VII SEMESTER SYLLABUS

CLOUD COMPUTING

Sub Code :	**21SCS71**	**IA Marks :**	**50**
Hrs/ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**PBL**	**Total Hours :**	**45**

Course Objectives:

This course will enable students to

- Explain the fundamentals of cloud computing
- Illustrate the cloud application programming and aneka platform
- Contrast different cloud platforms used in industry
- Learn application development
- Understand cloud computing architecture and its real time uses

Course Outcomes:

On Completion of this course the students are able to,

CO1: Explain cloud computing, virtualization and classify services of cloud computing

CO2: Illustrate architecture and programming in cloud

CO3: Describe the platforms for development of cloud applications and List the application of cloud

CO4: Describe data intensive computing

CO5: Explain concurrent computing and its applications

MODULE 1

Introduction ,Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Historical Developments, Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility- Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google App Engine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Manjra soft Aneka Virtualization, Introduction, Characteristics of Virtualized, Environments Taxonomy of Virtualization Techniques, Execution Virtualization, Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples Xen: Para virtualization, VMware: Full Virtualization, Microsoft Hyper-V

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 2

Cloud Computing Architecture, Introduction, Cloud Reference Model, Architecture, Infrastructure /Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Definition, Cloud Interoperability and Standards Scalability and Fault Tolerance Security, Trust, and Privacy Organizational Aspects Aneka: Cloud Application Platform, Framework Overview, Anatomy of the Aneka Container, From the Ground Up: Platform Abstraction Layer, Fabric Services, foundation Services, Application Services, Building Aneka Clouds, Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode, Cloud Programming and Management, Aneka SDK, Management Tools

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 3

Concurrent Computing: Thread Programming, Introducing Parallelism for Single Machine Computation, Programming Applications with Threads, What is a Thread?, Thread APIs, Techniques for Parallel Computation with Threads, Multithreading with Aneka, Introducing the Thread Programming Model, Aneka Thread vs. Common Threads, Programming Applications with Aneka Threads, Aneka Threads Application Model, Domain Decomposition: MatrixMultiplication, Functional Decomposition: Sine, Cosine, and Tangent. High-Throughput Computing: Task Programming, Task Computing, Characterizing a Task, Computing Categories, Frameworks for Task Computing,Task-based Application Models, Embarrassingly Parallel Applications, Parameter Sweep Applications, MPI Applications, Workflow Applications with Task Dependencies, Aneka Task-Based Programming, Task Programming Model, Developing Applications with the Task Model, Developing ParameterS weep Application, Managing Workflows.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 4

Data Intensive Computing: Map-Reduce Programming, What is Data-Intensive Computing?, Characterizing Data-Intensive Computations, Challenges Ahead, Historical Perspective, Technologies for Data-Intensive Computing, Storage Systems, Programming Platforms, Aneka MapReduce Programming, Introducing the MapReduce Programming Model, Example Application

Teaching Methodology*: Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 5

Cloud Platforms in Industry, Amazon Web Services, Compute Services, Storage Services, Communication Services, Additional Services, Google AppEngine, Architecture and Core Concepts, Application Life-Cycle, Cost Model, Observations, Microsoft Azure, Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance. Cloud Applications Scientific Applications, Healthcare: ECG

Analysis in the Cloud, Biology: Protein Structure Prediction, Biology: Gene Expression Data Analysis for Cancer Diagnosis, Geoscience: Satellite Image Processing, Business and Consumer Applications, CRM and ERP, Productivity, Social Networking, Media
Applications, Multiplayer Online Gaming.

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Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

Continuous Internal Assessment (CIA) Method

Sl.no	Type of Assessment	Mode of assessment	Marks
1	Mini Project	Regular Mode of Assessment	30
2	One Open Book Written Exam at the end of the Module 4	Regular Mode of Assessment	10
3	Assignments on Advanced Topics (group of size 2/individual)	Regular Mode of Assessment	05
4	Attendance	As per the Guidelines given in the Regulations	05
		Total	**50**

Scheme of Examination for End Semester Examination of 50 Marks:

PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.

1 Marks x 10 = **10 Marks**

PART B: TWO questions to be set from each module.

Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

Text Books:

1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi Mastering Cloud. Computing McGraw Hill Education

Reference Books:

1. Dan C. Marinescu, Cloud Computing Theory and Practice, Morgan Kaufmann, Elsevier 2013.

DATA SCIENCE

Sub Code :	**21SCS72**	**IA Marks :**	**50**
Hrs/ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

This course will enable students to
• Students will develop relevant programming abilities.

• Students will demonstrate proficiency with statistical analysis of data.

• Students will develop the ability to build and assess data-based models.

• Students will execute statistical analyses with professional statistical software.

• Students will apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

Course Outcomes:

On Completion of this course the students are able to,
CO1: Define data science and its fundamentals
CO2: Demonstrate the process in data science
CO3: Explain machine learning algorithms necessary for data sciences
CO4: Illustrate the process of feature selection and analysis of data analysis algorithms
CO5: Visualize the data and follow of ethics

MODULE 1

Introduction What is Data Science? Big Data and Data Science hype – and getting past the hype, Why now? – Datafication, Current landscape of perspectives, Skill sets. Needed Statistical Inference: Populations and samples, Statistical modeling, probability distributions, fitting a model, - Introduction to R

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 2

Exploratory Data Analysis and the Data Science Process: Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA,The Data Science Process, Case Study: RealDirect (online real estate firm). Three Basic Machine Learning Algorithms: Linear Regression, kNearest Neighbors (k-NN), k-means

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 3

One More Machine Learning Algorithm and Usage in Applications: Motivating application: Filtering Spam, Why Linear Regression and k-NN are poor choices for Filtering Spam, Naïve Bayes and why it works for Filtering Spam, Data Wrangling: APIs and other tools for scrapping the Web

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 4

Feature Generation and Feature Selection (Extracting Meaning From Data): Motivating application: user (customer) retention. Feature Generation (brainstorming, role of domain expertise, and place for imagination), Feature Selection algorithms. Filters; Wrappers; Decision Trees; Random Forests. Recommendation Systems: Building a User-Facing Data Product, Algorithmic ingredients of a Recommendation Engine, Dimensionality Reduction, Singular Value Decomposition, Principal Component Analysis, Exercise: build your own recommendation system

Teaching Methodology*: Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 5

Mining Social-Network Graphs: Social networks as graphs, Clustering of graphs, Direct discovery of communities in graphs, Partitioning of graphs, Neighborhood properties in graphs, Data Visualization: Basic principles, ideas and tools for data visualization. Data Science and Ethical Issues, Discussions on privacy, security, ethics, Next-generation data scientists

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

Continuous Internal Assessment (CIA) Method

Sl.no	Type of Assessment	Mode of assessment	Marks
1	Mini Project / Solving Challenging Problems/ Case study	Regular Mode of Assessment	15
2	One Open Book Written Exam at the end of the Module 4	Regular Mode of Assessment	10
3	Assignments on Advanced Topics (group of size 2/individual)	Regular Mode of Assessment	10
4	MCQ based Test at the end of each Module	2 Marks for each Module	10
5	Attendance	As per the Guidelines given in the Regulations	5
		Total	**50**

Scheme of Examination for End Semester Examination of 50 Marks:

PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.

1 Marks x 10 = **10 Marks**

PART B: TWO questions to be set from each module.

Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

Text Books:

1) Doing Data Science Cathy O'Neil and Rachel Schutt Straight Talk From The Frontline.O'Reilly 2014

2) Mining of Massive Datasets. v2.1 Jure Leskovek, Anand Rajaraman and Jeffrey Ullman Cambridge University Press 2014

Reference Books:

1) Data Mining: Concepts and Techniques Jiawei Han, Micheline Kamber and Jian Pei ThirdEdition 2012.

2) Machine Learning: A Probabilistic Perspective Kevin P. Murphy 2013

INFORMATION SECURITY

Sub Code :	**21SCS73**	**IA Marks :**	**50**
Hrs/ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

This course will enable students to

- Learn fundamentals of cryptography and its application to network security.
- Understand network security threats, security services, and countermeasures.
- Understand vulnerability analysis of network security.
- Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.
- Gain handson experience with programming and simulation techniques for security protocols. Obtain background for original research in network security, especially wireless network and MANET security.
- Understand the tradeoffs and criteria/concerns for security countermeasure development.

Course Outcomes:

On Completion of this course the students are able to,

CO1: Understand and explain the risks faced by computer systems and networks.

CO2: Identify and analyze security problems in computer systems and networks.

CO3: Explain how standard security mechanisms work.

CO4: Develop security mechanisms to protect computer systems and networks.

CO5: Use cryptography algorithms and protocols to achieve computer security

MODULE 1

Introduction Introduction to Information Security : Attacks, Vulnerability, Security Goals, Security Services and mechanisms.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 2

Conventional Cryptograph ic Techniques : Conventional substitution and transposition ciphers, One time Pad, Block cipher and Stream Cipher, Steganography Symmetric and Asymmetric Cryptographic Techniques DES, AES, RSA algorithms

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 3

Authentication and Digital Signatures : Use of Cryptography for authentication, Secure Hash function, Key management 5 Kerberos

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 4

Program Security : Nonmalicious Program errors— Buffer overflow, Incomplete mediation, Timeof 15 check to Time use Errors, Viruses, Trapdoors, Salami attack, Manin-- ofthe 6 middle attacks, Covert channels

Teaching Methodology*: Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 5

Security in Networks : Threats in networks ,Network Security ControlsArchitecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security , Types of Firewalls, Firewalls Personal FirewallsDesign and , IDS, Email Security PGP,S/MIME

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

Continuous Internal Assessment (CIA) Method

Sl.no	Type of Assessment	Mode of assessment	Marks
1	Mini Project / Solving Challenging Problems/ Case study	Regular Mode of Assessment	15
2	One Open Book Written Exam at the end of the Module 4	Regular Mode of Assessment	10
3	Assignments on Advanced Topics (group of size 2/individual)	Regular Mode of Assessment	10
4	MCQ based Test at the end of each Module	2 Marks for each Module	10
5	Attendance	As per the Guidelines given in the Regulations	5
		Total	**50**

Scheme of Examination for End Semester Examination of 50 Marks:

PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.

1 Marks x 10 = **10 Marks**

PART B: TWO questions to be set from each module.

Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

Text Books:

1.Security inComputing, Fourth Edition, by Charles P. Pfleeger, Pearson Education
2. Cryptography And NetworkSecurityPrinciples And Practice,Fourthor Fifth Edition, William Stallings, Pearson

Reference Books:

1.Modern Cryptography: Theory and Practice, byWenboMao, Prentice Hall.
2.Network SecurityEssentials: Applications and Standards,by William Stallings. Prentice Hall.

HIGH PERFORMANCE COMPUTING

Sub Code :	**21SCS741**	**IA Marks :**	**50**
Hrs/ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

This course will enable students to

- Introduction to scalable parallel algorithms.
- To really scale your algorithm in both of these senses, you need to be smart about reducing asymptotic complexity the way you've done for sequential algorithms
- The techniques you'll encounter cover the main algorithm design and analysis ideas for three major classes of machines: for multicore and manycore shared memory machines, via the work-span model; for distributed memory machines like clusters and supercomputers, via network models; and for sequential or parallel machines with deep memory hierarchies

Course Outcomes:

On Completion of this course the students are able to,

CO1: Illustrate the key factors affecting performance of CSE applications

CO2: Illusrate mapping of applications to high-performance computing systems

CO3: Apply hardware/software co-design for achieving performance on real-world applications

CO4: Develop security mechanisms to protect computer systems and networks.

CO5: Use cryptography algorithms and protocols to achieve computer security

MODULE 1

Introduction: Computational Science and Engineering: Computational Science and Engineering Applications; characteristics and requirements, Review of Computational Complexity, Performance: metrics and measurements, Granularity and Partitioning, Locality: temporal/spatial/stream/kernel, Basic methods for parallel programming, Real-world case studies (drawn from multiscale, multi-discipline applications)

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 2

High-End Computer Systems : Memory Hierarchies, Multi-core Processors: Homogeneous and Heterogeneous, Shared-memory Symmetric Multiprocessors, Vector Computers, Distributed Memory Computers, Supercomputers and Petascale Systems, Application Accelerators / Reconfigurable Computing, Novel computers: Stream, multithreaded, and purpose-built

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 3

Parallel Algorithms: Parallel models: ideal and real frameworks, Basic Techniques: Balanced Trees, Pointer Jumping, Divide and Conquer, Partitioning, Regular Algorithms: Matrix operations and Linear Algebra, Irregular Algorithms: Lists, Trees, Graphs, Randomization: Parallel Pseudo-Random Number Generators, Sorting, Monte Carlo techniques

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 4

Parallel Programming: Revealing concurrency in applications, Task and Functional Parallelism, Task Scheduling, Synchronization Methods, Parallel Primitives (collective operations), SPMD Programming (threads, OpenMP, MPI), I/O and File Systems, Parallel Matlabs (Parallel Matlab, Star-P, Matlab MPI), Partitioning Global Address Space (PGAS) languages (UPC, Titanium, Global Arrays)

Teaching Methodology*: Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 5

Achieving Performance: Measuring performance, Identifying performance bottlenecks, Restructuring applications for deep memory hierarchies, Partitioning applications for heterogeneous resources, using existing libraries, tools, and frameworks

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

Continuous Internal Assessment (CIA) Method

Sl.no	Type of Assessment	Mode of assessment	Marks
1	Mini Project / Solving Challenging Problems/ Case study	Regular Mode of Assessment	15
2	One Open Book Written Exam at the end of the Module 4	Regular Mode of Assessment	10
3	Assignments on Advanced Topics (group of size 2/individual)	Regular Mode of Assessment	10
4	MCQ based Test at the end of each Module	2 Marks for each Module	10
5	Attendance	As per the Guidelines given in the Regulations	5
		Total	**50**

Scheme of Examination for End Semester Examination of 50 Marks:

PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.

1 Marks x 10 = **10 Marks**

PART B: TWO questions to be set from each module.
Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

Text Books:

1. Introduction to Parallel Computing, AnanthGrama, Anshul Gupta, George Karypis, and Vipin Kumar, 2nd edition, Addison-Welsey, 2003.

2. Petascale Computing: Algorithms and Applications, David A. Bader (Ed.), Chapman & Hall/CRC Computational Science Series, 2007

Reference Books:

1. Grama, A. Gupta, G. Karypis, V. Kumar, An Introduction to Parallel Computing, Design and Analysis of Algorithms: 2/e, Addison-Wesley, 2003.

2. G.E. Karniadakis, R.M. Kirby II, Parallel Scientific Computing in C++ and MPI: A Seamless Approach to Parallel Algorithms and their Implementation, Cambridge University Press,2003.

3. Wilkinson and M. Allen, Parallel Programming: Techniques and Applications Using Networked Workstations and Parallel Computers, 2/E, Prentice Hall, 2005.

INTRODUCTION TO SOFT COMPUTING

Sub Code :	**21SCS742**	**IA Marks :**	**50**
Hrs/ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

This course will enable students to

- Fuzzy logic and its applications.
- Artificial neural networks and its applications.
- Solving single-objective optimization problems using GAs.
- Solving multi-objective optimization problems using Evolutionary algorithms (MOEAs).
- Applications of Soft computing to solve problems in varieties of application domains.

Course Outcomes:

On Completion of this course the students are able to,

CO1: A strong mathematical background

CO2: Profiency with the algorithms.

CO3: Apply programming skilss in C/C++/ java, MATLAB etc

CO4: Critical thinking and problem-solving skills.

CO5: Understand concept of computing software skills.

MODULE 1

Introduction: Introduction to Soft Computing Concept of computing systems."Soft" compiting versus "Hard" computing Characteristics of Soft computing Some applications of Soft computing techniques

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 2

Fuzzy logic: Introduction to Fuzzy logic. Fuzzy sets and membership functions. Operations on Fuzzy sets. Fuzzy relations, rules, propositions, implications and inferences. Defuzzification techniques. Fuzzy logic controller design. Some applications of Fuzzy logic.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 3

Genetic Algorithms: Concept of "Genetics" and "Evolution" and its application to proablistic search techniques Basic GA framework and different GA architectures. GA operators: Encoding, Crossover, Selection, Mutation, etc.Solving single-objective optimization problems using GAs.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 4

Multi-objective Optimization Problem Solving Concept of multi-objective optimization problems (MOOPs) and issues of solving them. Multi-Objective Evolutionary Algorithm (MOEA). Non-Pareto approaches to solve MOOPs Pareto-based approaches to solve MOOPs Some applications with MOEAs.

Teaching Methodology*: Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 5

Artificial Neural Networks Biological neurons and its working. Simulation of biolgical neurons to problem solving. Different ANNs architectures. Training techniques for ANNs.
Applications of ANNs to solve some real-life problems.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

Continuous Internal Assessment (CIA) Method

Sl.no	Type of Assessment	Mode of assessment	Marks
1	Mini Project / Solving Challenging Problems/ Case study	Regular Mode of Assessment	15
2	One Open Book Written Exam at the end of the Module 4	Regular Mode of Assessment	10
3	Assignments on Advanced Topics (group of size 2/individual)	Regular Mode of Assessment	10
4	MCQ based Test at the end of each Module	2 Marks for each Module	10
5	Attendance	As per the Guidelines given in the Regulations	5
		Total	**50**

Scheme of Examination for End Semester Examination of 50 Marks:

PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.
1 Marks x 10 = **10 Marks**

PART B: TWO questions to be set from each module.
Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

Text Books:

1. Fuzzy Logic: A Pratical approach, F. Martin, , Mc neill, and Ellen Thro, AP Professional, 2000.
2. Fuzzy Logic with Engineering Applications (3rd Edn.), Timothy J. Ross, Willey, 2010.

3. Foundations of Neural Networks, Fuzzy Systems, and Knowldge Engineering, Nikola K. Kasabov, MIT Press, 1998.

Reference Books:

1. Fuzzy Logic for Embedded Systems Applications, Ahmed M. Ibrahim, Elesvier Press, 2004.
2. An Introduction to Genetic Algorithms, Melanie Mitchell, MIT Press, 2000.
3. Genetic Algorithms In Search, Optimization And Machine Learning, David E. Goldberg, Pearson Education, 2002.
4. Practical Genetic Algorithms, Randy L. Haupt and sue Ellen Haupt, John Willey & Sons, 2002.
5. Neural Networks, Fuzzy Logis and Genetic Algorithms : Synthesis, and Applications, S. Rajasekaran, and G. A. Vijayalakshmi Pai, Prentice Hall of India, 2007.

PARALLEL ALGORITHMS

Sub Code :	**21SCS743**	**IA Marks :**	**50**
Hrs/ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

This course will enable students to

- To understand different parallel architectures and models of computation.
- To introduce the various classes of parallel algorithms.
- To study parallel algorithms for basic problems.

Course Outcomes:

On Completion of this course the students are able to,

CO1: Develop parallel algorithms for standard problems and applications.

CO2: Analyse efficiency of different parallel algorithms.

MODULE 1

Introduction: Need for Parallel Processing - Data and Temporal Parallelism - Models of Computation - RAM and PRAM Model – Shared Memory and Message Passing Models- Processor Organisations - PRAM Algorithm – Analysis of PRAM Algorithms- Parallel Programming Languages.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept*.

9 Hours

MODULE 2

Parallel Algorithms for Reduction – Prefix Sum – List Ranking –Preorder Tree Traversal – Searching -Sorting - Merging Two Sorted Lists – Matrix Multiplication - Graph Coloring - Graph Searching.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 3

2D Mesh SIMD Model - Parallel Algorithms for Reduction - Prefix Computation - Selection - Odd-Even Merge Sorting - Matrix Multiplication

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 4

Hypercube SIMD Model - Parallel Algorithms for Selection- Odd-Even Merge Sort- Bitonic Sort- Matrix Multiplication Shuffle Exchange SIMD Model - Parallel Algorithms for Reduction - Bitonic Merge Sort - Matrix Multiplication - Minimum Cost Spanning Tree

Teaching Methodology*: Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 5

UMA Multiprocessor Model -Parallel Summing on Multiprocessor- Matrix Multiplication on Multiprocessors and Multicomputer - Parallel Quick Sort - Mapping Data to Processors.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

Continuous Internal Assessment (CIA) Method

Sl.no	Type of Assessment	Mode of assessment	Marks
1	Mini Project / Solving Challenging Problems/ Case study	Regular Mode of Assessment	15
2	One Open Book Written Exam at the end of the Module 4	Regular Mode of Assessment	10
3	Assignments on Advanced Topics (group of size 2/individual)	Regular Mode of Assessment	10
4	MCQ based Test at the end of each Module	2 Marks for each Module	10
5	Attendance	As per the Guidelines given in the Regulations	5
		Total	**50**

Scheme of Examination for End Semester Examination of 50 Marks:

PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.

1 Marks x 10 = **10 Marks**

PART B: TWO questions to be set from each module.

Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

Text Books:

1. Michael J. Quinn, "Parallel Computing : Theory & Practice", Tata McGraw Hill Edition, Second edition, 2017.

2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", University press, Second edition , 2011.

3. V Rajaraman, C Siva Ram Murthy, " Parallel computers- Architecture and Programming ", PHI learning, 2016.

Reference Books:

1. Ananth Grame, George Karpis, Vipin Kumar and Anshul Gupta, "Introduction to Parallel Computing", 2nd Edition, Addison Wesley, 2003.
2. M Sasikumar, Dinesh Shikhare and P Ravi Prakash , " Introduction to Parallel Processing", PHI learning , 2013.
3. S.G.Akl, "The Design and Analysis of Parallel Algorithms", PHI, 1989.

SOCIAL AND WEB ANALYTICS

Sub Code :	**21SCS744**	**IA Marks :**	**50**
Hrs/ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

This course will enable students to

- Understand and apply key concepts in social media metrics.
- Understand and apply social media analytics tools.
- Collect social media data.
- Monitor consumers and competitors and glean deeper consumer insights based on advanced social media data modeling.
- Students will demonstrate skill in data management

Course Outcomes:

On Completion of this course the students are able to,

CO1: Demonstrate the semantic web technologies like RDF Ontology and others
CO2: Learn the various semantic web applications
CO3: Identify the architectures and challenges in building social networks
CO4: Analyze the performance of social networks using electronic sources
CO5: Develop social media strategy and measure social media campaign effectiveness

MODULE 1

Introduction: Web Intelligence Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 2

Knowledge Representation for the Semantic Web Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 3

Ontology Engineering, Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 4

Semantic Web Applications, Services and Technology Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base, XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

Teaching Methodology*: Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 5

Social Network Analysis and semantic web What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

Continuous Internal Assessment (CIA) Method

Sl.no	Type of Assessment	Mode of assessment	Marks
1	Mini Project / Solving Challenging Problems/ Case study	Regular Mode of Assessment	15
2	One Open Book Written Exam at the end of the Module 4	Regular Mode of Assessment	10
3	Assignments on Advanced Topics (group of size 2/individual)	Regular Mode of Assessment	10
4	MCQ based Test at the end of each Module	2 Marks for each Module	10
5	Attendance	As per the Guidelines given in the Regulations	5
		Total	**50**

Scheme of Examination for End Semester Examination of 50 Marks:

PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.

1 Marks x 10 = **10 Marks**

PART B: TWO questions to be set from each module.

Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

Text Books:

1. Thinking on the Web Berners Lee, Godel and Turing Wiley inter science 2008

2. Social Networks and the Semantic Web Peter Mika Springer 2007

Reference Books:

1. Semantic Web and Semantic Web Services Liyang Lu Chapman and Hall CRC Publishers `

2. Programming the Semantic Web T.Segaran, C.Evans, J.Taylor O'Reilly.

EMBEDDED SYSTEMS

Sub Code :	**21SCS745**	**IA Marks :**	**50**
Hrs/ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

This course will enable students to

- Identify hardware and software components to build an embedded system
- Demonstrate the interfacing of peripherals with microcontroller
- Demonstrate deadlock situation in RTOS
- To handle shared data issues in RTOS,

Course Outcomes:

On Completion of this course the students are able to,

CO1: Able to acquire knowledge and understand fundamental embedded systems design paradigms, architectures, possibilities and challenges, both with respect to software and hardware

CO2: Able to analyze a system both as whole and in the included parts, to understand how t t these parts interact in the functionality and properties of the system

CO3: Able to practically apply gained theoretical knowledge in order to design, analyze and implement embedded systems

CO4: Apply formal method, testing, verification, validation and simulation techniques and tools in order to engineer reliable and safe embedded systems,

CO5: Demonstrate a deeper understanding of the electronics and physical principles used for embedded biomedical measuring systems

MODULE 1

Introduction: Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems. Core of Embedded Systems : Microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors, Application specific ICs, Programmable logic devices, COTS, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept*.

9 Hours

MODULE 2

Characteristics and quality attributes of embedded systems : Characteristics, Operational and non-operational quality attributes, application specific embedded system - washing machine, domain specific - automotive.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 3

Programming Embedded Systems: Structure of embedded program, infinite loop, compiling, linking and locating, downloading and debugging. **Embedded hardware :** Memory map, i/o map, interrupt map, processor family, external peripherals, memory - RAM, ROM, types of RAM and ROM, memory testing, CRC, Flash memory.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 4

Peripherals : Control and Status Registers, Device Driver, Timer Driver-Watchdog Timers, Embedded Operating System, Real-Time Characteristics, Selection Process.

Teaching Methodology*: Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 5

Design and Development : Embedded System development environment - IDE, Types of file generated on cross compilation, disassembler / decompiler, simulator, emulator and debugging, embedded product development life-cycle, trends in embedded industry.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

Continuous Internal Assessment (CIA) Method

Sl.no	Type of Assessment	Mode of assessment	Marks
1	Mini Project / Solving Challenging Problems/ Case study	Regular Mode of Assessment	15
2	One Open Book Written Exam at the end of the Module 4	Regular Mode of Assessment	10
3	Assignments on Advanced Topics (group of size 2/individual)	Regular Mode of Assessment	10
4	MCQ based Test at the end of each Module	2 Marks for each Module	10
5	Attendance	As per the Guidelines given in the Regulations	5
		Total	**50**

Scheme of Examination for End Semester Examination of 50 Marks:

PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.

1 Marks x 10 = **10 Marks**

PART B: TWO questions to be set from each module.

Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

Text Books:

1.Programming Embedded Systems in C and C++, First Edition,January, Michael Barr, O' Reilly
2.Introduction to embedded systems,Shibu K V Tata McGraw-Hill.

Reference Books:

1. Embedded Systems, Rajkamal, TataMcGraw-Hill

OBJECT ORIENTED SYSTEM DESIGN

Sub Code :	**21SCS746**	**IA Marks :**	**50**
Hrs/ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

This course will enable students to

- To describe the object-oriented software development process, including object- oriented methodologies and work flow
- To explain various UML diagrams

Course Outcomes:

On Completion of this course the students are able to,

CO1: Analyze the requirements and generate use cases

CO2: Perform Object oriented analysis

CO3: Perform overall design using various UML diagrams

CO4: Focus will be on Object Oriented Analysis of the system requirements followed by system design

CO5: Helps in learning software design in a real world perspective

MODULE 1

INTRODUCTION TO UML: Introduction to object oriented concepts like inheritance, Polymorphism, Information hiding, Importance of modelling, Principles of modelling, Object oriented modelling, An overview of UML, Conceptual model of the UML, Architecture, Software development life cycle.

BASIC STRUCTURAL MODELING: *Classes:* Terms and concepts, Common modelling techniques; *Relationships* Modelling simple dependencies, Single inheritance and structural relationships; Common mechanisms and diagrams.

ADVANCED STRUCTURAL MODELING: Advance classes, Advance relationships, Interfaces, Types and Roles, Packages, Instances.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 2

THE OBJECT-ORIENTED DESIGN PROCESS: The object and class Concepts, Identifying classes, Identifying responsibilities, Relationships between Classes, Use Cases, CRC cards, UML class diagrams, Sequence diagrams, State diagrams, Using Java doc for design documentation, *Case Study:* A voice mail system.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 3

GUIDELINES FOR CLASS DESIGN: An overview of the date classes in the java library, designing a day class, the importance of encapsulation, analyzing the quality of an interface, programming by contract, unit testing.**INTERFACE TYPES AND POLYMORPHISM:** The icon interface type, polymorphism, drawing shapes, the comparable interface type, the comparator interface type, anonymous classes, frames and user interface components, user interface actions, timers, designing an interface type.
Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 4

PATTERNS AND GUI PROGRAMMING: Iterators, the pattern concept, the observer pattern, layout managers and the strategy pattern, components, containers and the composite pattern, scroll bars and the decorator pattern, how to recognize patterns, putting patterns to work.**INHERITANCE AND ABSTRACT CLASSES:** The concept of inheritance, graphics programming with inheritance, abstract classes, the template method pattern, protected interfaces, the hierarchy of swing components, the hierarchy of standard geometric shapes, the hierarchy of exception classes, when not to use inheritance.
Teaching Methodology*: Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 5

FRAMEWORKS: Frameworks, applets as a simple framework, the collections framework, a graph editor framework, enhancing the graph editor framework.
MULTITHREADING: Thread basics, Thread synchronization, Animations.
MORE DESIGN PATTERNS: The Adapter pattern, Actions and the command pattern, the factory method pattern, the proxy pattern, the singleton pattern, the visitor pattern, other design patterns
Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

Continuous Internal Assessment (CIA) Method

Sl.no	Type of Assessment	Mode of assessment	Marks
1	Mini Project / Solving Challenging Problems/ Case study	Regular Mode of Assessment	15
2	One Open Book Written Exam at the end of the Module 4	Regular Mode of Assessment	10
3	Assignments on Advanced Topics (group of size 2/individual)	Regular Mode of Assessment	10
4	MCQ based Test at the end of each Module	2 Marks for each Module	10
5	Attendance	As per the Guidelines given in the Regulations	5
		Total	**50**

Scheme of Examination for End Semester Examination of 50 Marks:

PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.

1 Marks x 10 = **10 Marks**

PART B: TWO questions to be set from each module.

Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson (2009), The Unified Modeling Language User guide, 2nd edition, Pearson Education, New Delhi, India.

2. Cay Horstmann (2004), Object-Oriented Design and Patterns, Wiley India edition, New Delhi, India.

Reference Books:

1. Meilir Page-Jones (2000), Fundamentals of Object Oriented Design in UML, Pearson Education and NewYork.

2. Craig Larman (2005), An introduction to Object –Oriented Analysis and Design and UnifieD Process Appling UML and Patterns, 3rdedition, Pearson Education, New Delhi, India.

3. John W. Satzinger, Robert B Jackson, Stephen D Burd (2004), Object-Oriented Analysis and Design with theUnified Process, Cengage learning, India.

BIG DATA ANALYTICS

Sub Code :	**21SCS75**	**IA Marks :**	**50**
Hrs/ Week :	**3**	**Exam Hours :**	**2**
Credits :	**3**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

This course will enable students to

- Understand the Big Data Platform and its Use cases
- Provide an overview of Apache Hadoop
- Provide HDFS Concepts and Interfacing with HDFS
- Understand Map Reduce Jobs
- Provide hands on Hodoop Eco System
- Apply analytics on Structured, Unstructured Data.
- Exposure to Data Analytics with R.

Course Outcomes:

On Completion of this course the students are able to,

CO1: Identify Big Data and its Business Implications.
List the components of Hadoop and Hadoop Eco-System

CO2: Access and Process Data on Distributed File System
Manage Job Execution in Hadoop Environment

CO3: Develop Big Data Solutions using Hadoop Eco System

CO4: Analyze Infosphere BigInsights Big Data Recommendations.

CO5: Apply Machine Learning Techniques using R.

MODULE 1

INTRODUCTION TO BIG DATA AND HADOOP

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 2

HDFS(Hadoop Distributed File System)

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 3

Map Reduce:

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 4

Hadoop Eco System

Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.

Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.

Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS.

Big SQL : Introduction

Teaching Methodology*: Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

MODULE 5

Data Analytics with R

Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.

Teaching Methodology: *Chalk and talk using PPT and Demo to explain the Concept.*

9 Hours

Continuous Internal Assessment (CIA) Method

Sl.no	Type of Assessment	Mode of assessment	Marks
1	Mini Project / Solving Challenging Problems/ Case study	Regular Mode of Assessment	15
2	One Open Book Written Exam at the end of the Module 4	Regular Mode of Assessment	10
3	Assignments on Advanced Topics (group of size 2/individual)	Regular Mode of Assessment	10
4	MCQ based Test at the end of each Module	2 Marks for each Module	10
5	Attendance	As per the Guidelines given in the Regulations	5
		Total	**50**

Scheme of Examination for End Semester Examination of 50 Marks:

PART A: TEN Multiple Choice Questions (MCQs) to be set for **ONE MARK** each.

1 Marks x 10 = **10 Marks**

PART B: TWO questions to be set from each module.

Students have to answer **FIVE** full questions. Choosing at least **ONE** full question from each module. 08 Marks x 05 Question = **40 Marks.**

Text Books:

1 Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
2 Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015

Reference Books:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
3. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
4. Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012

CLOUD COMPUTING LAB

Sub Code :	**21SCSL76**	**IA Marks :**	**50**
Hrs/ Week :	**3**	**Exam Hours :**	**2**
Credits :	**2**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

This course will enable students to

- To develop web applications in cloud
- To learn the design and development process involved in creating a cloud based application
- To learn to implement and use parallel programming using Hadoop

Course Outcomes:

On Completion of this course the students are able to,

CO1: Configure various virtualization tools such as Virtual Box, VMware workstation
CO2: Design and deploy a web application in a PaaS environment
CO3: Learn how to simulate a cloud environment to implement new schedulers
CO4: Install and use a generic cloud environment that can be used as a private cloud
CO5: Manipulate large data sets in a parallel environment.

LABORATORY EXPERIMENTS

1. Install VirtualBox/VMware workstation with different flavours of Linux or windows os on top of windows7 or 8.

2. Install a c compiler in the virtual machine created using virtual box and execute simple Programs

3. Install google app engine. create hello world app and other simple web applications using python/java.

4. Use gae launcher to launch the web applications.

5. Simulate a cloud scenario using cloudsim and run a scheduling algorithm that is not present In cloudsim.

6. Find a procedure to transfer the files from one virtual machine to another virtual machine.

7. Find a procedure to launch virtual machine using try stack (online open stack demo version)

8. Install Hadoop single node cluster and run simple applications like wordcount

Continuous Internal Assessment (CIA) Method

Sl.no	Type of Assessment	Mode of assessment	Marks
1	Mini Project / Solving Challenging Problems	Regular Mode of Assessment	10
2	Assessment in each Lab session for 2 marks (10 Lab Sessions)	Regular Mode of Assessment	20
3	Maintaining the Record Note Book	Regular Mode of Assessment	10
4	MCQ /Viva at the end of each lab session	2 Marks for each Module	5
5	Attendance	As per the Guidelines given in the Regulations	5
		Total	**50**

Conduction of Practical Examination:

- All laboratory experiments are to be included for practical examination.
- Students are allowed to pick one experiment from the lot.
- Strictly follow the instructions as printed on the cover page of answer script
- Marks distribution: Procedure + Conduction + Viva:**12+28+10=50** Marks
- **Change of experiment is allowed only once and marks allotted to the procedure part to be made zero.**

MINI PROJECT

Sub Code :	**21SCS77**	**IA Marks :**	**50**
Hrs/ Week :	**4 (SELF STUDY)**	**Exam Hours :**	**2**
Credits :	**2**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:
At the end of the course, the student will be able to:

- Demonstrate a sound technical knowledge of their selected project topic.
- Undertake problem identification, formulation and solution.
- Design engineering solutions to complex problems utilising a systems approach.
- Communicate with engineers and the community at large in written an oral form.
- Demonstrate the knowledge, skills and attitudes of a professional engineer.

Instructions/Guidelines:

Students in consultation with the guide/s shall carry out literature survey/ visit industries to finalize the topic of the Project. Subsequently, the students shall collect the material required for the selected project, prepare synopsis and narrate the methodology to carry out the project work

Students should select a problem which addresses some basic home, office or other real life applications. Students have to collect an International Journal paper on the topics of their interest, prepare a write up and present with suitable demonstration by software or experimental work. Evaluation will be based on relevant topic student has studied, communication skill and reporting/documenting procedure.

Scheme of Evaluation:

CIE marks for the project report and seminar shall be awarded (based on the quality of report and presentation skill, participation in the question and answer session by the student) by the committee constituted for the purpose by the Head of the Department. The committee shall consist of 2 faculty members from the department with the senior most acting as the Chairman.
Each student, under the guidance of a Faculty, is required to

- Present the seminar on the selected Project orally and/or through power point slides.
- Answer the queries and involve in debate/discussion.
- Submit two copies of the typed report with a list of references.
- The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Note: This course is a non-credit, mandatory, audit course to be completed with internal & external assessment marks. The student has to obtain 50% marks (25/50) in the internal assessment to pass the course.

ESEP- PATENT FILING AND IPR

Sub Code :	**21SQA79**	**IA Marks :**	**50**
Hrs/ Week :	**2**		
Credits :	**2**		
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

- To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.
- To disseminate knowledge on patents, patent regime in India and abroad and registration aspects
- To disseminate knowledge on copyrights and its related rights and registration aspects
- To disseminate knowledge on trademarks and registration aspects
- To disseminate knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects
- To aware about current trends in IPR and Govt. steps in fostering IPR

Course Outcomes:

CO1. The students once they complete their academic projects, shall get an adequate knowledge on patent and copyright for their innovative research works

CO2. During their research career, information in patent documents provide useful insight on novelty of their idea from state-of-the art search. This provide further way for developing their idea or innovations

CO3. Pave the way for the students to catch up Intellectual Property(IP) as an career option

a. R&D IP Counsel

b. Government Jobs – Patent Examiner

c. Private Jobs

d. Patent agent and Trademark agent

e. Entrepreneur

Module- 1 Overview of Intellectual Property 6 hours

Introduction and the need for intellectual property right (IPR) – Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge – Trade Secret - IPR in India : Genesis and development – IPR in abroad - Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, the Berne Convention, 1886, the Universal Copyright Convention, 1952, the WIPO Convention, 1967,the Patent

Co-operation Treaty, 1970, the TRIPS Agreement, 1994
Module 2 – Patents 6 Hours Patents - Elements of Patentability: Novelty , Non Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties – Patent office and Appellate Board
Module 3 – Copyrights 6 Hours Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights
Module 4 - Trademarks and Design 6 Hours Concept of Trademarks - Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties - Trademarks registry and appellate board **Design** Design: meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection
Module 5 - Patent Filing (hands on Training) 6 Hours Purposes and techniques of Patent searching, Art of Drafting, Anatomy of Patent applications. Overall procedure

References:

Text book:

1. Nithyananda, K V. (2019). Intellectual Property Rights: Protection and Management. India, IN: Cengage Learning India Private Limited.
2. Neeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, IN: PHI learning Private Limited.

Reference book:

1. Ahuja, V K. (2017). Law relating to Intellectual Property Rights. India, IN: Lexis Nexis.

E-resources:

1. Subramanian, N., & Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf

2. World Intellectual Property Organisation. (2004). WIPO Intellectual property Handbook. Retrieved from https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf

Reference Journal:

1. Journal of Intellectual Property Rights (JIPR): NISCAIR

Useful Websites:

1. Cell for IPR Promotion and Management (http://cipam.gov.in/)
2. World Intellectual Property Organisation (https://www.wipo.int/about-ip/en/)
3. Office of the Controller General of Patents, Designs & Trademarks

INTERNSHIP-2

Sub Code :	**21SCS78**		
Hrs/ Week :	**4**		
Credits :	**2**	**Exam Marks:**	**50**
Mode of Delivery:	**RM**	**Total Hours :**	**45**

Course Objectives:

- Demonstrate a sound technical knowledge of their internship area / topic.
- Undertake problem identification, formulation and solution.
- Design engineering solutions to complex problems utilising a systems approach.
- Communicate with engineers and the community at large in written an oral forms.
- Demonstrate the knowledge, skills and attitudes of a professional engineer.

Course Outcomes:

Each student, under the guidance of a Faculty, is required to:

CO1: Present the work done in his/her internship on the selected topic orally and/or through power point slides.
CO2: Answer the queries and involve in debate/discussion.
CO3: Submit two copies of the typed report with a list of references.
CO4: The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.
CO5: Demonstrate the presentation with sound technical knowledge and communication skills

Instructions:
Following are the guidelines to be followed for the Internship Programme:

1. The Internship Programme duration is of Four weeks.

2. The internship can be carried out in any industry / R and D Organization / Research Institute / Educational institute of repute.

3. The institutions may also suggest the students to enroll for the Internshala platform for free internships as there is MoU with the AICTE for the beneficial of the affiliated Institutions (https://internshala.com/)

4. The Examination of Internship will be carried out in line with the University Project Viva-Voce examination.

5.The Department/college shall nominate staff member/s to facilitate, guide and supervise students under internship.

6. The students shall report the progress of the internship to the guide in regular intervals and seek his/her advice.

7. After the completion of Internship, students shall submit a report with completion and attendance certificates to the Head of the Department with the approval of both internal and external guides.

8. There will be 50 marks for CIE (Seminar: 15, Internship report: 05) and 25 marks for Viva - Voce conducted during SEE. The minimum requirement of CIE marks shall be 50% of the maximum marks.

9. The internal guide shall award the marks for seminar and internship report after evaluation. He/she will also be the internal examiner for Viva-Voce conducted during SEE.

10. The external guide from the industry shall be an examiner for the viva voce on Internship. Viva-Voce on internship shall be conducted at the college and the date of Viva-Voce shall be fixed in consultation with the external Guide. The Examiners shall jointly award the Viva- Voce marks.

11. In case the external Guide expresses his inability to conduct viva voce, the Chief Superintendent of the institution shall appoint a senior faculty of the Department to conduct viva-voce along with the internal guide. The same shall be informed in writing to the concerned Chairperson, Board of Examiners (BOE).

12. The students are permitted to carry out the internship anywhere in India or abroad. The University will not provide any kind of financial assistance to any student for carrying out the Internship.

SOCIAL INTERNSHIP

Sub Code :	**21SSI01**	**IA Marks :**	**100**
Hrs/ Week :	**2 (Self study)**		
Credits :		**Exam Marks:**	**00**
Mode of Delivery:	**BM**	**Total Hours :**	**45**

Course Objectives:

1. To do some socially relevant surveys.
2. To List out areas where engineers can contribute to society.
3. Visiting some village and assessing the condition of social life.
4. Visiting some industry and assessing the working environment

Course Outcomes:

CO1: Students are able to find the solution to socially relevant issues.
CO2: To formulate plans for engineers in delivering new technology to society.
CO3: To assess the ground reality of society in villages.
CO4: To assess the ground reality of working environment in industries.

Activity 1

Planning a Survey on a typical socially relevant topic. Conducting survey (inside campus). Analysing the survey and making a report.

3 Hours

Activity 2

Listing out needs and concerns of society. Finding areas where engineers can contribute to society. Making a report.

3 Hours

Activity 3

Visiting a village. Interacting with villagers. Finding the issues of society. Proposing solutions. Making a report.

3 Hours

Activity 4

Visiting an industry. Interacting with management, officers and workers. Making a report on working environment.

3 Hours

Note: Students are grouped to carry out activities. Each group is required to submit a report on the activities.