incorporated that will be considered for evaluation. Laboratory work will be based on Digital Trainer kits and simulators.

Suggested Readings^:

1. M. Morris Mano, Digital Logic and Computer Design, PHI
2. Malvino and Leach, Digital Principals and applications, McGraw-Hill
3. Virendra Kumar, Digital Technology Principals and Practices, New Age International
4. Holdsworth, Digital logic design, Elsevier Science

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NIRMA UNIVERSITY
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L	T	P	C
3	1	0	4

Course Code	CSI0304
Course Title	Discrete Mathematics

Course Outcomes:

At the end of the course, students will be able to

1. interpret the preliminaries of discrete mathematics
2. comprehend role of discrete mathematics in theoretical computer science
3. recognize the importance of formal approach for solving computing problems

Syllabus:

Teaching Hours:30

Unit I **3**

Sets, Relation and Function: Operations and laws of sets, Cartesian products, binary relation, partial ordering relation, equivalence relation, image of a set, sum and product of functions, bijective functions, inverse and composite function. Basic counting techniques: inclusion and exclusion, pigeon-hole principle.

Unit II **6**

Proof Techniques: proof methods and strategies, forward proof, proof by contradiction, principles of mathematical induction, strong induction, the well-ordering principle, recursive definition, proof by contraposition, proof of necessity and sufficiency.

Unit III **6**

Propositional Logic: syntax, semantics, validity and satisfiability, basic connectives and truth tables. logical equivalence: the laws of logic, logical implication, rules of inference, the use of quantifiers.

Unit IV **5**

Algebraic Structures and Morphism: algebraic structures with one binary operation, semi groups, monoids, groups, congruence relation and quotient structures, free and cyclic monoids and groups, permutation groups.

Unit V **6**

Graphs and Trees: graphs and their properties, isomorphism, Eulerian and Hamiltonian walks, graph coloring, perfect graph, rooted trees, trees and sorting, weighted trees and prefix codes, shortest path, spanning trees.

Unit VI **4**

Recurrence Relations and Recursive Algorithms: Recurrence relations, linear recurrence relations with constant coefficients, use of recurrence relations for analysis of algorithms.

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Tutorial Work:

Tutorial work will be based on the above syllabus with minimum 10 tutorials to be incorporated.

Suggested Readings^:

1. C. L. Liu, Elements of Discrete Mathematics, Tata McGraw Hill.
2. Tremblay, J.P. & Manohar, Discrete mathematical structures with application to computer science, McGraw Hill.
3. Rosen, Kenneth L., Discrete Mathematics and its applications, McGraw Hill.
4. Susanna S. Epp, Discrete Mathematics with Applications, Wadsworth Publishing Co. Inc.

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NIRMA UNIVERSITY
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L	T	P	C
1	1	0	2

Course Code	CSI0305
Course Title	Environmental Studies

Course Outcomes:

At the end of the course, students will be able to –

1. outline the multidisciplinary nature of environment and sustainability
2. explain types of environmental pollution and its control measures
3. appraise need of e-waste management

Syllabus:

Teaching Hours: 10

Unit I **03**

Environment and Sustainability: Environment: Components, Multidisciplinary nature, Impact Assessment; Concept of sustainability, Carbon credit.

Unit II **04**

Environmental Pollution: Types of environmental pollution and pollutants; Causes, effects and control measures of air pollution, water pollution and noise pollution.

Unit III **03**

E-Waste Management: E-waste: types and sources, Recycling of E-Waste, E-Waste Management Rules of India, Case Studies.

Self-Study:

The self-study contents will be declared at the commencement of semester.

Tutorial Work:

Tutorial work will be based on above syllabus with minimum 03 Assignments to be incorporated.

Suggested Readings^:

1. Dara, S. S., & Mishra, D. D. A textbook of Environmental Chemistry and Pollution Control. S. Chand & Company Ltd.
2. Bharucha, E., Textbook of Environmental Studies, Universities Press.
3. Dhameja, S. Environmental Studies. S. Kataria and Sons.
4. Ristinen, R., & Kraushaar, J. Energy and the Environment, Wiley Publications.

5. Rakesh Johri, E-Waste: Implementation, Regulation & Management in India & Current global best practices, TERI Press.
6. Electronic Waste Management Rules, Ministry of Environment, Forest and Climate Change, Government of India, New Delhi.

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