

<b>MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY</b> <b>(Effective from the academic year 2018 -2019)</b> <b>SEMESTER – V</b>			
<b>Course Code</b>	<b>18CS51</b>	<b>CIE Marks</b>	<b>40</b>
<b>Number of Contact Hours/Week</b>	2:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	03
<b>CREDITS – 03</b>			
<b>Course Learning Objectives:</b> This course (18CS51) will enable students to:			
<ul style="list-style-type: none"> <li>• Explain the principles of management, organization and entrepreneur.</li> <li>• Discuss on planning, staffing, ERP and their importance</li> <li>• Infer the importance of intellectual property rights and relate the institutional support</li> </ul>			
<b>Module – 1</b>	<b>Contact Hours</b>		
<b>Introduction</b> - Meaning, nature and characteristics of management, scope and Functional areas of management, goals of management, levels of management, brief overview of evolution of management theories., Planning- Nature, importance, types of plans, steps in planning, Organizing- nature and purpose, types of Organization, Staffing- meaning, process of recruitment and selection <b>RBT: L1, L2</b>	08		
<b>Module – 2</b>			
<b>Directing and controlling-</b> meaning and nature of directing, leadership styles, motivation Theories, Communication- Meaning and importance, Coordination- meaning and importance, Controlling- meaning, steps in controlling, methods of establishing control. <b>RBT: L1, L2</b>	08		
<b>Module – 3</b>			
<b>Entrepreneur</b> – meaning of entrepreneur, characteristics of entrepreneurs, classification and types of entrepreneurs, various stages in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India and barriers to entrepreneurship. Identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study and social feasibility study. <b>RBT: L1, L2</b>	08		
<b>Module – 4</b>			
<b>Preparation of project and ERP</b> - meaning of project, project identification, project selection, project report, need and significance of project report, contents, formulation, guidelines by planning commission for project report, <b>Enterprise Resource Planning: Meaning and Importance-</b> ERP and Functional areas of Management – Marketing / Sales- Supply Chain Management – Finance and Accounting – Human Resources – Types of reports and methods of report generation <b>RBT: L1, L2</b>	08		
<b>Module – 5</b>			
<b>Micro and Small Enterprises:</b> Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in establishing micro and small enterprises, Government of India industrial policy 2007 on micro and small enterprises, case study (Microsoft), Case study(Captain G R Gopinath),case study (N R Narayana Murthy & Infosys), <b>Institutional support:</b> MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency, <b>Introduction to IPR.</b>	08		

<b>RBT: L1, L2</b>	
<b>Course outcomes:</b> The students should be able to:	
<ul style="list-style-type: none"> <li>• Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship</li> <li>• Utilize the resources available effectively through ERP</li> <li>• Make use of IPRs and institutional support in entrepreneurship</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
<ol style="list-style-type: none"> <li>1. Principles of Management -P. C. Tripathi, P. N. Reddy; Tata McGraw Hill, 4th / 6<sup>th</sup> Edition, 2010.</li> <li>2. Dynamics of Entrepreneurial Development &amp; Management -Vasant Desai Himalaya Publishing House.</li> <li>3. Entrepreneurship Development -Small Business Enterprises -Poornima M Charantimath Pearson Education – 2006.</li> <li>4. Management and Entrepreneurship - Kanishka Bedi- Oxford University Press-2017</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. Management Fundamentals -Concepts, Application, Skill Development Robert Lusier – Thomson.</li> <li>2. Entrepreneurship Development -S S Khanka -S Chand &amp; Co.</li> <li>3. Management -Stephen Robbins -Pearson Education /PHI -17th Edition, 2003</li> </ol>	

**COMPUTER NETWORKS AND SECURITY**  
**(Effective from the academic year 2018 -2019)**  
**SEMESTER – V**

<b>Course Code</b>	<b>18CS52</b>	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	03

**CREDITS –4**

**Course Learning Objectives:** This course (18CS52) will enable students to:

- Demonstration of application layer protocols
- Discuss transport layer services and understand UDP and TCP protocols
- Explain routers, IP and Routing Algorithms in network layer
- Disseminate the Wireless and Mobile Networks covering IEEE 802.11 Standard
- Illustrate concepts of Multimedia Networking, Security and Network Management

<b>Module 1</b>	<b>Contact Hours</b>
<b>Application Layer:</b> Principles of Network Applications: Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the Internet, Application-Layer Protocols. The Web and HTTP: Overview of HTTP, Non-persistent and Persistent Connections, HTTP Message Format, User-Server Interaction: Cookies, Web Caching, The Conditional GET, File Transfer: FTP Commands & Replies, Electronic Mail in the Internet: SMTP, Comparison with HTTP, Mail Message Format, Mail Access Protocols, DNS; The Internet's Directory Service: Services Provided by DNS, Overview of How DNS Works, DNS Records and Messages, Peer-to-Peer Applications: P2P File Distribution, Distributed Hash Tables, Socket Programming: creating Network Applications: Socket Programming with UDP, Socket Programming with TCP. <b>T1: Chap 2</b> <b>RBT: L1, L2, L3</b>	10
<b>Module 2</b>	
<b>Transport Layer :</b> Introduction and Transport-Layer Services: Relationship Between Transport and Network Layers, Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing: Connectionless Transport: UDP, UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer: Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N, Selective repeat, Connection-Oriented Transport TCP: The TCP Connection, TCP Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control: The Causes and the Costs of Congestion, Approaches to Congestion Control, Network-assisted congestion-control example, ATM ABR Congestion control, TCP Congestion Control: Fairness. <b>T1: Chap 3</b> <b>RBT: L1, L2, L3</b>	10
<b>Module 3</b>	
<b>The Network layer:</b> What's Inside a Router?: Input Processing, Switching, Output Processing, Where Does Queuing Occur? Routing control plane, IPv6, A Brief foray into IP Security, Routing Algorithms: The Link-State (LS) Routing Algorithm, The Distance-Vector (DV) Routing Algorithm, Hierarchical Routing, Routing in the Internet, Intra-AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter/AS Routing: BGP, Broadcast Routing Algorithms and Multicast. <b>T1: Chap 4: 4.3-4.7</b> <b>RBT: L1, L2, L3</b>	10

<b>Module 4</b> Network Security:Overview of Network Security:Elements of Network Security , Classification of Network Attacks ,Security Methods ,Symmetric-Key Cryptography :Data Encryption Standard (DES),Advanced Encryption Standard (AES) , Public-Key Cryptography :RSA Algorithm ,Diffie-Hellman Key-Exchange Protocol , Authentication :Hash Function , Secure Hash Algorithm (SHA) , Digital Signatures , Firewalls and Packet Filtering ,Packet Filtering , Proxy Server . <b>Textbook2: Chapter 10</b> <b>RBT: L1, L2, L3</b>	10
<b>Module 5</b> Multimedia Networking: Properties of video, properties of Audio, Types of multimedia Network Applications, Streaming stored video: UDP Streaming, HTTP Streaming, Adaptive streaming and DASH, content distribution Networks Voice-over-IP :Limitations of the Best-Effort IP Service ,Removing Jitter at the Receiver for Audio ,Recovering from Packet Loss Protocols for Real-Time Conversational Applications , RTP , SIP <b>Textbook11: Chap 7</b> <b>RBT: L1, L2, L3</b>	10
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Explain principles of application layer protocols</li> <li>• Recognize transport layer services and infer UDP and TCP protocols</li> <li>• Classify routers, IP and Routing Algorithms in network layer</li> <li>• Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard</li> <li>• Describe Multimedia Networking and Network Management</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
<ol style="list-style-type: none"> <li>1. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson,2017 .</li> <li>2. Nader F Mir, Computer and Communication Networks, 2<sup>nd</sup> Edition, Pearson, 2014.</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition</li> <li>2. Larry L Peterson and Brusce S Davie, Computer Networks, fifth edition, ELSEVIER</li> <li>3. Andrew S Tanenbaum, Computer Networks, fifth edition, Pearson</li> <li>4. Mayank Dave, Computer Networks, Second edition, Cengage Learning</li> </ol>	

**DATABASE MANAGEMENT SYSTEM**  
**(Effective from the academic year 2018 -2019)**  
**SEMESTER – V**

<b>Course Code</b>	<b>18CS53</b>	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	03

**CREDITS –4**

**Course Learning Objectives:** This course (18CS53) will enable students to:

- Provide a strong foundation in database concepts, technology, and practice.
- Practice SQL programming through a variety of database problems.
- Demonstrate the use of concurrency and transactions in database
- Design and build database applications for real world problems.

<b>Module 1</b>	<b>Contact Hours</b>
<b>Introduction to Databases:</b> Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. <b>Overview of Database Languages and Architectures:</b> Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. <b>Conceptual Data Modelling using Entities and Relationships:</b> Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples, Specialization and Generalization. <b>Textbook 1:Ch 1.1 to 1.8, 2.1 to 2.6, 3.1 to 3.10</b> <b>RBT: L1, L2, L3</b>	10
<b>Module 2</b>	
<b>Relational Model:</b> Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. <b>Relational Algebra:</b> Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. <b>Mapping Conceptual Design into a Logical Design:</b> Relational Database Design using ER-to-Relational mapping. <b>SQL:</b> SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL. <b>Textbook 1: Ch4.1 to 4.5, 5.1 to 5.3, 6.1 to 6.5, 8.1; Textbook 2: 3.5</b> <b>RBT: L1, L2, L3</b>	10
<b>Module 3</b>	
<b>SQL : Advances Queries:</b> More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL. <b>Database Application Development:</b> Accessing databases from applications, An introduction to JDBC, JDBC classes and interfaces, SQLJ, Stored procedures, Case study: The internet Bookshop. <b>Internet Applications:</b> The three-Tier application architecture, The presentation layer, The Middle Tier <b>Textbook 1: Ch7.1 to 7.4; Textbook 2: 6.1 to 6.6, 7.5 to 7.7.</b> <b>RBT: L1, L2, L3</b>	10
<b>Module 4</b>	
<b>Normalization: Database Design Theory</b> – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. <b>Normalization Algorithms:</b> Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational	10

Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms <b>Textbook 1: Ch14.1 to 14.7, 15.1 to 15.6</b> <b>RBT: L1, L2, L3</b>	
<b>Module 5</b>	
<b>Transaction Processing:</b> 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. <b>Concurrency Control in Databases:</b> Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking. <b>Introduction to Database Recovery Protocols:</b> Recovery Concepts, NO-UNDO/REDO recovery based on Deferred update, Recovery techniques based on immediate update, Shadow paging, Database backup and recovery from catastrophic failures <b>Textbook 1: 20.1 to 20.6, 21.1 to 21.7, 22.1 to 22.4, 22.7.</b> <b>RBT: L1, L2, L3</b>	10
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS.</li> <li>• Use Structured Query Language (SQL) for database manipulation.</li> <li>• Design and build simple database systems</li> <li>• Develop application to interact with databases.</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
<ol style="list-style-type: none"> <li>1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.</li> <li>2. Database management systems, Ramakrishnan, and Gehrke, 3<sup>rd</sup> Edition, 2014, McGraw Hill</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. Silberschatz Korth and Sudharshan, Database System Concepts, 6<sup>th</sup> Edition, Mc-GrawHill, 2013.</li> <li>2. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.</li> </ol>	

<b>AUTOMATA THEORY AND COMPUTABILITY</b> (Effective from the academic year 2018 -2019) <b>SEMESTER – V</b>			
<b>Course Code</b>	18CS54	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	03
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS54) will enable students to:			
<ul style="list-style-type: none"> <li>• Introduce core concepts in Automata and Theory of Computation</li> <li>• Identify different Formal language Classes and their Relationships</li> <li>• Design Grammars and Recognizers for different formal languages</li> <li>• Prove or disprove theorems in automata theory using their properties</li> <li>• Determine the decidability and intractability of Computational problems</li> </ul>			
<b>Module 1</b>		<b>Contact Hours</b>	
<b>Why study the Theory of Computation, Languages and Strings:</b> Strings, Languages. A Language Hierarchy, Computation, <b>Finite State Machines (FSM):</b> Deterministic FSM, Regular languages, Designing FSM, Nondeterministic FSMs, From FSMs to Operational Systems, Simulators for FSMs, Minimizing FSMs, Canonical form of Regular languages, Finite State Transducers, Bidirectional Transducers.		08	
<b>Textbook 1: Ch 1,2, 3,4, 5.1 to 5.10</b>			
<b>RBT: L1, L2</b>			
<b>Module 2</b>			
<b>Regular Expressions (RE):</b> what is a RE?, Kleene's theorem, Applications of REs, Manipulating and Simplifying REs. Regular Grammars: Definition, Regular Grammars and Regular languages. Regular Languages (RL) and Non-regular Languages: How many RLs, To show that a language is regular, Closure properties of RLs, to show some languages are not RLs.		08	
<b>Textbook 1: Ch 6, 7, 8: 6.1 to 6.4, 7.1, 7.2, 8.1 to 8.4</b>			
<b>RBT: L1, L2, L3</b>			
<b>Module 3</b>			
<b>Context-Free Grammars(CFG):</b> Introduction to Rewrite Systems and Grammars, CFGs and languages, designing CFGs, simplifying CFGs, proving that a Grammar is correct, Derivation and Parse trees, Ambiguity, Normal Forms. Pushdown Automata (PDA): Definition of non-deterministic PDA, Deterministic and Non-deterministic PDAs, Non-determinism and Halting, alternative equivalent definitions of a PDA, alternatives that are not equivalent to PDA.		08	
<b>Textbook 1: Ch 11, 12: 11.1 to 11.8, 12.1, 12.2, 12.4, 12.5, 12.6</b>			
<b>RBT: L1, L2, L3</b>			
<b>Module 4</b>			
<b>Algorithms and Decision Procedures for CFLs:</b> Decidable questions, Un-decidable questions. <b>Turing Machine:</b> Turing machine model, Representation, Language acceptability by TM, design of TM, Techniques for TM construction. Variants of Turing Machines (TM), The model of Linear Bounded automata.		08	
<b>Textbook 1: Ch 14: 14.1, 14.2, Textbook 2: Ch 9.1 to 9.8</b>			
<b>RBT: L1, L2, L3</b>			
<b>Module 5</b>			
<b>Decidability:</b> Definition of an algorithm, decidability, decidable languages, Undecidable languages, halting problem of TM, Post correspondence problem. Complexity: Growth rate		08	

<p>of functions, the classes of P and NP, Quantum Computation: quantum computers, Church-Turing thesis. <b>Applications:</b> G.1 Defining syntax of programming language, Appendix J: Security</p> <p><b>Textbook 2: 10.1 to 10.7, 12.1, 12.2, 12.8, 12.8.1, 12.8.2</b></p> <p><b>Textbook 1: Appendix: G.1(only), J.1 &amp; J.2</b>  <b>RBT: L1, L2, L3</b></p>	
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation</li> <li>• Learn how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models).</li> <li>• Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.</li> <li>• Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness.</li> <li>• Classify a problem with respect to different models of Computation.</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
<ol style="list-style-type: none"> <li>1. Elaine Rich, Automata, Computability and Complexity, 1<sup>st</sup> Edition, Pearson education,2012/2013</li> <li>2. K L P Mishra, N Chandrasekaran , 3<sup>rd</sup> Edition, Theory of Computer Science, PhI, 2012.</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. John E Hopcroft, Rajeev Motwani, Jeffery D Ullman, Introduction to Automata Theory, Languages, and Computation, 3rd Edition, Pearson Education, 2013</li> <li>2. Michael Sipser : Introduction to the Theory of Computation, 3rd edition, Cengage learning,2013</li> <li>3. John C Martin, Introduction to Languages and The Theory of Computation, 3<sup>rd</sup> Edition, Tata McGraw –Hill Publishing Company Limited, 2013</li> <li>4. Peter Linz, “An Introduction to Formal Languages and Automata”, 3rd Edition, Narosa Publishers, 1998</li> <li>5. Basavaraj S. Anami, Karibasappa K G, Formal Languages and Automata theory, Wiley India, 2012</li> <li>6. C K Nagpal, Formal Languages and Automata Theory, Oxford University press, 2012.</li> </ol>	
<b>Faculty can utilize open source tools (like JFLAP) to make teaching and learning more interactive.</b>	

<b>APPLICATION DEVELOPMENT USING PYTHON</b> <b>[(Effective from the academic year 2018 -2019)]</b> <b>SEMESTER – V</b>			
<b>Course Code</b>	<b>18CS55</b>	<b>IA Marks</b>	<b>40</b>
<b>Number of Lecture Hours/Week</b>	<b>03</b>	<b>Exam Marks</b>	<b>60</b>
<b>Total Number of Lecture Hours</b>	<b>40</b>	<b>Exam Hours</b>	<b>03</b>
<b>CREDITS – 03</b>			
<b>Course Learning Objectives:</b> This course (18CS55) will enable students to			
<ul style="list-style-type: none"> <li>• Learn the syntax and semantics of Python programming language.</li> <li>• Illustrate the process of structuring the data using lists, tuples and dictionaries.</li> <li>• Demonstrate the use of built-in functions to navigate the file system.</li> <li>• Implement the Object Oriented Programming concepts in Python.</li> <li>• Appraise the need for working with various documents like Excel, PDF, Word and Others.</li> </ul>			
<b>Module – 1</b>		<b>Teaching Hours</b>	
<b>Python Basics</b> , Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, <b>Flow control</b> , Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys.exit(), <b>Functions</b> , def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number <b>Textbook 1: Chapters 1 – 3</b> <b>RBT: L1, L2</b>		08	
<b>Module – 2</b>			
<b>Lists</b> , The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References, <b>Dictionaries and Structuring Data</b> , The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things, <b>Manipulating Strings</b> , Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup <b>Textbook 1: Chapters 4 – 6</b> <b>RBT: L1, L2, L3</b>		08	
<b>Module – 3</b>			
<b>Pattern Matching with Regular Expressions</b> , Finding Patterns of Text Without Regular Expressions, Finding Patterns of Text with Regular Expressions, More Pattern Matching with Regular Expressions, Greedy and Nongreedy Matching, The findall() Method, Character Classes, Making Your Own Character Classes, The Caret and Dollar Sign Characters, The Wildcard Character, Review of Regex Symbols, Case-Insensitive Matching, Substituting Strings with the sub() Method, Managing Complex Regexes, Combining re.IGNORECASE, re.DOTALL, and re.VERBOSE, Project: Phone Number and Email Address Extractor, <b>Reading and Writing Files</b> , Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the pprint.pformat() Function, Project: Generating Random Quiz Files, Project: Multiclipboard, <b>Organizing Files</b> , The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module, Project: Renaming Files with American-Style Dates to European-Style Dates, Project: Backing Up a Folder into a ZIP File, <b>Debugging</b> , Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE's Debugger. <b>Textbook 1: Chapters 7 – 10</b>		08	

<b>RBT: L1, L2, L3</b>	
<b>Module – 4</b>	
<b>Classes and objects</b> , Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying, <b>Classes and functions</b> , Time, Pure functions, Modifiers, Prototyping versus planning, <b>Classes and methods</b> , Object-oriented features, Printing objects, Another example, A more complicated example, The init method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation, <b>Inheritance</b> , Card objects, Class attributes, Comparing cards, Decks, Printing the deck, Add, remove, shuffle and sort, Inheritance, Class diagrams, Data encapsulation <b>Textbook 2: Chapters 15 – 18</b> <b>RBT: L1, L2, L3</b>	08
<b>Module – 5</b>	
<b>Web Scraping</b> , Project: MAPIT.PY with the webdriver Module, Downloading Files from the Web with the requests Module, Saving Downloaded Files to the Hard Drive, HTML, Parsing HTML with the BeautifulSoup Module, Project: “I’m Feeling Lucky” Google Search, Project: Downloading All XKCD Comics, Controlling the Browser with the selenium Module, <b>Working with Excel Spreadsheets</b> , Excel Documents, Installing the openpyxl Module, Reading Excel Documents, Project: Reading Data from a Spreadsheet, Writing Excel Documents, Project: Updating a Spreadsheet, Setting the Font Style of Cells, Font Objects, Formulas, Adjusting Rows and Columns, Charts, <b>Working with PDF and Word Documents</b> , PDF Documents, Project: Combining Select Pages from Many PDFs, Word Documents, <b>Working with CSV files and JSON data</b> , The csv Module, Project: Removing the Header from CSV Files, JSON and APIs, The json Module, Project: Fetching Current Weather Data <b>Textbook 1: Chapters 11 – 14</b> <b>RBT: L1, L2, L3</b>	08
<b>Course Outcomes:</b> After studying this course, students will be able to	
<ul style="list-style-type: none"> <li>• Demonstrate proficiency in handling of loops and creation of functions.</li> <li>• Identify the methods to create and manipulate lists, tuples and dictionaries.</li> <li>• Discover the commonly used operations involving regular expressions and file system.</li> <li>• Interpret the concepts of Object-Oriented Programming as used in Python.</li> <li>• Determine the need for scraping websites and working with CSV, JSON and other file formats.</li> </ul>	
<b>Question paper pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Text Books:</b>	
<ol style="list-style-type: none"> <li>1. Al Sweigart, “<b>Automate the Boring Stuff with Python</b>”, 1<sup>st</sup> Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at <a href="https://automatetheboringstuff.com/">https://automatetheboringstuff.com/</a>) (Chapters 1 to 18)</li> <li>2. Allen B. Downey, “<b>Think Python: How to Think Like a Computer Scientist</b>”, 2<sup>nd</sup> Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at <a href="http://greenteapress.com/thinkpython2/thinkpython2.pdf">http://greenteapress.com/thinkpython2/thinkpython2.pdf</a>) (Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above links)</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. Gowrishankar S, Veena A, “<b>Introduction to Python Programming</b>”, 1<sup>st</sup> Edition, CRC Press/Taylor &amp; Francis, 2018. ISBN-13: 978-0815394372</li> </ol>	

- 2. Jake VanderPlas, "**Python Data Science Handbook: Essential Tools for Working with Data**", 1<sup>st</sup> Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
- 3. Charles Dierbach, "**Introduction to Computer Science Using Python**", 1<sup>st</sup> Edition, Wiley India Pvt Ltd, 2015. ISBN-13: 978-8126556014
- 4. Wesley J Chun, "**Core Python Applications Programming**", 3<sup>rd</sup> Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365

**UNIX PROGRAMMING**  
**(Effective from the academic year 2018 -2019)**  
**SEMESTER – V**

<b>Course Code</b>	<b>18CS56</b>	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	03
<b>CREDITS – 3</b>			
<b>Course Learning Objectives:</b> This course (18CS56) will enable students to			
<ul style="list-style-type: none"> <li>• Interpret the features of UNIX and basic commands.</li> <li>• Demonstrate different UNIX files and permissions</li> <li>• Implement shell programs.</li> <li>• Explain UNIX process, IPC and signals.</li> </ul>			
<b>Module 1</b>		<b>Contact Hours</b>	
<b>Introduction:</b> Unix Components/Architecture. Features of Unix. The UNIX Environment and UNIX Structure, Posix and Single Unix specification. General features of Unix commands/ command structure. Command arguments and options. Basic Unix commands such as echo, printf, ls, who, date, passwd, cal, Combining commands. Meaning of Internal and external commands. The type command: knowing the type of a command and locating it. The root login. Becoming the super user: su command.	08		
<b>Unix files:</b> Naming files. Basic file types/categories. Organization of files. Hidden files. Standard directories. Parent child relationship. The home directory and the HOME variable. Reaching required files- the PATH variable, manipulating the PATH, Relative and absolute pathnames. Directory commands – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent present and parent directories and their usage in relative path names. File related commands – cat, mv, rm, cp, wc and od commands.			
<b>RBT: L1, L2</b>			
<b>Module 2</b>			
<b>File attributes and permissions:</b> The ls command with options. Changing file permissions: the relative and absolute permissions changing methods. Recursively changing file permissions. Directory permissions.	08		
<b>The shells interpretive cycle:</b> Wild cards. Removing the special meanings of wild cards. Three standard files and redirection. <b>Connecting commands:</b> Pipe. Basic and Extended regular expressions. The grep, egrep. Typical examples involving different regular expressions.			
<b>Shell programming:</b> Ordinary and environment variables. The .profile. Read and readonly commands. Command line arguments. exit and exit status of a command. Logical operators for conditional execution. The test command and its shortcut. The if, while, for and case control statements. The set and shift commands and handling positional parameters. The here (<<) document and trap command. Simple shell program examples.			
<b>RBT: L1, L2</b>			
<b>Module 3</b>			
<b>UNIX File APIs:</b> General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs.	08		
<b>UNIX Processes and Process Control:</b>			
<b>The Environment of a UNIX Process:</b> Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes.			
<b>Process Control:</b> Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3,			

wait4 Functions, Race Conditions, exec Functions <b>RBT: L1, L2, L3</b>	
<b>Module 4</b> Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times, I/O Redirection. <b>Overview of IPC Methods</b> , Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores. <b>Shared Memory</b> , Client-Server Properties, Stream Pipes, Passing File Descriptors, An Open Server-Version 1, Client-Server Connection Functions. <b>RBT: L1, L2, L3</b>	08
<b>Module 5</b> <b>Signals and Daemon Processes:</b> Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX.lb Timers. Daemon Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model. <b>RBT: L1, L2, L3</b>	08
<b>Course Outcomes:</b> The student will be able to : <ul style="list-style-type: none"> <li>• Explain Unix Architecture, File system and use of Basic Commands</li> <li>• Illustrate Shell Programming and to write Shell Scripts</li> <li>• Categorize, compare and make use of Unix System Calls</li> <li>• Build an application/service over a Unix system.</li> </ul>	
<b>Question Paper Pattern:</b> <ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b> <ol style="list-style-type: none"> <li>1. Sumitabha Das., Unix Concepts and Applications., 4<sup>th</sup>Edition., Tata McGraw Hill ( Chapter 1,2 ,3,4,5,6,8,13,14)</li> <li>2. W. Richard Stevens: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education, 2005 ( Chapter 3,7,8,10,13,15)</li> <li>3. Unix System Programming Using C++ - Terrence Chan, PHI, 1999. ( Chapter 7,8,9,10)</li> </ol>	
<b>Reference Books:</b> <ol style="list-style-type: none"> <li>1. M.G. Venkatesh Murthy: UNIX &amp; Shell Programming, Pearson Education.</li> <li>2. Richard Blum , Christine Bresnahan : Linux Command Line and Shell Scripting Bible, 2ndEdition, Wiley,2014.</li> </ol>	
<b>Faculty can utilize open source tools to make teaching and learning more interactive.</b>	

**COMPUTER NETWORK LABORATORY**  
**(Effective from the academic year 2018 -2019)**  
**SEMESTER – V**

<b>Course Code</b>	<b>18CSL57</b>	<b>CIE Marks</b>	<b>40</b>
<b>Number of Contact Hours/Week</b>	<b>0:2:2</b>	<b>SEE Marks</b>	<b>60</b>
<b>Total Number of Lab Contact Hours</b>	<b>36</b>	<b>Exam Hours</b>	<b>03</b>

**Credits – 2**

**Course Learning Objectives:** This course (18CSL57) will enable students to:

- Demonstrate operation of network and its management commands
- Simulate and demonstrate the performance of GSM and CDMA
- Implement data link layer and transport layer protocols.

**Descriptions (if any):**

- For the experiments below modify the topology and parameters set for the experiment and take multiple rounds of reading and analyze the results available in log files. Plot necessary graphs and conclude. Use NS2/NS3.
- **Installation procedure of the required software must be demonstrated, carried out in groups and documented in the journal.**

**Programs List:**

**PART A**

1.	Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.
2.	Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
3.	Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.
4.	Implement simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.
5.	Implement and study the performance of GSM on NS2/NS3 (Using MAC layer) or equivalent environment.
6.	Implement and study the performance of CDMA on NS2/NS3 (Using stack called Call net) or equivalent environment

**PART B (Implement the following in Java)**

7.	Write a program for error detecting code using CRC-CCITT (16- bits).
8.	Write a program to find the shortest path between vertices using bellman-ford algorithm.
9.	Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.
10.	Write a program on datagram socket for client/server to display the messages on client side, typed at the server side.
11.	Write a program for simple RSA algorithm to encrypt and decrypt the data.
12.	Write a program for congestion control using leaky bucket algorithm.

**Laboratory Outcomes:** The student should be able to:

- Analyze and Compare various networking protocols.
- Demonstrate the working of different concepts of networking.
- Implement, analyze and evaluate networking protocols in NS2 / NS3 and JAVA programming language

**Conduct of Practical Examination:**

- Experiment distribution

- For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.
- For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.
- Marks Distribution (*Courseed to change in accordance with university regulations*)
  - i) For laboratories having only one part – Procedure + Execution + Viva-Voce:  $15+70+15 = 100$  Marks
  - j) For laboratories having PART A and PART B
    - i. Part A – Procedure + Execution + Viva =  $6 + 28 + 6 = 40$  Marks
    - ii. Part B – Procedure + Execution + Viva =  $9 + 42 + 9 = 60$  Marks

**DBMS LABORATORY WITH MINI PROJECT**

(Effective from the academic year 2018 -2019)

**SEMESTER – V**

<b>Course Code</b>	<b>18CSL58</b>	<b>CIE Marks</b>	<b>40</b>
<b>Number of Contact Hours/Week</b>	<b>0:2:2</b>	<b>SEE Marks</b>	<b>60</b>
<b>Total Number of Lab Contact Hours</b>	<b>36</b>	<b>Exam Hours</b>	<b>03</b>

**Credits – 2****Course Learning Objectives:** This course (18CSL58) will enable students to:

- Foundation knowledge in database concepts, technology and practice to groom students into well-informed database application developers.
- Strong practice in SQL programming through a variety of database problems.
- Develop database applications using front-end tools and back-end DBMS.

**Descriptions (if any):****PART-A: SQL Programming (Max. Exam Mks. 50)**

- Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.
- Create Schema and insert at least 5 records for each table. Add appropriate database constraints.

**PART-B: Mini Project (Max. Exam Mks. 30)**

- Use Java, C#, PHP, Python, or any other similar front-end tool. All applications must be demonstrated on desktop/laptop as a stand-alone or web based application (Mobile apps on Android/IOS are not permitted.)

**Installation procedure of the required software must be demonstrated, carried out in groups and documented in the journal.****Programs List:****PART A**

1.	<p>Consider the following schema for a Library Database:</p> <p>BOOK(<u>Book_id</u>, Title, Publisher_Name, Pub_Year)      BOOK_AUTHORS(<u>Book_id</u>, Author_Name)      PUBLISHER(<u>Name</u>, Address, Phone)      BOOK_COPIES(<u>Book_id</u>, <u>Programme_id</u>, No-of_Copies)      BOOK_LENDING(<u>Book_id</u>, <u>Programme_id</u>, <u>Card_No</u>, Date_Out, Due_Date)      LIBRARY_PROGRAMME(<u>Programme_id</u>, Programme_Name, Address)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.</li> <li>2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.</li> <li>3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.</li> <li>4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.</li> <li>5. Create a view of all books and its number of copies that are currently available in the Library.</li> </ol>
2.	<p>Consider the following schema for Order Database:</p> <p>SALESMAN(<u>Salesman_id</u>, Name, City, Commission)      CUSTOMER(<u>Customer_id</u>, Cust_Name, City, Grade, Salesman_id)      ORDERS(<u>Ord_No</u>, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. Count the customers with grades above Bangalore's average.</li> </ol>

	<ol style="list-style-type: none"> <li>2. Find the name and numbers of all salesman who had more than one customer.</li> <li>3. List all the salesman and indicate those who have and don't have customers in their cities (Use UNION operation.)</li> <li>4. Create a view that finds the salesman who has the customer with the highest order of a day.</li> <li>5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.</li> </ol>
3.	<p>Consider the schema for Movie Database:</p> <p>ACTOR(<u>Act_id</u>, Act_Name, Act_Gender)      DIRECTOR(<u>Dir_id</u>, Dir_Name, Dir_Phone)      MOVIES(<u>Mov_id</u>, Mov_Title, Mov_Year, Mov_Lang, Dir_id)      MOVIE_CAST(<u>Act_id</u>, <u>Mov_id</u>, Role)      RATING(<u>Mov_id</u>, Rev_Stars)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. List the titles of all movies directed by 'Hitchcock'.</li> <li>2. Find the movie names where one or more actors acted in two or more movies.</li> <li>3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).</li> <li>4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.</li> <li>5. Update rating of all movies directed by 'Steven Spielberg' to 5.</li> </ol>
4.	<p>Consider the schema for College Database:</p> <p>STUDENT(<u>USN</u>, SName, Address, Phone, Gender)      SEMSEC(<u>SSID</u>, Sem, Sec)      CLASS(<u>USN</u>, <u>SSID</u>)      COURSE(<u>Subcode</u>, Title, Sem, Credits)      IAMARKS(<u>USN</u>, <u>Subcode</u>, <u>SSID</u>, Test1, Test2, Test3, FinalIA)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. List all the student details studying in fourth semester 'C' section.</li> <li>2. Compute the total number of male and female students in each semester and in each section.</li> <li>3. Create a view of Test1 marks of student USN '1BI15CS101' in all Courses.</li> <li>4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.</li> <li>5. Categorize students based on the following criterion:          If FinalIA = 17 to 20 then CAT = 'Outstanding'          If FinalIA = 12 to 16 then CAT = 'Average'          If FinalIA &lt; 12 then CAT = 'Weak'</li> </ol> <p>Give these details only for 8<sup>th</sup> semester A, B, and C section students.</p>
5.	<p>Consider the schema for Company Database:</p> <p>EMPLOYEE(<u>SSN</u>, Name, Address, Sex, Salary, SuperSSN, DNo)      DEPARTMENT(<u>DNo</u>, DName, MgrSSN, MgrStartDate)      DLOCATION(<u>DNo</u>, <u>DLoc</u>)      PROJECT(<u>PNo</u>, PName, PLocation, DNo)      WORKS_ON(<u>SSN</u>, <u>PNo</u>, Hours)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.</li> <li>2. Show the resulting salaries if every employee working on the 'IoT' project is</li> </ol>

	<p>given a 10 percent raise.</p> <ol style="list-style-type: none"> <li>3. Find the sum of the salaries of all employees of the ‘Accounts’ department, as well as the maximum salary, the minimum salary, and the average salary in this department</li> <li>4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).</li> <li>5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.</li> </ol>
<b>PART B: Mini Project</b>	
•	For any problem selected
•	Make sure that the application should have five or more tables
•	Indicative areas include; health care
<b>Laboratory Outcomes:</b> The student should be able to:	
<ul style="list-style-type: none"> <li>• Create, Update and query on the database.</li> <li>• Demonstrate the working of different concepts of DBMS</li> <li>• Implement, analyze and evaluate the project developed for an application.</li> </ul>	
<b>Conduct of Practical Examination:</b>	
<ul style="list-style-type: none"> <li>• Experiment distribution <ul style="list-style-type: none"> <li>○ For laboratories having only one part: Students are allowed to pick one experiment from the lot with equal opportunity.</li> <li>○ For laboratories having PART A and PART B: Students are allowed to pick one experiment from PART A and one experiment from PART B, with equal opportunity.</li> </ul> </li> <li>• Change of experiment is allowed only once and marks allotted for procedure to be made zero of the changed part only.</li> <li>• Marks Distribution (<i>Courseed to change in accordance with university regulations</i>) <ul style="list-style-type: none"> <li>k) For laboratories having only one part – Procedure + Execution + Viva-Voce: <math>15+70+15 = 100</math> Marks</li> <li>I) For laboratories having PART A and PART B <ul style="list-style-type: none"> <li>i. Part A – Procedure + Execution + Viva = <math>6 + 28 + 6 = 40</math> Marks</li> <li>ii. Part B – Procedure + Execution + Viva = <math>9 + 42 + 9 = 60</math> Marks</li> </ul> </li> </ul> </li> </ul>	

<p style="text-align: center;"><b>B. E. COMMON TO ALL PROGRAMMES</b>  <b>Choice Based Credit System (CBCS) and Outcome Based Education (OBE)</b>  <b>SEMESTER – V</b></p>						
<b>ENVIRONMENTAL STUDIES</b>						
Course Code	<b>18CIV59</b>	CIE Marks	40			
Teaching Hours / Week (L:T:P)	(1:0:0)	SEE Marks	60			
Credits	01	Exam Hours	02			
<b>Module - 1</b>						
<p><b>Ecosystems</b> (Structure and Function): Forest, Desert, Wetlands, Riverine, Oceanic and Lake.</p> <p><b>Biodiversity:</b> Types, Value; Hot-spots; Threats and Conservation of biodiversity, Forest Wealth, and Deforestation.</p>						
<b>Module - 2</b>						
<p><b>Advances in Energy Systems</b> (Merits, Demerits, Global Status and Applications): Hydrogen, Solar, OTEC, Tidal and Wind.</p> <p><b>Natural Resource Management</b> (Concept and case-studies): Disaster Management, Sustainable Mining, Cloud Seeding, and Carbon Trading.</p>						
<b>Module - 3</b>						
<p><b>Environmental Pollution</b> (Sources, Impacts, Corrective and Preventive measures, Relevant Environmental Acts, Case-studies): Surface and Ground Water Pollution; Noise pollution; Soil Pollution and Air Pollution.</p> <p><b>Waste Management &amp; Public Health Aspects:</b> Bio-medical Wastes; Solid waste; Hazardous wastes; E-wastes; Industrial and Municipal Sludge.</p>						
<b>Module - 4</b>						
<p><b>Global Environmental Concerns</b> (Concept, policies and case-studies):Ground water depletion/recharging, Climate Change; Acid Rain; Ozone Depletion; Radon and Fluoride problem in drinking water; Resettlement and rehabilitation of people, Environmental Toxicology.</p>						
<b>Module - 5</b>						
<p><b>Latest Developments in Environmental Pollution Mitigation Tools (Concept and Applications):</b> G.I.S. &amp; Remote Sensing, Environment Impact Assessment, Environmental Management Systems, ISO14001; Environmental Stewardship- NGOs.</p> <p><b>Field work:</b> Visit to an Environmental Engineering Laboratory or Green Building or Water Treatment Plant or Waste water treatment Plant; ought to be Followed by understanding of process and its brief documentation.</p>						
<p><b>Course Outcomes:</b> At the end of the course, students will be able to:</p> <ul style="list-style-type: none"> <li>• CO1: Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,</li> <li>• CO2: Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.</li> <li>• CO3: Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.</li> <li>• CO4: Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.</li> </ul>						
<p><b>Question paper pattern:</b></p> <ul style="list-style-type: none"> <li>• The Question paper will have 100 objective questions.</li> <li>• Each question will be for 01 marks</li> <li>• Student will have to answer all the questions in an OMR Sheet.</li> <li>• The Duration of Exam will be 2 hours.</li> </ul>						
<b>Sl. No.</b>	<b>Title of the Book</b>	<b>Name of the Author/s</b>	<b>Edition and Year</b>			
<b>Textbook/s</b>						

1	Environmental Studies	Benny Joseph	Tata Mc Graw – Hill.	2 <sup>nd</sup> Edition, 2012
2.	Environmental Studies	S M Prakash	Pristine Publishing House, Mangalore	3 <sup>rd</sup> Edition 2018
3	Environmental Studies – From Crisis to Cure	R Rajagopalan	Oxford Publisher	2005

#### **Reference Books**

1	Principals of Environmental Science and Engineering	Raman Sivakumar	Cengage learning, Singapur.	2 <sup>nd</sup> Edition, 2005
2	Environmental Science – working with the Earth	G.Tyler Miller Jr.	Thomson Brooks /Cole,	11 <sup>th</sup> Edition, 2006
3	Text Book of Environmental and Ecology	Pratiba Sing, Anoop Singh& Piyush Malaviya	Acme Learning Pvt. Ltd. New Delhi.	1 <sup>st</sup> Edition