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# D. Y. Patil College of Engineering and Technology

**Kasaba Bawada, Kolhapur**

## (An Autonomous Institute)
## Accredited by NAAC with 'A' Grade

## M. Tech Programme Structure

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## Department of Computer Science and Engineering
## 2020-21

**D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR**

Teaching and Evaluation Scheme from Year 2020-21

**First Year M. Tech. Computer Science & Engineering**

**SEMESTER- I**

| Sr. No. | Course Code | Course Type | Name of the Course | Teaching Scheme per Week | | | | | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lecture | Tutorial | Practical | Credits | Total Marks | Type | Max. Marks | Min. Marks for Passing | |
| 1 | 202CSL601 | PC | Mathematical Foundations of Computer Science | 3 | - | - | 3 | 100 | ISE<br>MSE<br>ESE | 20<br>30<br>50 | 20<br><br>20 | 40 |
| 2 | 202CSL602 | PC | Advanced Data Structures | 3 | - | - | 3 | 100 | ISE<br>MSE<br>ESE | 20<br>30<br>50 | 20<br><br>20 | 40 |
| 3 | 202CSL603<br>202CSL604<br>202CSL605 | PE | Program Elective I | 3 | - | - | 3 | 100 | ISE<br>MSE<br>ESE | 20<br>30<br>50 | 20<br><br>20 | 40 |
| 4 | 202CSL608<br>202CSL609<br>202CSL610 | PE | Program Elective II | 3 | - | - | 3 | 100 | ISE<br>MSE<br>ESE | 20<br>30<br>50 | 20<br><br>20 | 40 |
| 5 | 202CSL613 | ESC | Research Methodology and IPR | 2 | - | - | 2 | 50 | ISE | 50 | 20 | 20 |
| 6 | 202CSP614 | PC | Laboratory I (Based on Program Core courses ) | - | - | 4 | 2 | 25 | ISE - Lab | 25 | 10 | 10 |
| 7 | 202CSP615 | PE | Laboratory II (Based on Program Elective courses) | - | - | 4 | 2 | 25 | ISE - Lab | 25 | 10 | 10 |
| 8 | 202CSMXXX | HSMC | Audit Course | - | 2 | - | - | - | - | - | - | - |
| | | | **Total:** | 14 | 2 | 8 | **18** | **500** | | **500** | | |
| | | | | **24** | | | | | | | | |

***ISE: In Semester Evaluation, MSE: Mid Semester Examination, ESE: End Semester Examination***

**Note: ESE will be conducted for 100 marks and converted to 50 marks**

**Program Elective-I**

| | | | |
|---|---|---|---|
| **1.** | 202CSL603 | Machine Learning |
| **2.** | 202CSL604 | Data Preparation and Analysis |
| **3.** | 202CSL605 | Block Chain Technology |

**Program Elective-II**

| | | |
|---|---|---|
| **1.** | 202CSL608 | Distributed System and Cloud Computing |
| **2.** | 202CSL609 | Data Storage Technologies and Networks |
| **3.** | 202CSL610 | Smart Technology and Internet of Things |

**D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR**

Teaching and Evaluation Scheme from Year 2020-21

**First Year M. Tech. Computer Science & Engineering**

**SEMESTER- II**

| Sr. No. | Course Code | Course Type | Name of the Course | Teaching Scheme per Week | | | | Total Marks | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lecture | Tutorial | Practical | Credits | | Type | MaxMarks | Min. Marks for Passing | |
| 1 | 202CSL631 | PC | Software Architectures | 3 | - | - | 3 | 100 | ISE<br>MSE<br>ESE | 20<br>30<br>50 | 20<br><br>20 | 40 |
| 2 | 202CSL632 | PC | Network Engineering and Management | 3 | - | - | 3 | 100 | ISE<br>MSE<br>ESE | 20<br>30<br>50 | 20<br><br>20 | 40 |
| 3 | 202CSL633<br>202CSL634<br>202CSL635 | PE | Program Elective – III | 3 | - | - | 3 | 100 | ISE<br>MSE<br>ESE | 20<br>30<br>50 | 20<br><br>20 | 40 |
| 4 | 202CSL638<br>202CSL639<br>202CSL640 | PE | Program Elective - IV | 3 | - | - | 3 | 100 | ISE<br>MSE<br>ESE | 20<br>30<br>50 | 20<br><br>20 | 40 |
| 5 | 202CSP643 | PC | Laboratory III (Based on Program Core courses) | - | - | 4 | 2 | 25 | ISE - Lab | 25 | 10 | 10 |
| 6 | 202CSP644 | PE | Laboratory IV (Based on Program Elective courses) | - | - | 4 | 2 | 25 | ISE - Lab | 25 | 10 | 10 |
| 7 | 202CSP645 | PROJ | Pre-Dissertation Seminar | - | 2 | - | 2 | 50 | ISE | 50 | 20 | 20 |
| 8 | 202CSMYYY | MC | Audit Course | - | 2 | - | - | - | - | - | - | - |
| | | | **Total:** | **12** | **4** | **8** | **18** | **500** | | **500** | | |
| | | | | **24** | | | | | | | | |

***ISE: In Semester Evaluation, MSE: Mid Semester Examination, ESE: End Semester Examination***

**Note: ESE will be conducted for 100 marks and converted to 50 marks**

**Program Elective-III**

| | | |
|---|---|---|
| **1.** | 202CSL633 | Secure Software Design and Enterprise Computing |
| **2.** | 202CSL634 | Cyber Security and Digital Forensics |
| **3.** | 202CSL635 | Security Assessment and Risk Analysis |

**Program Elective-IV**

| | | |
|---|---|---|
| **1.** | 202CSL638 | Human and Computer Interaction |
| **2.** | 202CSL639 | Knowledge Discovery |
| **3.** | 202CSL640 | Quantum Computing |

**Audit Course**

| | | |
|---|---|---|
| **1.** | 202CSM616 | English for Research Paper Writing |
| **2.** | 202CSM617 | Disaster Management |
| **3.** | 202CSM618 | Sanskrit for Technical Knowledge |
| **4.** | 202CSM619 | Value Education |
| **5.** | 202CSM620 | Constitution of India |
| **6.** | 202CSM621 | Pedagogy Studies |
| **7.** | 202CSM622 | Stress Management by Yoga |
| **8.** | 202CSM623 | Personality Development through Life Enlightenment Skills |

**D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR**

Teaching and Evaluation Scheme from Year 2021-22

**Second Year M. Tech. Computer Science & Engineering**

**SEMESTER-III***

| Sr. No. | Course Code | Course Type | Name of the Course | Teaching Scheme per Week | | | | Total Marks | Evaluation Scheme | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lecture | Tutorial | Practical | Credits | | Type | Max.Marks | Min. Marks for Passing | |
| 1 | 202CSL701 | PE | Program Elective – V* | - | 2 | - | 2 | 100 | ISE | 100 | 40 | **40** |
| 2 | 202CSL711 | OE | Open Elective* | - | 2 | - | 2 | 100 | ISE | 100 | 40 | 40 |
| 3 | 202CSP721 | PROJ | Dissertation Phase - I | - | - | 24 | 12 | 100 | ISE | 50 | 20 | **40** |
| | | | | | | | | | ESE-OE | 50 | 20 | |
| | | | **Total:** | **0** | **4** | **24** | **16** | **300** | | **300** | | |
| | | | | **28** | | | | | | | | |

*Students going for Industrial Project/Thesis will complete these courses through MOOCs

**Open Elective:**

1. 202CSL711 Business Analytics
2. 202CSL712 Industrial Safety
3. 202CSL713 Operations Research
4. 202CSL714 Cost Management of Engineering Projects
5. 202CSL715 Composite Materials
6. 202CSL716 Waste to Energy.

**D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR**

Teaching and Evaluation Scheme from Year 2020-21

**Second Year M. Tech. Computer Science & Engineering**

**SEMESTER-IV**

| Sr. No. | Course Code | Course Type | Name of the Course | Teaching Scheme per Week | | | | Total Marks | Evaluation Scheme | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lecture | Tutorial | Practical | Credits | | Type | Max.Mark | Min. Marks for Passing |
| 1 | 202CSP723 | PROJ | Dissertation Phase- II | 0 | 0 | 32 | 16 | **200** | ISE | 100 | 40 |
| | | | | | | | | | ESE - OE | 100 | 40 |
| | | | **Total:** | **0** | **0** | **32** | **16** | **200** | | **200** | |
| | | | | **32** | | | | | | | |

**Note 1:**

- Tutorials and practical's shall be conducted in batches with batch size of 9 students.
- For Pre-Dissertation Seminar, work load will be for two students.
- Every student should submit the Dissertation synopsis within first week of S. Y. M Tech, (Sem-III)
- Dissertation Phase-I, Dissertation phase-II work load will be for one student.

**Note 2:**

- Open Elective course can be chosen from the given list. However, any other Open Elective course can be chosen provided the said course is available is MOOC form and it is to be chosen with prior permission from the department head.
- Program Elective V is to be chosen by the students based on the domain related to the dissertation topic with prior permission from the guide.
- Audit courses in first and second semester are to be chosen by the students from the given list of audit courses, distinct for each semester.

**Evaluation Methods:**

1. **In Semester Evaluation (ISE-Theory) 20 marks:** ISE-1 and ISE-2 can be done by using following modes

✓ Surprise test
✓ Self learning topic
✓ Case study
✓ Assignments
✓ Active learning methods

2. **ISE (Lab) 25 marks**: Lab assessment is to be done using continuous assessment method.
3. **Mid Semester Examination (MSE)** will be conducted for 30 marks.
4. **End Semester Examination (ESE) 50 marks: -** ESE will be conducted on entire syllabus for 100 marks for 3 hours duration and converted to 50 marks.

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# Teaching And Evaluation Scheme for First Year M. Tech CSE Programme

## Semester – I

| Course Title: **Mathematical Foundations of Computer Science** | |
|---|---|
| Course Code: 202CSL601 | **Semester: I** |
| Teaching Scheme: L-T-P: **3-0-0** | Credits: 3 |
| Evaluation Scheme: ISE + MSE Marks: **20 + 30** | ESE Marks: **50** |

| **COURSE OBJECTIVES** |
|---|
| • To enhance the problem-solving skills in the areas of theoretical computer science. |
| • To make the students to use the mathematical concepts in the development of computer applications. |
| • To make the student aware of mathematical tools, formal methods & automata techniques to computing. |
| • To strengthen the students' ability to carry out formal and higher studies in computer science. |

| **COURSE OUTCOMES** | |
|---|---|
| After completion of course, students would be able to: | |
| • Use mathematical concepts in the design and development of languages. | |
| • Design regular expressions and automata for different language classes | |
| • Describe different types of Turing Machines, their use, capability, and limitations. | |
| • Determine decidability and reducibility of computational problems | |
| • Determine Computational Complexity and use Probability concepts. | |
| **Pre-Requisites** | Discrete Mathematics and Formal Systems and Automata |

| **Course Contents** |
|---|
| Unit 1. Introduction (5)<br>Mathematical notions and terminology of sets, sequences and tuples, functions and relations graphs, strings and languages. Boolean logic properties and representation. Definitions, Theorems and types of proofs, formal proofs, deductive, reduction to definition, proof by construction, contradiction, induction, indirect, automatic, counter-examples. |
| Unit 2. State Machines and Grammars (7)<br>Types of Languages, Types of grammar, recurrence relations, Regular expressions, Finite State Machines, DFA, NFA, Equivalence of DFA & NFA., Kleen's Theorem, pumping Lemma, Applications 5 Push down automata and CFG PDA, N-PDA, CFG, ambiguous grammar, non ambiguous grammar, CNF, Parsers: Topdown, Bottom-up, applications. |
| Unit 3. Turing Machines (6)<br>Turing machines, variations of TMs, Combining TM's, programming techniques for TMs, Universal Turing Machines, recursive and recursively enumerable languages. |
| Unit 4. Decidability and Reducibility (6)<br>Decidable languages, decidable problems concerning context-free languages, FA, PDA, Turing Machines, Undecidable problems from language theory, A simple undecidable problem (PCP), The halting problem- Diagonalization method, Reduction problems, mapping reducibility. |

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|---|
| Unit 5. Computational Complexity (5)<br>Tractable and intractable problems, growth rates of functions. Time complexity of TM. Tractable decision problems. Theory of Optimization. |
| Unit 6. Introduction to probability theory (7)<br>Probability Models, Sample Space, Events, Algebra of Events, Graphical Methods of Representing Events, Probability Axioms, Combinatorial Problems, Conditional Probability, Independence of Events, Bayes' Rule, Bernoulli Trials. |
| **Reference Books** |
| 1. Michael Sipser, Thomson Brools Cole , "Introduction to Theory of Computation"<br>2. J. E. Hopcroft, Rajeev Motwani & J. D. Ullman, "Introduction to Automata Theory, Language and Computations", Pearson Education Asia, 2nd Edition.<br>3. Kishor S. Trivedi , " Probability and Statistics with Reliability, Queuing and Computer Science Applications", John Wiley & Sons, Inc., 2016.<br>4. John. Martin, "Introduction to Languages and Theory of Computation", MGH, 3rd Edition<br>5. J. P. Trembley, R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science",<br>6. E. V. Krishamoorthy , "Theory of Computer Science"<br>7. John Vince, "Foundation Mathematics for Computer Science A Visual Approach", Springer Nature Switzerland. second Edition. |

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|---|---|
| Course Title : **Advanced Data Structures** | |
| Course Code : 202CSL602 | **Semester : I** |
| Teaching Scheme : L-T-P : **3-0-0** | Credits : 3 |
| Evaluation Scheme : ISE + MSE Marks : **20 + 30** | ESE Marks : **50** |

| **COURSE OBJECTIVES** |
|---|
| • To introduce the student regarding the sorting and hashing techniques. |
| • To expose the students with the different traversal techniques used in the tree. |
| • To aware the students regarding the efficient search operation in binary and digital search tree. |
| • To strengthen the ability of the students for implementing different graphs. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Use the merge sort algorithm for implementing different sorting flavors. |
| • Choose appropriate data structures for implementing the static and dynamic hashing. |
| • Design the different traversal program using trees. |
| • Design the binary search tree application in efficient way. |
| • Learn and implement the digital search tree. |
| • Implement the different algorithms for graph. |

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|---|---|
| **Pre-Requisites** | Basic Data Structures |

**Course Contents**

**Unit-1 : External Sorting** **(4)**

Introduction, k–way Merge Sort, 2-way Merge Sort, 3–way Merge Sort, 4–way Merge Sort, Merging Runs Time Complexity Buffer Handling for Parallel Operation

**Unit-2 : Hashing** **(6)**

Introduction to Static Hashing, Hash Tables, Hash Functions, Different Hash Functions, Division Method, Multiplication Method, Mid-Square Method, Folding Method, Secure Hash Functions, Collision Resolution (or Overflow Handling) Techniques, Open Addressing Techniques, Linear Probing Quadratic Probing, Double Hashing, Rehashing, Chaining Technique, Comparison between Open Hashing and Closed Hashing Techniques used for Resolving Collisions, Dynamic Hashing, Motivation for Dynamic Hashing, Pros and Cons of Hashing, Applications of Hashing

**Unit-3 : Trees** **(6)**

Trees, Introduction, Basic Terminology, Types of Trees, General Trees, Forests, Binary Trees, Binary Search Trees, Expression Trees, Tournament Trees, creating a Binary Tree from a General Tree, traversing a Binary Tree, Pre-order Traversal, In-order Traversal, Post-order Traversal, Level-order Traversal, Constructing a Binary Tree from Traversal Results, Applications of Trees

**Unit-4 : Efficient Binary Search Trees** **(6)**

Efficient Binary Search Trees, Binary Search Trees, Operations on Binary Search Trees, Searching for a Node in a Binary Search Tree, Inserting a New Node in a Binary Search Tree, Deleting a Node from a Binary Search Tree, Optimal Binary Search Tree (OBST), Self-balancing Binary Search Tree, AVL Trees, Operations on AVL Trees, Red-Black Trees, Properties and Representation of Red-Black Trees Operations on Red-Black Trees, Searching for a Node in a Red-Black Tree, Inserting a Node in a Red-Black Tree, Deleting a Node from a Red-Black Tree, Joining and Splitting Red-Black Tree, Applications of Red-Black Trees

**Unit-5 : Digital Search Structures** **(8)**

Digital Search Structures, Introduction to Digital Search Tree, Operations on Digital Search Trees, Insertion, Searching, Deletion, Binary Tries and Patricia, Binary Tries, Compressed Binary Trie, Patricia, Searching Patricia, Inserting into Patricia, Delete a node from Patricia, Multi-way Tries, Definition, Searching a Trie, Sampling Strategies, Inserting into a Trie, Deletion from a Trie, Keys with Different Length, Height of a Trie, Space Required and Alternative Node Structures, Prefix Search and Applications, Compressed Tries, Compressed Tries with Digit Numbers, Inserting into a Compressed Trie with Digit Numbers, Deletion of Element from Compressed tries with Digit Numbers, Compressed Tries with Skip Fields, Searching a Compressed Tries with Skip, Inserting into a Compressed Trie with Skip Fields, Deleting an Element from a Compressed Trie with Skip Fields, Compressed Tries with Labeled Edges, Searching a Compressed Trie with Labeled Edges, Inserting into a Compressed Trie with Labeled Edges, Deleting an Element from a Compressed Trie with Labeled Edges, Tries and Internet Packet (IP) Forwarding, IP Routing, 1-bit Tries, Fixed–stride Tries Variable–stride Tries

**Unit-6 : Graphs** **(6)**

Introduction, Graph Terminology, Directed Graphs, Terminology of a Directed Graph, Transitive Closure of a Directed Graph, Bi-connected Components, Representation of Graphs, Adjacency Matrix Representation, Adjacency List Representation, Graph Traversal Algorithms, Breadth-First Search, Depth-First Search, Topological Sorting, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm, Shortest Path Algorithms, Dijkstra's Algorithm, Bellman-Ford Algorithm, Warshall's Algorithm, Floyd-Warshall Algorithm, Applications of Graphs.

| **Reference Books** |
|---|
| 1. Reema Thareja, S. Rama Sree, advanced data structures, oxford university press, 2018<br>2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004. |

# Program Elective I

| Course Title : **Machine Learning** | |
|---|---|
| Course Code : 202CSL603 | **Semester : I** |
| Teaching Scheme : L-T-P : **3-0-0** | Credits : 3 |
| Evaluation Scheme : ISE + MSE Marks : **20 + 30** | ESE Marks : **50** |

| **COURSE OBJECTIVES** |
|---|
| • To introduce students to the basic concepts and techniques of Machine Learning. |
| • To become familiar with regression methods, classification methods, clustering methods. |
| • To become familiar with dimensionality reduction Techniques. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Gain knowledge about basic concepts of Machine Learning. |
| • Identify machine-learning techniques suitable for a given problem. |
| • Solve the problems using various machine-learning techniques. |
| • Apply dimensionality reduction techniques. |
| • Design application using machine learning techniques. |

| **Pre-Requisites** | Basic statistics and computer networks |
|---|---|

| **Course Contents** |
|---|
| Unit 1. **Introduction to Machine Learning**: (6)<br>Machine Learning, Types of Machine Learning, Issues in Machine Learning, Application of Machine Learning, designing a learning system: training data, concept representation, function approximation Steps in developing a Machine Learning Application |
| Unit 2. **Learning with Regression and trees:** (6)<br>Linear Regression, Logistic Regression. **Trees:** Decision Trees, Constructing Decision Trees, Decision tree representation, appropriate problems, for decision tree learning, basic decision tree algorithm, search in decision tree learning, issues in decision tree learning Classification and Regression Trees (CART). |
| Unit 3. **Learning with Classification and clustering:** (6)<br>**Classification:** Rule based classification, classification by back propagation, Bayesian Belief networks, Hidden Markov Models. **Clustering:** Expectation Maximization Algorithm, Supervised learning after clustering, , K-nearest neighbor learning, Radial Basis functions. Expectation maximization (EM) for soft clustering. Semi-supervised learning with EM using labelled and unlabeled data. |
| Unit 4. **Support Vector Machine**: Maximum Margin Linear Separators, (6)<br>Quadratic Programming solution to finding maximum margin separators, Kernels for learning non-linear functions. |

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Unit 5. **ARTIFICIAL NEURAL NETWORK**: (6)
Introduction, neural network representation, problems for neural network learning, perceptions, multilayer network.
**GENETIC ALGORITHMS**: Introduction, genetic operators, genetic programming, models of evolution & learning, parallelizing genetic algorithm.

Unit 6. **Dimensionality Reduction:** (6)
Dimensionality Reduction Techniques, Principal Component Analysis, Independent Component Analysis, Single value decomposition.

**Reference Books**


1. Peter Harrington "Machine Learning In Action", Dream Tech Press
2. Ethem Alpaydın, "Introduction to Machine Learning", MIT Press
3. Tom M. Mitchell "Machine Learning" McGraw Hill
4. Stephen Marsland, "Machine Learning An Algorithmic Perspective" CRC Press
5. Kevin P. Murphy, "Machine Learning a Probabilistic Perspective", The MIT Press
6. William W. Hsieh, "Machine Learning Methods in the Environmental Sciences", Cambridge
7. Han Kamber, "Data Mining Concepts and Techniques", Morgann Kaufmann Publishers
8. Margaret. H .Dunham, "Data Mining Introductory and Advanced Topics", Pearson Education


| Course Title : **Data Preparation and Analysis** | |
|---|---|
| Course Code : 202CSL604 | **Semester : I** |
| Teaching Scheme : L-T-P : **3-0-0** | Credits : 3 |
| Evaluation Scheme : ISE + MSE Marks : **20 + 30** | ESE Marks : **50** |

**COURSE OBJECTIVES**

- To expose the importance of the data coming from the different sources.
- To make familiar with different data conversion techniques for preparing unstructured data.
- To prepare the data for analysis and develop meaningful Data Visualizations.
- To make the students identify and model the meaningful data by using different techniques.

**COURSE OUTCOMES**

After completion of course, students would be able to:

- Recall the importance of the data
- Evaluate the details regarding the data using different parameters
- Extract the unstructured data by making operations such as cleaning, converting and combining the data
- Analyze the relationship between the unstructured data
- Prepare the grouping of data by using clustering and association rules.
- Design the models for representing the meaningful data.

**Course Contents**

**Unit-1 : Introduction** (6)
Overview, Sources of Data, Process for Making Sense of Data

**Unit-2 : DESCRIBING DATA** (6)

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|---|
| Overview, Observations and Variables, Types of Variables, Central Tendency, Distribution of the Data, Confidence Intervals, Hypothesis Tests |
| **Unit-3 : PREPARING DATA TABLES** (6)<br>Overview, Cleaning the Data, Removing Observations and Variables, Generating Consistent Scales Across Variables, New Frequency Distribution, Converting Text to Numbers, Converting Continuous Data to Categories, Combining Variables, Generating Groups, Preparing Unstructured Data |
| **Unit-4 : UNDERSTANDING RELATIONSHIPS** (6)<br>Overview, Visualizing Relationships Between Variables, Calculating Metrics About Relationships |
| **Unit-5 : IDENTIFYING AND UNDERSTANDING GROUPS** (6)<br>Overview, Clustering, Association Rules, Learning Decision Trees from Data |
| **Unit-6 : BUILDING MODELS FROM DATA** (6)<br>Overview, Linear Regression, Logistic Regression, *k*-Nearest Neighbors, Classification and Regression Trees, Other Approaches |
| **Reference Books** |
| 1. Glenn J. Myatt, Wayne P. Johnson, making sense of data i a Practical Guide to Exploratory Data Analysis and Data Mining, Second Edition, WILEY, 2014. |

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|---|---|
| Course Title : **Block Chain Technology** | |
| Course Code : 202CSL605 | **Semester : I** |
| Teaching Scheme : L-T-P : **3-0-0** | Credits : 3 |
| Evaluation Scheme : ISE + MSE Marks : **20 + 30** | ESE Marks : **50** |

| **COURSE OBJECTIVES** |
|---|
| • To make aware regarding the Block chain basics and its functionality. |
| • To expose the students regarding the design and working of Bitcoins. |
| • To make aware regarding the Ethereum basics and its functionality. |
| • To expose the students regarding the development of the Blockchain application. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Understand the design of the Block chain |
| • Extract the working details of the Block Chain technology |
| • Understand the design and implementation technique of Bitcoin |
| • Develop the application using the Block chain Technology |
| • Build the applications using Ethereum DApp |

| | |
|---|---|
| **Pre-Requisites** | Cryptography basics, computer network basics |

| **Course Contents** |
|---|
| **Unit-1** Introduction to Blockchain (6)<br>Backstory of Blockchain, What is Blockchain?, Centralized vs. Decentralized Systems , Layers of Blockchain, Why is Blockchain Important?, Blockchain Uses and Use Cases |
| **Unit-2 :** Working of Blockchain (6)<br>Laying the Blockchain Foundation, Cryptography, Game Theory, Computer Science |

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|---|
| Engineering Putting It All Together, Blockchain Applications, Scaling Blockchain |
| **Unit-3 :** Working of Bitcoin (6)<br>The History of Money ,Dawn of Bitcoin, The Bitcoin Blockchain, The Bitcoin Network, Bitcoin Scripts, Full Nodes vs. SPVs, Bitcoin Wallets |
| **Unit-4 :** Working of Ethereum (6)<br>From Bitcoin to Ethereum , Enter the Ethereum Blockchain, Ethereum Smart Contracts, Ethereum Virtual Machine and Code Execution, Ethereum Ecosystem |
| **Unit-5 :** Blockchain Application Development (6)<br>Decentralized Applications, Blockchain Application Development, Interacting with the Bitcoin Blockchain, Interacting Programmatically with Ethereum—Sending Transactions, Interacting Programmatically with Ethereum—Creating a Smart Contract, Interacting Programmatically with Ethereum—Executing Smart Contract Functions, Blockchain Concepts Revisited, Public vs. Private Blockchains, Decentralized Application Architecture |
| **Unit-6 :** Building an Ethereum DApp (6)<br>The DApp , Setting Up a Private Ethereum Network , Creating the Smart Contract, Deploying the Smart Contract, Client Application |
| **Reference Books** |
| 1. Bikramaditya Singhal, Gautam Dhameja, Priyansu Sekhar Panda, Beginning Blockchain A Beginner's Guide to Building Blockchain Solutions, apress<br>2. Tiana Laurence, Blockchain For Dummies, John Wiley & Sons, 2017<br>3. Melanie Swan, Blockchain Blueprint for a New Economy, O'Reilly, 2015 |

# Program Elective II

| | |
|---|---|
| Course Title : **Distributed System and Cloud Computing** | |
| Course Code : 202CSL608 | **Semester : I** |
| Teaching Scheme : L-T-P : **3-0-0** | Credits : 3 |
| Evaluation Scheme : ISE + MSE Marks : **20 + 30** | ESE Marks : **50** |

| **COURSE OBJECTIVE** |
|---|
| • To expose the students to web based distributed systems. |
| • To make the students to identify various coordinating features of coordination based distributed systems. |
| • To make the students aware on the cloud security issues. |
| • To explore the audit and compliances norms and regulations. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Design web based distributed systems. |
| • Differentiate various coordinating features of distributed systems. |
| • Identify and provide the solutions for cloud security issues. |
| • Apply privacy and security compliance norms in their career. |

| | |
|---|---|
| **Pre-Requisites** | Networking basics |

| **Course Contents** |
|---|
| **Unit-1: Distributed Systems**: (6)<br>Computing systems, information systems, Pervasive systems, multimedia systems; Architectures: Centralized, Decentralized, Hybrid; Mobile and Ubiquitous Computing: Introduction, Volatile systems, Association, Interoperation, Sensing and Context awareness, Security and Privacy, Adaption. |
| **Unit-2 : Distributed Web Based Systems**: (6)<br>Architecture, Web Service, Processes- Clients, Web Servers, Web Server Clusters; Communication- HTTP, SOAP; Naming, Synchronization, Consistency and Replication. |
| **Unit-3 : Distributed Coordination Based Systems**: (6)<br>Introduction, Architecture, Processes, Naming, Synchronization, Consistency and Replication. |
| **Unit-4 : Cloud Computing:** (6)<br>Cloud Definition, Characteristic Features, Cloud Models- Delivery and Deployment Models; Impact of Cloud Computing, Barriers to Cloud Computing for Adaption in Enterprises; |
| **Unit-5 : Cloud Security**: (6)<br>Infrastructure Security- Network Level, Host Level and Application Level; Data Security and storage; Identity Access Management- Challenges, Architecture and practices; IAM Standards and Specifications for Organizations and Consumers; IAM Practices in Cloud. |
| **Unit-6 : Cloud Privacy**: (6)<br>Privacy, Data Life Cycle, Key Primary Concerns, Laws and Regulations for Protecting Privacy; Audit and Compliance; Internal Policy Compliance, Governance, Risk and Compliance (GRC); Control Objectives for Cloud Computing- Basic, Specific, Key Management; Regulatory/External Policy Compliance; Cloud Security Standards, Cloud Security Alliance (CSA); Auditing the Cloud for Compliance. |
| **Reference Books** |
| 1. Distributed Systems Principles and Paradigms - Andrews S. Tanenbaum, Maarten Van Steen, Second Edition, PHI Learning Pvt. Ltd.<br>2. Distributed Systems Concept and Design - George Coulouris, Jean Dollimore, Tim Kindberg, Fourth Edition, Pearson Education.<br>3. Pervasive Computing Technology and Architecture of Mobile Internet Applications - Jochen Burkhardt, Horst Henn, Stefan Hepper, Klaus Rindtorff, Thomas Schaeck, Pearson Education, Ltd.<br>4. Cloud Security and Privacy An Enterprise Perspective on Risk and Compliance- Jin Mather, Subra Kumaraswamy, Shahed Latif, O' Relly.<br>5. Cloud Computing- Implementation, Management and Security- John W. Rittinghouse, James F. Ransome, CRC Press [Taylor and Francis Group]<br>6. Cloud Computing Concepts, Technology and Architecture- Thomas Erl, Ricardo Puttini, Zaigham Mahmood. |

| Course Title : **Data Storage Technologies and Networks** | |
|---|---|
| Course Code : 202CSL609 | **Semester : I** |
| Teaching Scheme : L-T-P : **3-0-0** | Credits : 3 |
| Evaluation Scheme : ISE + MSE Marks : **20 + 30** | ESE Marks : **50** |

| **COURSE OBJECTIVES** |
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| • To expose the basics of the storage technology. |
| • To make aware regrading the RAID, NAS and SAN technology. |

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| • To expose the students with the capacity optimization, backup and recovery techniques. |
| • To make aware regarding the design and details of the data center and cloud storage. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Recall the storage basics. |
| • Understand and design the storage using RAID, SAN and NAS |
| • To implement the different techniques for capacity optimization, backup and recovery. |
| • To learn the details regarding design of data center. |
| • To recall the different facilities provided by the cloud computing for storing data. |

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| **Pre-Requisites** | Storage technology basics, computer network basics |

| **Course Contents** |
|---|
| **Unit-1** Storage Basics (6)<br>The Importance of Information Technology, The Role of Storage in IT, Storage from 40,000 Feet, The Mechanical Disk Drive, The Anatomy of a Disk Drive, Solid-State Media, Hybrid Drives, Tape, Further Storage Considerations |
| **Unit-2 :** RAID, SAN, NAS (6)<br>The History and Reason for RAID, What Is RAID?, RAID Concepts, RAID Levels, What Is an FC SAN?, Why FC SAN?, FC SAN Components, SAN Topologies, iSCSI from 40,000 Feet, Initiators and Targets, IP Network Considerations, What Files, NAS, and Objects Are, Network-Attached Storage, Object Storage |
| **Unit-3 :** Capacity Optimization Technologies (6)<br>Capacity Optimization Technologies Overview, Thin Provisioning, Compression, Deduplication, Auto-tiering. |
| **Unit-4 :** Backup and Recovery (6)<br>Why We Back Up, It's All about Recovery, Backup Architecture, Backup Methods, Backup Types, Backup Targets and Devices, Backup Retention Policies, Archiving |
| **Unit-5 :** The Wider Data Center Neighborhood (6)<br>Data Center Design, Data Center Overview, Data Center Cabling, Working in the Data Center, A Tale of Two Networks, Single Converged Data Center Network |
| **Unit-6 :** Cloud Storage (6)<br>The Cloud Overview- Public Cloud, Private Cloud, Hybrid Cloud, Storage and the Cloud. |
| **Reference Books** |
| 1. Nigel Poulton, Data Storage Networking, Data Storage Networking: Real World Skills for the CompTIA Storage, SYBEX<br>2. The Complete Guide to Data Storage Technologies for Network-centric Computing Paperback– Import, Mar 1998 by Computer Technology Research Corporation. |

| Course Title : **Smart Technology and Internet of Things** | |
|---|---|
| Course Code : 202CSL610 | **Semester : I** |
| Teaching Scheme : L-T-P : **3-0-0** | Credits : 3 |
| Evaluation Scheme : ISE + MSE Marks : **20 + 30** | ESE Marks : **50** |

| **COURSE OBJECTIVES** |
|---|
| • To aware related to smart technology and IoT connectivity |
| • To expose the smart technology related to homes, TV's and City |
| • To expose the problems faced in the smart technology-based devices |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Understand the basics of smart technology and connectivity based on IoT. |
| • Make extraction of the different new technology used in the daily life product. |
| • Extract the problems and design solutions to overcome the problems faced in Smart Technology. |

| **Pre-Requisites** | IoT basics |
|---|---|

| **Course Contents** |
|---|
| **Unit-1** Smart Connectivity and Technology (6)<br>Welcome to the Future, What Is the Internet of Things?, What Kinds of Things Can Be Connected to the Internet of Things?, What Do All Those Connected Things Do?, When Will the Internet of Things Arrive?, How Important Is the Internet of Things?, Smart Connectivity and You, Understanding the Internet of Things: The Big Picture, Building the Internet of Things, Stage One: Device Proliferation and Connection, Stage Two: Making Things Work Together, Stage Three: Developing Intelligent Applications, Understanding Smart Devices, Understanding Network Connections, Examining Wireless Technologies , Understanding the Data, Understanding Intelligent Applications, Understanding Big Data, Profiting from the Internet of Things, Resources, Smart Technology and You |
| **Unit-2 :** Smart TVs and Appliances (6)<br>What Exactly Is Smart TV?, Considering Smart TV Operating Systems, Examining a Typical Smart TV, Exploring Smart TV Set-Top Devices, How to Choose a Smart TV or Device, How Secure Are Smart TVs?, Integrating Smart TVs into the Internet of Things, Smart TVs and You, Understanding Smart Appliances Today, Smarter Food Storage with Smart Refrigerators, Smarter Cooking with Smart Ovens, Smarter Cleaning with Smart Washers and Dryers, Smarter Dishwashing with Smart Dishwashers, Smart Appliances and You. |
| **Unit-3 :** Smart Homes and Cities (6)<br>Automating the Home, Short History of Smart Homes, Smart Steps to a Smart Home, Simple Components for a Smart Home, Smarter Living with Smart Furniture, Smarter Environment with Smart Lighting, Smarter Views with Smart Windows, Smarter Heating and Cooling with Smart Thermostats, Smarter Protection with Smart Security Systems, Smarter Sensing with Smart Monitors, Smarter Information with Amazon Echo, Reimagining the Smart Network, Controlling the Smart Home, Where Can You Find Smart Home Devices?, Smart Homes and You, Understanding the Smart City, Smart Infrastructure, Smart Communication and Emergency Management, Smart Roads and Traffic Management, Smart Public Lighting, Smart Utilities, Smart Grid, Smart Cities and You |
| **Unit-4 :** Smart Clothing and Medicine: (6)<br>Wearable Technology Today–and Tomorrow, Watching the Smartwatches, Exercising with Fitness Trackers, Keeping Well with Wearable Healthcare Devices, Monitoring Your Family with Wearable Trackers, Recording with Wearable Cameras, Eyeing Smart |

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| Eyewear, Wearing Other Smart Clothing, Dealing with Your Personal Data, Where Do You Get Those Wonderful Toys?, Smart Clothing and You, Welcome to the Internet of Medical Things, Smart Medical Devices and Monitoring, Smart Meds, Smart Hospitals, Smart Medical Records, Smart Medicine and You |
| **Unit-5 :** Smart Businesses: Better Working Through Technology (6)<br>Smart Offices, Smart Stores, Smart Inventory Management, Smart Businesses and You, Scaling the Internet of Things Globally, Connecting Cities, States, and Countries, The Rural Internet of Things, The Agricultural Internet of Things, The Environmental Internet of Things, Battling Climate Change, Impediments to the Global Internet of Things, The Smart World and You |
| **Unit-6 :** Smart Problems: Big Brother Is Watching You (6)<br>Privacy Issues, What Do They Really Know About You?, Your Government Is Spying On You, Privacy Versus the IoT, Security Issues, Data Security, System Security, Big Data Issues, Autonomy and Control Issues, Smart Machine Issues, Smart Problems and You |
| **Reference Books** |
| 1. Michael Miller, Internet of Things, The: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World, 2015 |

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|---|---|
| Course Title : **Research Methodology and IPR** | |
| Course Code : 202CSL613 | **Semester : I** |
| Teaching Scheme : L-T-P : **2-0-0** | Credits : 2 |
| Evaluation Scheme : ISE Marks : **50** | |

| **COURSE OBJECTIVES** |
|---|
| • To give an overview of the research methodology and explain the technique of defining a research problem. |
| • To explain the functions of the literature review in research. |
| • To explain the art of interpretation and the art of writing research reports. |
| • To explain the intellectual property and its relevance. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Understand research problem formulation |
| • Analyze research related information |
| • Follow research ethics |
| • Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity. |
| • Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular |
| • Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits |

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| **Pre-Requisites** | Project Basics |

| **Course Contents** |
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| **Unit-1**<br>Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations |
| **Unit-2 :**<br>Effective literature studies approaches, analysis Plagiarism, Research ethics. |
| **Unit-3 :**<br>Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee. |
| **Unit-4 :**<br>Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT. |
| **Unit-5 :**<br>Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications |
| **Unit-6 :**<br>New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs. |
| **Reference Books** |
| 1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"<br>2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"<br>3. Ranjit Kumar, 2 nd Edition, "Research Methodology: A Step by Step Guide for beginners"<br>4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.<br>5. Mayall , "Industrial Design", McGraw Hill, 1992.<br>6. Niebel , "Product Design", McGraw Hill, 1974.<br>7. Asimov , "Introduction to Design", Prentice Hall, 1962.<br>8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.<br>9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008 |

| Course Title : **Laboratory I (Based on Program Core courses )** | |
|---|---|
| Course Code : 202CSP614 | **Semester : I** |
| Teaching Scheme : L-T-P : 0-**0-4** | Credits : 2 |
| Evaluation Scheme : ISE-Lab Marks : 25 | |

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| **Pre-Requisites** | Any Programming Language |

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| Students should perform minimum 10-12 assignment based on the program core courses i.e. Mathematical Foundations of Computer Science and Advanced Data Structures using any programming language. |

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|---|---|
| Course Title : **Laboratory II (Based on Program Elective courses )** | |
| Course Code : 202CSP615 | **Semester : I** |
| Teaching Scheme : L-T-P : 0-**0-4** | Credits : 2 |
| Evaluation Scheme : ISE-Lab Marks : 25 | |

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|---|---|
| **Pre-Requisites** | Any Programming Language |

Students should perform minimum 10-12 assignment based on the program Elective courses using any programming language and tools.

# Teaching And Evaluation Scheme for First Year M. Tech CSE Programme

## Semester –II

| Course Title : Software Architectures | |
|---|---|
| Course Code : 202CSL631 | **Semester : II** |
| Teaching Scheme : L-T-P : **3-0-0** | Credits : 3 |
| Evaluation Scheme : ISE + MSE Marks : **20 + 30** | ESE Marks : **50** |

| **Pre-Requisites** | Basics of Software Engineering |
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| **COURSE OBJECTIVE** |
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| 1. To introduce the student regarding need of the software architectures. |
| 2. To expose the students with the different software architecture patterns. |
| 3. To aware the students regarding the software architecture requirements and design. |
| 4. To strengthen the ability of the students for documenting, implementing and testing the software architecture. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| 1. Learn the need and contexts of the software architectures. |
| 2. Build the software architecture by considering quality attributes and patterns. |
| 3. Design the software architecture requirement and design strategy |
| 4. Learn and implement documentation, implementation and testing of software architecture |

| **Course Contents** |
|---|
| **Unit-1: Introduction of Software Architecture (8)**<br>What Software Architecture Is and What It Isn't, Architectural Structures and View, Architectural Patterns, What Makes a "Good" Architecture?, Inhibiting or Enabling a System's Quality Attributes, Reasoning About and Managing Change, Predicting System Qualities, Enhancing Communication among Stakeholders, Carrying Early Design Decisions, Defining Constraints on an Implementation, Influencing the Organizational Structure, Enabling Evolutionary Prototyping, Improving Cost and Schedule Estimates, Supplying a Transferable, Reusable Model, Allowing Incorporation of Independently Developed Components, Restricting the Vocabulary of Design Alternatives, Providing a Basis for Training |
| **Unit-2: Contexts of Software Architecture (5)**<br>Architecture in a Technical Context, Architecture in a Project Life-Cycle Context, Architecture in a Business Context, Architecture in a Professional Context, Stakeholders, How Is Architecture Influenced?, What Do Architectures Influence? |
| **Unit-3: Quality Attributes (5)**<br>Architecture and Requirements, Functionality, Quality Attribute Considerations, Specifying Quality Attribute Requirements, Achieving Quality Attributes through Tactics, Guiding Quality Design Decisions |
| **Unit-4 : Architectural Patterns (5)**<br>Architectural Patterns, Overview of the Patterns Catalog, Relationships between Tactics and Patterns, Contents, Using Tactics Together |
| **Unit-5 : Architecture Requirements and Design (7)** |

Gathering, ASRs from Requirements Documents, Gathering ASRs by Interviewing Stakeholders, Gathering ASRs by Understanding the Business Goals, Capturing ASRs in a Utility Tree, Tying the Methods Together, Designing an Architecture, Design Strategy, The Attribute-Driven Design Method, The Steps of ADD

**Unit-6 : Documenting Software Architectures, Implementation, and Testing (6)**

Uses and Audiences for Architecture Documentation, Notations for Architecture Documentation, Views, Choosing the Views, Combining Views, Building the Documentation Package, Documenting Behavior, Architecture Documentation and Quality Attributes, Documenting Architectures That Change Faster Than You Can Document Them, Documenting Architecture in an Agile Development Project, Architecture and Implementation, Architecture and Testing

**Reference Books**


1. Len Bass Paul Clements Rick Kazman, Software Architecture in Practice, Third Edition, Pearson Edu.,
2. The Art of Software Architecture: Stephen T. Albin, Wiley dreamtech, (2003).
3. Pattern Oriented Software Architecture Vol. I: Buschmann, F. WSE, (1996).
4. Large Scale Software Architecture: A Practical Guide Using UM: Jeff Garland, Richard Anthony, Wiley dreamtech, (2003).
5. Software Architecture - Perspectives on an Emerging Discipline: Mary Shaw & David Garlan, , PHI, (1996).
6. Design Patterns : Elements of Reusable Object Oriented Software: Gamma, E. et. Al., Addison Wesley, (1995).
7. Software Engineering 7th ed.: Ian Sommerville, Addison Wesley, 2004


| Course Title : Network Engineering and Management | |
|---|---|
| Course Code : 202CSL632 | **Semester : II** |
| Teaching Scheme : L-T-P : **3-0-0** | Credits : 3 |
| Evaluation Scheme : ISE + MSE Marks : **20 + 30** | ESE Marks : **50** |

| **COURSE OBJECTIVE** |
|---|
| 1. Expose to the Network Management needs, components and scenarios |
| 2. Learn Network Management standards, models and language |
| 3. Experiment with the available tools, utilities and systems for Network Management |
| 4. Aware of advanced and recent NM Technologies, standards and systems. |

| **COURSE OUTCOMES :** After completion of course, students would be able to: |
|---|
| 1. Understand needs of an Network Manager and the Organization Network. |
| 2. Practice and manage different networks using SNMP based NMS. |
| 3. Use Network Management tools, systems and applications. |
| 4. Be conversant with advanced and recent NM technology and standards. |

| **Pre-Requisites** | Computer Networks |
|---|---|

**Course Contents**

**Unit-1 : Data Communication and Network Management Overview (6)**

Analogy of Telephone Network Management, Data and Telecommunication Network, Communication Architectures - OSI, TCP/IP reference models, DCE, Communication protocols and standards, Protocol Stack, Demonstration Network, Challenges of IT Managers, Network Management - Goals, Organization, Functional Grouping/Categories, Tools, NM Arch and Organization, NM Perspectives, NMS Platform.

**Unit-2 : SNMP and Network Management (7)**

Basic Foundations : Standards, Models and Language - NM Standards, NM Models - Organization, Information, Communication, Functional Model, ASN.1, Encoding Structure, Macros, Managed Network - Case Histories and examples, SNMP model - Organization model, System overview - Management Station/Agent Communication, SNMP Packet, SNMP Commands and Arguments.

**Unit-3 : SNMPv1 Information model, SNMPv2, SNMPv3 (6)**

SNMPv1 Information model - SMI, Managed Objects, MIB, Major changes in SNMPv2, SNMPv3: Key Features, Applications, Security and SNMPv3 User-based Security model.

**Unit-4 : Remote Monitoring (5)**

RMON SMI and MIB, RMON1, RMON2 and ATM Remote Monitoring.

**Unit-5 : Network Management Tools, Systems and Engineering (6)**

System Utilities for Management, Network Statistics Measurement Systems, NMS Design, Network Management Systems and Applications.

**Unit-6 : Advance Network Management Technology (6)**

Desktop Management - DMI, DMI/SNMP Mapping, Web Based Management, XML Based NM Technology, Recent NM-related standards and technologies.

**Reference Books**


1. Network Management Principles and Practices - Mani Subramanian, Pearson, Second Edition.
2. Network Management Concepts and Practice : A Hands-on Approach - J. Richard Burke, Pearson Education.
3. Advances in Network Management - Jianguo Ding, CRC Press
4. Network Management: Accounting and Performance Strategies - Benoit Claise, Ralf Wolter, Cisco Press - Pearson Education.

# Program Elective-III

| Course Title: Secure Software Design and Enterprise Computing (Program Elective-III) | |
|---|---|
| Course Code: 202CSL633 | **Semester: II** |
| Teaching Scheme: L-T-P: **3-0-0** | Credits: 3 |
| Evaluation Scheme: ISE + MSE Marks: **20 + 30** | ESE Marks: **50** |

| **COURSE OBJECTIVE** |
|---|
| 1. To fix software flaws and bugs in various software. |
| 2. To make students aware of various issues like weak random number generation, information leakage, poor usability, and weak or no encryption on data traffic. |
| 3. Techniques for successfully implementing and supporting network services on an enterprise scale and heterogeneous systems environment. |
| 4. Methodologies and tools to design and develop secure software containing minimum vulnerabilities and flaws. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| 1. Differentiate between various software vulnerabilities |
| 2. Software process vulnerabilities for an organization . |
| 3. Monitor resources consumption in a software. |
| 4. Interrelate security and software development process. |

| **Pre-Requisites** | Computer Programming, Software Engineering |
|---|---|

| **Course Contents** |
|---|
| **Unit 1: Secure Software Design** **(6)**<br>Identify software vulnerabilities and perform software security analysis, Master security programming practices, Master fundamental software security design concepts, Perform security testing and quality assurance. |
| **Unit 2: Enterprise Application Development** **(8)**<br>Describe the nature and scope of enterprise software applications, Design distributed N-tier software application, Research technologies available for the presentation, business and data tiers of an enterprise software application, Design and build a database using an enterprise database system, Develop components at the different tiers in an enterprise system, Design and develop a multi-tier solution to a problem using technologies used in enterprise system, Present software solution. |
| **Unit 3: Enterprise Systems Administration** **(5)**<br>Design, implement and maintain a directory-based server infrastructure in a heterogeneous systems environment, Monitor server resource utilization for system reliability and availability, Install and administer network services (DNS/DHCP/Terminal Services/Clustering/Web/Email). |
| **Unit 4:** **(6)**<br>Obtain the ability to manage and troubleshoot a network running multiple services, |

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| Understand the requirements of an enterprise network and how to go about managing them. |
| **Unit 5:** **(6)**<br>Handle insecure exceptions and command/SQL injection, Defend web and mobile applications against attackers, software containing minimum vulnerabilities and flaws. |
| **Unit 6:** **(5)**<br>Case study of DNS server, DHCP configuration, SQL injection attack and other specific attacks. |
| **Reference Books:** |
| 1. Theodor Richardson, Charles N Thies, Secure Software Design, Jones & Bartlett<br>2. Kenneth R. van Wyk, Mark G. Graff, Dan S. Peters, Diana L. Burley, Enterprise Software Security, Addison Wesley. |

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|---|---|
| Course Title: Cyber Security and Digital Forensics (Program Elective-III) | |
| Course Code: 202CSL634 | **Semester: II** |
| Teaching Scheme: L-T-P: **3-0-0** | Credits: 3 |
| Evaluation Scheme: ISE + MSE Marks: **20 + 30** | ESE Marks: **50** |

| **COURSE OBJECTIVE** |
|---|
| 1. Provides an in-depth study of the rapidly changing and fascinating field of cyber security and digital forensics. |
| 2. Combine both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes. |
| 3. Gain knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools |
| 4. Involve in E-evidence collection and preservation, investigating operating systems and file systems, network forensics and mobile device forensics. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| 1. Understand cyber threats and frauds and apply appropriate security policies to protect computers and digital information. |
| 2. Use standards and obey cyber laws to enhance information security in the professional and day today day activities. |
| 3. Apply computer forensics, digital detective and various processes, policies and procedures |
| 4. Analyze and adapt E-discovery guidelines and standards, E-evidence, tools and environment. |
| 5. Practice and apply laws concerned with Email, web forensics. network forensics and mobile device forensics and help the society by punishing the culprits. |

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| **Pre-Requisites** | Information Security and Computer Networks |

| **Course Contents** |
|---|
| Unit 1 **Cyber Security Concepts:** **(7)**<br>Introduction to Computer Security, Threats to Network Security, Identifying Types of Threats, Basic Security Terminology, Concepts and Approaches, CIA, Attacks, Exploits, Information |

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Gathering (Social Engineering, Foot Printing & Scanning), Cyber Frauds, DoS, Viruses **:** Internet Frauds, Identity Theft, Cyber Stalking, DoS, DDoS Attacks, Malwares: Viruses, Trojan Horses, The Buffer-Overflow Attack, Spywares, Rootkits, Robots, Ransomwares, Zombies etc, Detecting and Eliminating Viruses and Spyware.

Unit 2. **Cyber Laws:** (5)
Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013.

Unit 3. **Digital Forensics Introduction:** (6)
Definition of Digital Forensics, Uses of Digital Forensics, Locard's Exchange Principle, Scientific method, Organizations of note, Role of Forensic examiner in the Judicial system. Collecting Evidence : Crime scenes and collecting evidence, Documenting the scene, Chain of custody, Cloning, Live system versus Dead system, Hashing, Final report.

Unit 4. **Legal Aspects:** (6)
Criminal Law - Searches without a warrant, searching with a warrant, eDiscovery, Finding Evidence on the PC, Finding Evidence in System Logs , Getting Back Deleted Files, Operating System Utilities, Expert testimony,

Unit 5. **Internet, E-mail and Network Forensics :** (6)
Internet and E-mail : Internet overview, Web browsers, E-mail, Social networking sites, Social Engg, Network security tools, Network attacks, Incident response, Network evidence and investigations and challenges.

Unit 6. **Mobile Device Forensics:** (6)
Cell Phone Concepts, Cellular networks, Operating Systems, Cell Phone evidence, Cell phone forensic tools, GPS, Challenges and Concerns : Standards and controls, Cloud forensics, Evidence stored in the Cloud, Legal concerns, Solid state drives, Speed of change.

**Reference Books:**


1. Computer Security Fundamentals - Chuck Easttom, Pearson. 3ed Edition.
2. Cyber Security Essentials - James Graham Richard Howard Ryan Olson, CRC Press
3. Information and Cyber Security - Gupta Sarika, Khanna Publishing House, Delhi
4. *Cyber Security Essentials* - James Graham, Richard Howard, Ryan Olson, CRC Press.
5. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics - John Sammons, Syngress, February 24, 2012.
6. Digital Forensic The Fascinating World of Digital Evidences - Nilakshi Jain, DhananjayR Kalbande, Wiley India Pvt Ltd, 2017 edition..
7. Incident Response & Computer Forensics - Jason Luttgens, Matthew Pepe, Kevin Mandia, McGrawHill Osborne Media, 3 rd edition.2014


| Course Title: Security Assessment and Risk Analysis (Program Elective-III) | |
|---|---|
| Course Code: 202CSL635 | **Semester: II** |
| Teaching Scheme: L-T-P: **3-0-0** | Credits: 3 |
| Evaluation Scheme: ISE + MSE Marks: **20 + 30** | ESE Marks: **50** |

**COURSE OBJECTIVE**

1. Describe the concepts of risk management
2. Define and differentiate various Contingency Planning components.

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| 3. Integrate the IRP, DRP, and BCP plans into a coherent strategy to support sustained organizational operations. |
| 4. Define and be able to discuss incident response options, and design an Incident Response Plan for sustained organizational operations. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| 1. Capable of recommending contingency strategies including data backup and recovery and alternate site selection for business resumption planning |
| 2. Skilled to be able to describe the escalation process from incident to disaster in case of security disaster.. |
| 3. Capable of Designing a Disaster Recovery Plan for sustained organizational operations. |
| 4. Capable of Designing a Business Continuity Plan for sustained organizational operations. |

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| **Pre-Requisites** | Computer and Network Security |

**Course Contents**

**Unit 1: Security Basics**: (6)

Information Security (INFOSEC) Overview: critical information characteristics – availability information states – processing security counter-measures - education, training and awareness, critical information characteristics – confidentiality critical information characteristics – integrity, information states – storage, information states – transmission, security counter measures - policy, procedures and practices, threats, vulnerabilities.

**Unit 2: Threats to and Vulnerabilities of Systems:** (7)

Definition of terms (e.g., threats, vulnerabilities, risk), major categories of threats (e.g., fraud, Hostile Intelligence Service (HOIS), malicious logic, hackers, environmental and technological hazards, disgruntled employees, careless employees, HUMINT, and monitoring), threat impact areas, Countermeasures: assessments (e.g., surveys, inspections), Concepts of Risk Management: consequences (e.g., corrective action, risk assessment), cost/benefit analysis of controls, implementation of cost effective controls, monitoring the efficiency and effectiveness of controls (e.g., unauthorized or inadvertent disclosure of information), threat and vulnerability assessment

**Unit 3: Security Planning**: (6)

Directives and procedures for policy mechanism, Risk Management: acceptance of risk (accreditation), corrective actions information identification, risk analysis and/or vulnerability assessment components, risk analysis results evaluation, roles and responsibilities of all the players in the risk analysis process, Contingency Planning/Disaster Recovery: agency response procedures and continuity of operations, contingency plan components, determination of backup requirements, development of plans for recovery actions after a disruptive event, development of procedures for off site processing, emergency destruction procedures, guidelines for determining critical and essential workload, team member responsibilities in responding to an emergency situation.

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| **Unit 4: POLICIES AND PROCEDURES : (7)**<br>Physical Security Measures: alarms, building construction, cabling, communications centre, environmental controls (humidity and air conditioning), filtered power, physical access control systems (key cards, locks and alarms) Personnel Security Practices and Procedures: access authorization/verification (need to know), contractors, employee clearances, position sensitivity, security training and awareness, systems maintenance personnel, Administrative Security Procedural Controls: attribution, copyright protection and licensing , Auditing and Monitoring: conducting security reviews, effectiveness of security programs, investigation of security breaches, privacy review of accountability controls, review of audit trails and logs. |
| **Unit 5: Operations Security (OPSEC):** (6)<br>OPSEC surveys/OPSEC planning INFOSEC: computer security – audit, cryptography - encryption (e.g., point_to_point, network, link), cryptography_key management (to include electronic key), cryptography_strength (e.g., complexity, secrecy, characteristics of the key) |
| **Unit 6: (4)**<br>Case study of threats and vulnerability assessment. |
| **Reference Books** |
| 1. Principles of Incident Response and Disaster Recovery, Whitman & Mattord, Course Technology ISBN: 141883663X<br>2. Web Link : http://www.cnss.gov/Assets/pdf/nstissi_4011.pdf |

## Program Elective-IV

| | |
|---|---|
| Course Title: Human and Computer Interaction (Program Elective-IV) | |
| Course Code: 202CSL638 | **Semester: II** |
| Teaching Scheme: L-T-P: **3-0-0** | Credits: 3 |
| Evaluation Scheme: ISE + MSE Marks: **20 + 30** | ESE Marks: **50** |

| **COURSE OBJECTIVE** |
|---|
| 1. To study and understand importance of user experience design principles, and good interface design. |
| 2. To understand human psychology in designing good interfaces. |
| 3. To bring out the creativity in the students and build innovative applications that are user friendly. |
| 4. To encourage students to indulge into research in Machine Interface Design |

| **COURSE OUTCOMES** : After completion of course, students would be able to: |
|---|
| 1. Design user centric, innovative and user friendly interfaces |
| 2. Apply HMI in emerging and established technologies to enhance User Experiences in design activities. |
| 3. Criticize existing interface designs and improve them. |
| 4. Design application for social, international standards with ethics and technical skills. |

| | |
|---|---|
| **Pre-Requisites** | Software Engineering; Web and Mobile Technologies; Experience in designing interfaces for applications and web sites. |

**Course Contents**

Unit 1 **Introduction to Human Computer Interface**: (8)
Introduction, Hardware, software and operating environment to use HMI in various fields. The psychopathology of everyday things – complexity of modern devices; human-centered design; fundamental principles of interaction; Psychology of everyday actions-how people do things; the seven stages of action and three levels of processing; human error; Principles to support usability, Learnability, Flexibility, Robustness.

Unit 2. **Understanding Goal Directed Design:** (6)
Goal directed design; Implementation models and mental models; Beginners, expert and intermediates – designing for different experience levels; Understanding users. Modeling users – personas and goals. Processes and methods for user-centered design.

Unit 3. **GUI:** (4)
Benefits of a good UI; popularity of graphics; concept of direct manipulation; advantages and disadvantages; characteristics of GUI; characteristics of Web UI; Mobile App UI; General design principles. and methods for user-centered design, User and task analysis

Unit 4. **Design Guidelines** : (6)
Conceptual Design, Conceptual Design Methods. perception, Gesalt principles, visual structure, reading is unnatural, color, vision, memory, six behavioral patterns, recognition and recall, learning, factors affecting learning, time.
The UX Design Process-The Structure: Information Architecture and Interaction Design Visual Design Principles, Information Design and Data Visualization Interaction Design, Information Architecture.

Unit 5. **UX Design Process:** (6)
Prototype and Test Testing your Design, Usability Testing, Types of Usability Testing, Usability Testing Process, Preparing and planning for the Usability Tests, Prototype your Design to Test, Introduction of prototyping tools, conducting Usability Test, communicating Usability Test Results Menus; windows; device base controls, screen base controls. Interaction Paradigms and human factors: Model.

Unit 6. **Detailed Design and Prototyping:** (6)
Concepts, Iterate/ Improve and Deliver Usability testing: Methods: Analytical methods, Empirical methods. Understanding the Usability Test, findings. Assemble testable prototypes, Write script including informed consent and task instructions, Perform practice test(s) team member as participant. Applying the Usability Test, feedback in improving the design. Communication with implementation team. UX Deliverables to be given to implementation team.

**Reference Books**


1. Alan Dix, J. E. Finlay, G. D. Abowd, R. Beale “Human Computer Interaction”, Prentice Hall.
2. Wilbert O. Galitz, “The Essential Guide to User Interface Design”, Wiley publication.
3. Alan Cooper, Robert Reimann, David Cronin, “About Face3: Essentials of Interaction design”, Wiley publication.

4. Jeff Johnson, "Designing with the mind in mind", Morgan Kaufmann Publication.
5. Donald A. Norman, "The design of everyday things", Basic books.
6. Rogers Sharp Preece, "Interaction Design: Beyond Human Computer Interaction", Wiley.
7. Guy A. Boy "The Handbook of Human Machine Interaction", Ashgate publishing Ltd.

| Course Title: Knowledge Discovery (Program Elective-IV) | |
|---|---|
| Course Code: 202CSL639 | **Semester: II** |
| Teaching Scheme: L-T-P: **3-0-0** | Credits: 3 |
| Evaluation Scheme: ISE + MSE Marks: **20 + 30** | ESE Marks: **50** |

| **Pre-Requisites** | Basics of database |
|---|---|

| **COURSE OBJECTIVE** |
|---|
| 1. To introduce the student regarding knowledge discovery and data mining. |
| 2. To expose the students with the data preprocessing techniques. |
| 3. To aware the students regarding the supervised and unsupervised learning methods. |
| 4. To strengthen the ability of the students for making use of data mining software for finding solution of different domain problems. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| 1. Learn the need of the knowledge discovery and data mining. |
| 2. Build the data by applying the data processing techniques. |
| 3. Design the training set using supervised and unsupervised learning methods. |
| 4. Learn and build data mining applications using different data mining software. |

**Course Contents**

**Unit-1: Introduction to Knowledge Discovery and Data Mining (5)**
The KDD Process, Taxonomy of Data Mining Methods, Data Mining within the Complete Decision Support System, KDD and DM Research Opportunities and Challenges, KDD & DM Trend.

**Unit-2: Data Preprocessing (6)**
DATA CLEANSING BACKGROUND, GENERAL METHODS FOR DATA CLEANSING, APPLYING DATA CLEANSING, Dimension Reduction and Feature Selection – Introduction, Feature Selection Techniques.

**Unit-3: Supervised Learning (6)**
Introduction, Training Set, Definition of the Classification Problem, Induction Algorithms, Performance Evaluation, Scalability to Large Datasets, The "Curse of Dimensionality", Decision Trees.

**Unit-4 : Unsupervised Methods (7)**
A survey of Clustering Algorithms, Association Rules- Introduction, Association Rule Mining, Frequent Set Mining- Introduction, Problem Description, Constraint-based Data

Mining- Motivations, Background and Notations.

**Unit-5 : Data Mining Applications** **(6)**

Multimedia Data Mining- Introduction, A Typical Architecture of a Multimedia Data Mining System, An Example — Concept Discovery in Imagery Data, Data Mining in Medicine- Introduction, Data Mining for Financial Applications- Introduction: Financial Tasks, Specifics of Data Mining in Finance, Data Mining for Intrusion Detection- Introduction, Data Mining Basics, 3Data Mining Meets Intrusion Detection.

**Unit-6 : Data Mining Software** **(6)**

Commercial Data Mining Software- Introduction, Literature Review, Data Mining Software, Supercomputing Data Mining Software, Text Mining Software, Web Mining Software, Weka-A Machine Learning Workbench for Data Mining.

**Reference Books**

1. Oded Maimon · Lior Rokach, Data Mining and Knowledge Discovery Handbook, Second Edition, Springer

| Course Title: Quantum Computing (Program Elective-IV) | |
|---|---|
| Course Code: 202CSL640 | **Semester: II** |
| Teaching Scheme: L-T-P: **3-0-0** | Credits: 3 |
| Evaluation Scheme: ISE + MSE Marks: **20 + 30** | ESE Marks: **50** |

**COURSE OBJECTIVE**

1. The course will provide an insight of basic of quantum physics from a computer scientist's perspective, and how it describes reality and understand the philosophical implications of quantum computing.

**COURSE OUTCOMES**

After completion of course, students would be able to:

1. knowledge of Vector spaces, Matrices, Quantum state, Density operator and Quantum Measurement theory.

| **Pre-Requisites** | Linear Algebra, Theory of Computation |
|---|---|

**Course Contents**

**Unit 1:** Qubit & Quantum States: (6)

The Qubit, Vector Spaces. Linear Combination Of Vectors, Uniqueness of a spanning set, basis & dimensions, inner Products, orthonormality, Gram-schmidt orthogonalization, bra-ket formalism, the Cauchyschwarez and triangle Inequalities.

**Unit 2:** Matrices & Operators: (8)

Observables, The Pauli Operators, Outer Products, The Closure Relation, Representation of operators using matrices, outer products & matrix representation, matrix representation of operators in two dimensional spaces, Pauli Matrix, Hermitian unitary and normal operator, Eigen values & Eigen Vectors, Spectral Decomposition, Trace of an operator, important properties of Trace, Expectation Value of Operator, Projection Operator, Positive Operators.

**Unit 3:** **(5)**
Commutator Algebra, Heisenberg uncertainty principle, polar decomposition &singular values, Postulates of Quantum Mechanics.

**Unit 4:** Tensor Products: (7)
Representing Composite States in Quantum Mechanics, Computing inner products, Tensor products of column vectors, operators and tensor products of Matrices.
Density Operator: Density Operator of Pure & Mix state, Key Properties, Characterizing Mixed State, Practical Trace & Reduce Density Operator, Density Operator & Bloch Vector.

**Unit 5:** Quantum Measurement Theory: (6)
Distinguishing Quantum states & Measures, Projective Measurements, Measurement on Composite systems, Generalized Measurements, Positive Operator- Valued Measures.

**Unit 6:** **(6)**
Recent trends in Quantum Computing Research, Quantum Computing Applications of Genetic Programming.

**Reference Books**


1. Quantum Computing without Magic by Zdzislaw Meglicki
2. Quantum Computing Explained By DAVID Mc MAHON
3. Quantum Computer Science By Marco Lanzagorta, Jeffrey Uhlmann
4. An Introduction to Quantum Computing Phillip Kaye, Raymond Laflamme, Michele Mosca.


| Course Title : **Laboratory III (Based on Program Core courses )** | |
|---|---|
| Course Code : 202CSP643 | **Semester : II** |
| Teaching Scheme : L-T-P : 0-**0-4** | Credits : 2 |
| Evaluation Scheme : ISE-Lab Marks : 25 | |

| **Pre-Requisites** | Any Programming Language |
|---|---|

Students should perform minimum 10-12 assignment based on the program core courses i.e. Software Architectures and Network Engineering and Management using any programming language.

| Course Title : **Laboratory IV (Based on Program Elective courses )** | |
|---|---|
| Course Code : 202CSP644 | **Semester : II** |
| Teaching Scheme : L-T-P : 0-**0-4** | Credits : 2 |
| Evaluation Scheme : ISE-Lab Marks : 25 | |

| **Pre-Requisites** | Any Programming Language |
|---|---|

Students should perform minimum 10-12 assignment based on the program Elective courses using any programming language and tools.

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| Course Title : **Pre-Dissertation Seminar** | |
|---|---|
| Course Code : 202CSP645 | **Semester : II** |
| Teaching Scheme : L-T-P : 0-**2-0** | Credits : 2 |
| Evaluation Scheme : ISE Marks : 50 | |

Each student is required to deliver a seminar presentation on a topic preferably from the area in which the student intends to work for his dissertation work. Preparation and presentation of a seminar is intended to investigate an in-depth review of literature, prepare a outline for the proposed work.

# Audit Course

| Course Title : **English for Research Paper Writing** | |
|---|---|
| Course Code : 202CSM616 | **Semester : I / II** |
| Teaching Scheme : L-T-P : 0-**2-0** | Credits : - |
| Evaluation Scheme : - | |

| **COURSE OBJECTIVES** |
|---|
| Students will be able to |
| • Understand that how to improve your writing skills and level of readability |
| • Learn about what to write in each section |
| • Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission |

| **Course Contents** |
|---|
| **Unit-1**<br>Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness. |
| **Unit-2 :**<br>Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction. |
| **Unit-3 :**<br>Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check. |
| **Unit-4 :**<br>key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature. |
| **Unit-5 :**<br>skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions. |
| **Unit-6 :**<br>useful phrases, how to ensure paper is as good as it could possibly be the first- time |

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submission.

**Reference Books**


1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011


| Course Title : **Disaster Management** | |
|---|---|
| Course Code : 202CSM617 | **Semester : I / II** |
| Teaching Scheme : L-T-P : 0-**2-0** | Credits : - |
| Evaluation Scheme : - | |

**COURSE OBJECTIVES**

Students will be able to

- learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response
- critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

**Course Contents**

**Unit-1 Introduction**

Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

**Unit-2 : Repercussions Of Disasters And Hazards**:

Economic Damage, Loss Of Human & Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts & Famines, Landslides & Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks & Spills, Outbreaks Of Disease & Epidemics, War & Conflicts.

**Unit-3 : Disaster Prone Areas In India**

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics.

**Unit-4 : Disaster Preparedness And Management**

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

**Unit-5 : Risk Assessment**

Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Cooperation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for

| |
|---|
| Survival. |
| **Unit-6 : Disaster Mitigation**<br>Meaning, Concept & Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation & Non-Structural Mitigation, Programs Of Disaster Mitigation in India. |
| **Reference Books** |
| 1. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies", New Royal book Company.<br>2. Sahni, Pardeep Et.Al. (Eds.)," Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.<br>3. Goel S. L. , Disaster Administration And Management Text And Case Studies" , Deep & Deep Publication Pvt. Ltd., New Delhi. |

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|---|---|
| Course Title : **Sanskrit for Technical Knowledge** | |
| Course Code : 202CSM618 | **Semester : I / II** |
| Teaching Scheme : L-T-P : 0-**2-0** | Credits : - |
| Evaluation Scheme : - | |

| **COURSE OBJECTIVES** |
|---|
| Students will be able to |
| • To get a working knowledge in illustrious Sanskrit, the scientific language in the world |
| • Learning of Sanskrit to improve brain functioning |
| • Learning of Sanskrit to develop the logic in mathematics, science & other subjects |
| • enhancing the memory power |
| • The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Understanding basic Sanskrit language |
| • Ancient Sanskrit literature about science & technology can be understood |
| • Being a logical language will help to develop logic in students |

| **Course Contents** |
|---|
| **Unit-1**<br>Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences. |
| **Unit-2 :**<br>Order, Introduction of roots, Technical information about Sanskrit Literature |
| **Unit-3 :**<br>Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics |
| **Reference Books** |
| 1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi<br>2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication<br>3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi. |

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| Course Title : **Value Education** | |
|---|---|
| Course Code : 202CSM619 | **Semester : I / II** |
| Teaching Scheme : L-T-P : 0-**2-0** | Credits : - |
| Evaluation Scheme : - | |

| **COURSE OBJECTIVES** |
|---|
| Students will be able to |
| • Understand value of education and self- development |
| • Imbibe good values in students |
| • Let the should know about the importance of character |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Knowledge of self-development |
| • Learn the importance of Human values |
| • Developing the overall personality |

| **Course Contents** |
|---|
| **Unit-1**<br>Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements. |
| **Unit-2 :**<br>Importance of cultivation of values, Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness, Honesty, Humanity. Power of faith, National Unity, Patriotism Love for nature , Discipline. |
| **Unit-3 :**<br>Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline., Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature. |
| **Unit-4 :**<br>Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence ,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively. |
| **Reference Books** |
| 1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi |

| Course Title : **Constitution of India** | |
|---|---|
| Course Code : 202CSM620 | **Semester : I / II** |
| Teaching Scheme : L-T-P : 0-**2-0** | Credits : - |
| Evaluation Scheme : - | |

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| **COURSE OBJECTIVES** |
|---|
| Students will be able to |
| • Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective. |
| • To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism |
| • To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics |
| • Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India |
| • Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution |
| • Discuss the passage of the Hindu Code Bill of 1956 |

| **Course Contents** |
|---|
| **Unit-1 History of Making of the Indian Constitution:**<br>History, Drafting Committee, (Composition & Working) |
| **Unit-2 : Philosophy of the Indian Constitution:**<br>Preamble, Salient Features |
| **Unit-3 : Contours of Constitutional Rights & Duties:**<br>Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties |
| **Unit-4 : Organs of Governance:**<br>Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions |
| **Unit-5 : Local Administration:**<br>District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy |
| **Unit-6 : Election Commission:**<br>Election Commission: Role and Functioning., Chief Election Commissioner and Election Commissioners., State Election Commission: Role and Functioning., Institute and Bodies for the welfare of SC/ST/OBC and women. |
| **Reference Books** |
| 1. The Constitution of India, 1950 (Bare Act), Government Publication.<br>2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.<br>3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.<br>4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015. |

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|---|---|
| Course Title : **Pedagogy Studies** | |
| Course Code : 202CSM621 | **Semester : I / II** |
| Teaching Scheme : L-T-P : 0-**2-0** | Credits : - |
| Evaluation Scheme : - | |

| **COURSE OBJECTIVES** |
|---|
| Students will be able to |
| • Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers |
| • Identify critical evidence gaps to guide the development. |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries? |
| • What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners? |
| • How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? |

| **Course Contents** |
|---|
| **Unit-1 Introduction and Methodology:**<br>Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions**.** Overview of methodology and Searching. |
| **Unit-2 :**<br>Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education. |
| **Unit-3 :**<br>Evidence on the effectiveness of pedagogical practices Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school, curriculum and guidance materials best support effective pedagogy?, Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies |
| **Unit-4 :**<br>Professional development: alignment with classroom practices and follow up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes |
| **Unit-5 : Research gaps and future directions**<br>Research design, , Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact. |
| **Reference Books** |
| 1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.<br>2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379. |

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3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

| Course Title : **Stress Management by Yoga** | |
|---|---|
| Course Code : 202CSM622 | **Semester : I / II** |
| Teaching Scheme : L-T-P : 0-**2-0** | Credits : - |
| Evaluation Scheme : - | |

| **COURSE OBJECTIVES** |
|---|
| Students will be able to |
| • To achieve overall health of body and mind |
| • To overcome stress |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Develop healthy mind in a healthy body thus improving social health also |
| • Improve efficiency |

| **Course Contents** |
|---|
| **Unit-1 :** Definitions of Eight parts of yog. ( Ashtanga ) |
| **Unit-2 :** Yam and Niyam, Do`s and Don'ts in life.<br>i) Ahinsa, satya, astheya, bramhacharya and aparigraha<br>ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan |
| **Unit-3 :** Asan and Pranayam<br>i) Various yog poses and their benefits for mind & body<br>ii)Regularization of breathing techniques and its effects-Types of pranayama |
| **Reference Books** |
| 1. 'Yogic Asanas for Group Tarining-Part-I" : Janardan Swami Yogabhyasi Mandal, Nagpur<br>2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata |

| Course Title : **Personality Development through Life Enlightenment Skills** | |
|---|---|
| Course Code : 202CSM623 | **Semester : I / II** |
| Teaching Scheme : L-T-P : 0-**2-0** | Credits : - |
| Evaluation Scheme : - | |

| **COURSE OBJECTIVES** |
|---|
| Students will be able to |

| |
|---|
| • To learn to achieve the highest goal happily |
| • To become a person with stable mind, pleasing personality and determination |
| • To awaken wisdom in students |

| **COURSE OUTCOMES** |
|---|
| After completion of course, students would be able to: |
| • Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life |
| • The person who has studied Geeta will lead the nation and mankind to peace and prosperity |
| • Study of Neetishatakam will help in developing versatile personality of students. |

| **Course Contents** |
|---|
| **Unit-1 :** Neetisatakam-Holistic development of personality<br>• Verses- 19,20,21,22 (wisdom)<br>• Verses- 29,31,32 (pride & heroism)<br>• Verses- 26,28,63,65 (virtue)<br>• Verses- 52,53,59 (dont's)<br>• Verses- 71,73,75,78 (do's) |
| **Unit-2 :** Approach to day to day work and duties.<br>• Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48,<br>• Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,<br>• Chapter 18-Verses 45, 46, 48. |
| **Unit-3 :** Statements of basic knowledge.<br>• Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68<br>• Chapter 12 -Verses 13, 14, 15, 16,17, 18<br>• Personality of Role model. Shrimad Bhagwad Geeta:<br>• Chapter2-Verses 17, Chapter 3-Verses 36,37,42,<br>• Chapter 4-Verses 18, 38,39<br>• Chapter18 – Verses 37,38,63 |
| **Reference Books** |
| 1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata<br>2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P. Gopinath. |

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