Semester- III

MULTIMEDIA COMMUNICATIONS			
Course Code	**22SCN31**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:2	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03

Course Learning objectives:
- Improve your reading, speaking, writing and listening skills in English in a technical context.
- Build up your knowledge of technical language in English
- Demonstrate learner autonomy by maximizing use of learning resources and producing quality work

Module-1
Introduction, multimedia information representation, multimedia networks, multimedia applications, Application and networking terminology, network QoS and application QoS, Digitization principles,.Text, images, audio and video.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-2
Text and image compression, compression principles, text compression- Runlength, Huffman, LZW, Document Image compression using T2 and T3 coding, image compression- GIF, TIFF and JPEG

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-3
Audio and video compression, audio compression – principles, DPCM, ADPCM, Adaptive and Linear predictive coding, Code-Excited LPC, Perceptual coding, MPEG and Dolby coders video compression, video compression principles.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-4
Video compression standards: H.261, H.263, MPEG, MPEG 1, MPEG 2, MPEG-4 and Reversible VLCs, MPEG 7 standardization process of multimedia content description, MPEG 21 multimedia framework.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-5
Notion of synchronization, presentation requirements, reference model for synchronization, Introduction to SMIL, Multimedia operating systems, Resource management, process management techniques.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one** **Skill Development Activity of 40 marks**
  to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

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

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books:

- *Multimedia Communications.* Fred Halsall. Pearson education. 2001.
- *Multimedia: Computing, Communications and Applications.* Raif Steinmetz, KlaraNahrstedt. Pearson education. 2002.

Refence Books:

- *Multimedia Communication Systems.* K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovanovic. Pearson education. 2004.
- *Multimedia: An Introduction.* John Billamil, Louis Molina. PHI. 2002.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=NPQW-UwR6vQ&list=PL6wr_B29b3UR5weQ80W8aYMkxEAz92IIC

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

Course outcome (Course Skill Set)

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

Sl. No.	Description	Blooms Level
CO1	Deploy the right multimedia communication models.	L2
CO2	Apply QoS to multimedia network applications with efficient routing techniques.	L2
CO3	Solve the security threats in the multimedia networks.	L2
CO4	Work on real-time multimedia network applications	L3

Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	Po1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x					x				x	
CO2		x		x								
CO3			x		x							
CO4			x	x	x							

SAMPLE TEMPLATE for PCC/PEC/OEC

Semester- III

Deep Learning			
Course Code	**22SCN321**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

- Discuss the context of neural networks and deep learning
- Have a working knowledge of neural networks and deep learning
- Explore the parameters for neural networks

Module-1	
Machine Learning Basics: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimator, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, building a Machine Learning Algorithm, Challenges Motivating Deep Learning.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-2	
Deep Feedforward Networks: Gradient-Based Learning, Hidden Units, Architecture Design, BackPropagation. Regularization: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, SemiSupervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging, Dropout.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-3	
Optimization for Training Deep Models: How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms. Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates. **Convolutional Networks:** The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-4	
Sequence Modelling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks. Long short-term memory	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-5	
Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyperparameters, Debugging Strategies, Example: Multi-Digit Number Recognition. Applications: Vision, NLP, Speech.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks**or**one**Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

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

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- *Deep Learning,* Lan Good fellow and YoshuaBengio, MIT Press https://www.deeplearn ingbook.org/ 2016.
- *Neural Networks:Asystematic Introduction*, Raúl Rojas, 1996.
- *Pattern Recognition and machine Learning*, Chirstopher Bishop, 2007.

Web links and Video Lectures (e-Resources):

- https://www.simplilearn.com/tutorials/deep-learning-tutorial
- https://www.kaggle.com/learn/intro-to-deep-learning
- https://www.javatpoint.com/deep-learning

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.

Course outcome (Course Skill Set)

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

Sl. No.	Description	Blooms Level
CO1	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.	L2
CO2	Implement deep learning algorithms and solve real-world problems.	L3
CO3	Execute performance metrics of Deep Learning Techniques.	L3
CO4	Compare modeling aspects of various neural network architectures.	L2

Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	Po1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
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12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x			x							
CO2			x		x							
CO3				x								x
CO4				x		x						

Semester- III

<table>
<tr><td colspan="4" align="center">**Database Security**</td></tr>
<tr><td>Course Code</td><td>**22SCN322**</td><td>CIE Marks</td><td>50</td></tr>
<tr><td>Teaching Hours/Week (L:P:SDA)</td><td>3:0:0</td><td>SEE Marks</td><td>50</td></tr>
<tr><td>Total Hours of Pedagogy</td><td>40</td><td>Total Marks</td><td>100</td></tr>
<tr><td>Credits</td><td>03</td><td>Exam Hours</td><td>03</td></tr>
</table>

Course Learning objectives:

- Demonstrate understanding of current database technology and typical database products.
- Demonstrate understanding of security architecture in modern computer systems in a typical enterprise.
- Formulate a working definition of database security and administration.
- Demonstrate the knowledge and skills for administration of user, profiles, password policies, privileges and roles.
- Implement typical security projects on enterprise systems

Module-1
Introduction Introduction to Databases Security Problems in Databases Security Controls Conclusions Security Models - Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-2
Security Models - Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion Security Mechanisms Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-3
Security Software Design Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design Statistical Database Protection & Intrusion Detection Systems Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls evaluation Criteria for Control Comparison .Introduction IDES System RETISS System ASES System Discovery

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-4
Models For The Protection Of New Generation Database Systems -1 Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object Oriented Systems SORION Model for the Protection of Object-Oriented Databases

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-5
Models For The Protection Of New Generation Database Systems -2 A Model for the Protection of New Generation Database Systems: the Orion Model Jajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions

Teaching-	Chalk and talk/PPT/case study/web content

Learning Process	

Assessment Details (both CIE and SEE)

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Semester End Examination:

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- The question paper will have ten full questions carrying equal marks.
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- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books:

- Database Security and Auditing, Hassan A. Afyouni, India Edition, CENGAGE Learning, 2009.
- Database Security, Castano, Second edition, Pearson Education.

Reference Book: 1. Database security by alfred basta, melissa zgola, CENGAGE learning

Web links and Video Lectures (e-Resources):

- https://alison.com/course/database-security-for-cyber-professionals
- https://www.javatpoint.com/database-security

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.

Course outcome (Course Skill Set)

Each course outcome is followed in parentheses by the Program Outcome to which it relates.

Sl. No.	Description	Blooms Level
CO1	Access control of relational database - Describe at least one access control policy and mechanism for relational databases	L2
CO2	Access control of structured database - Describe (at a high-level) at least one access control policy and mechanism for structured databases	L2
CO3	Integrity auditing - Describe at least one integrity auditing techniques for outsourced databases	L2
CO4	Security of distributed database system - Implement at least one security technique of the distributed database systems	L3

Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	Po1
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12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x			x							
CO2			x		x							
CO3				x								x
CO4				x		x						

Semester- III

<table>
<tr><td colspan="5" align="center">Pragmatic of Information Security</td></tr>
<tr><td>Course Code</td><td align="center">22SCN323</td><td>CIE Marks</td><td>50</td></tr>
<tr><td>Teaching Hours/Week (L:P:SDA)</td><td align="center">3:0:0</td><td>SEE Marks</td><td>50</td></tr>
<tr><td>Total Hours of Pedagogy</td><td align="center">40</td><td>Total Marks</td><td>100</td></tr>
<tr><td>Credits</td><td align="center">03</td><td>Exam Hours</td><td>03</td></tr>
</table>

Course Learning objectives:
- Explain the fundamentals of Cryptographic techniques
- Identify the security issues in the network and resolve it.
- Identifying the type of malware attacks and implementing preventive measures.

Module-1
Overview: Computer Security Concepts, Requirements, Architecture, Trends, Strategy Perimeter Security: Firewalls, Intrusion Detection, Intrusion Prevention systems, Honeypots Case Study: Readings, Intrusion and intrusion detection by John McHugh.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-2
User Authentication: Password, Password-based, token based, Biometric, Remote User authentication. Access Control: Principles, Access Rights, Discretionary Access Control, Unix File Access Control, Role Based Access Control Internet Authentication Applications: Kerberos, X.509, PKI, Federated Identity Management.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-3
Cryptographic Tools: Confidentiality with symmetric encryption, Message Authentication & Hash Functions, Digital Signatures, Random Numbers. Symmetric Encryption and Message Confidentiality: DES, AES, Stream Ciphers, Cipher Block Modes of Operation, Key Distribution.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-4
Internet Security Protocols: SSL, TLS, IPSEC, S/ MIME. Public Key Cryptography and Message Authentication: Secure Hash Functions, HMAC, RSA, Diffie Hellman Algorithms Case Study: Readings, Programming Satan's Computer Ross Anderson and Roger Needham.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-5
Malicious Software: Types of Malware, Viruses & Counter Measures, Worms, Bots, Rootkits Software Security: Buffer Overflows, Stack overflows, Defense, Other overflow attacks Case Study.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Assessment Details (both CIE and SEE)

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Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

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

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books:

- William Stalling & Lawrie, Computer Security: Principles and Practice, Pearson. 2010

Reference Book:

- Aleph, Readings: Smashing The Stack For Fun And Profit, http:// www.phrack. com/
- Chuck Easttom, Computer Security Fundamentals, Pearson, 2012.

Web links and Video Lectures (e-Resources):

- https://www.classcentral.com/subject/infosec
- https://www.udemy.com/topic/information-security/

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.

Course outcome (Course Skill Set)

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

Sl. No.	Description	Blooms Level
CO1	Explain the fundamentals of Cryptographic techniques	L1
CO2	Identify the security issues in the network and resolve it.	L2
CO3	Implement security algorithms in the field of Information technology	L3
CO4	Identifying the type of malware attacks and implementing preventive measures.	L2

Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
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Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x			x							
CO2			x		x							
CO3				x								x
CO4				x		x						

Semester- III

Advances in Storage Area Network			
Course Code	**22SCN324**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:
- Explore contrast storage centric and server centric systems.
- Define metrics used for Designing storage area networks.
- Discuss the data centers for maintaining the data with the concepts of backup mainly remote mirroring concepts.

Module-1	
Introduction: Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages. Case study: Replacing a server with Storage Networks The Data Storage and Data Access problem; The Battle for size and access. Intelligent Disk Subsystems: Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems, Availability of disk subsystems.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-2	
I/O Techniques: The Physical I/O path from the CPU to the Storage System; SCSI; Fibre Channel Protocol Stack; Fibre Channel SAN; IP Storage. Network Attached Storage: The NAS Architecture, The NAS hardware Architecture, The NAS Software Architecture, Network connectivity, NAS as a storage system. File System and NAS: Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-3	
Storage Virtualization: Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-4	
SAN Architecture and Hardware devices: Overview, Creating a Network for storage; SAN Hardware devices; The fibre channel switch; Host Bus Adaptors; Putting the storage in SAN; Fabric operation from a Hardware perspective. Software Components of SAN: The switch's Operating system; Device Drivers; Supporting the switch's components; Configuration options for SANs.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-5	
Management of Storage Network: System Management, Requirement of management System, Support by Management System, Management Interface, Standardized Mechanisms, Property Mechanisms, Inband Management, Use of SNMP, CIM and WBEM, Storage Management Initiative Specification (SMIS), CMIP and DMI, Optional Aspects of the Management of Storage Networks, Summary	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one** **Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

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

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

 Books:

- *Storage Networks Explained,* Ulf Troppens, Rainer Erkens and Wolfgang Muller, Wiley India, 2013.
- *Storage Networks The Complete Reference,* Robert Spalding, Tata McGrawHill, 2011.

- *Storage Networking Fundamentals:An Introduction to Storage Devices Subsystems, Applications, Management, and File Systems,* Marc Farley, Cisco Press, 2005.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=akEr8cUAd5g
- https://www.udemy.com/topic/storage-area-network/

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.

Course outcome (Course Skill Set)

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

Sl. No.	Description	Blooms Level
CO1	Identify the need for performance evaluation and the metrics used for it	L2
CO2	Apply the techniques used for data maintenance.	L2
CO3	Realize strong virtualization concepts	L2
CO4	Illustrate RAID concepts, policies for LUN masking, file systems	L3

Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x					x					
CO2	x											x
CO3			x		x							
CO4		x					x					

Semester- III

Information Retrieval			
Course Code	**22SCN325**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:
- To Understand Document as Vector
- Performance evolution metric for IR
- To understand search Engine functionality
- Various Supervised and Unsupervised learning Method

Module-1	
Overview of text retrieval systems: Boolean retrieval, the term vocabulary and postings lists, dictionaries and tolerant retrieval, Index construction and compression. Retrieval models and implementation: Vector Space Models, TF-IDF Weight, Evaluation in information retrieval	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-2	
Query expansion and feedback: Relevance feedback, pseudo relevance feedback, Query Reformulation Probabilistic models; statistical language models: Okapi/BM25; Language models, KL-divergence, Smoothing	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-3	
Text classification & Text clustering: The text classification problem, Naive Bayes text classification, k- nearest neighbors, Support vector Machine, Feature Selection, Vector-space clustering; K-means algorithm, Hierarchical clustering, DBSCAN algorithm, PAM and PAMK, EM algorithm	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-4	
Web search basics, crawling, indexes, Link analysis : Web Characteristic, Crawling , Web As a graph, Page Rank, Hubs and Authorities	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-5	
IR applications: Information extraction, Question answering, Opinion summarization, Social Network	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

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

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books:

- Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, Introduction to Information Retrieval, Cambridge University Press. 2008. http://nlp.stanford.edu/IR-book/information-retrieval-book.html
- ChengXiang Zhai, Statistical Language Models for Information Retrieval (Synthesis Lectures Series on Human Language Technologies), Morgan & Claypool Publishers, 2008.
- http://www.morganclaypool.com/doi/abs/10.2200/S00158ED1V01Y200811HLT 001

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=akEr8cUAd5g
- https://www.udemy.com/topic/storage-area-network/

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.

Course outcome (Course Skill Set)

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

Sl. No.	Description	Blooms Level
CO1	To Understand Document as Vector	L1
CO2	Performance evolution metric for IR	L2
CO3	To understand search Engine functionality	L2
CO4	To understand Various Supervised and Unsupervised learning Method	L2

Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x					x					
CO2	x											x
CO3			x		x							
CO4		x					x					

Semester- III

NETWORK PROGRAMMING			
Course Code	**22SCN331**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:
CLO 1.Define the key protocols which support the Internet
CLO 2.Exploreworking of the TCP/UDP Sockets
CLO 3.Demonstarte applications using techniques such as multiplexing, forking, multithreading
CLO 4.Illustrate working of Daemon Processes

Module-1	
Introduction to network application, client/server communication, OSI Model, BSD Networking history, Test Networks and Hosts, Unix Standards, 64-bit architectures, Transport Layer: TCP, UDP and SCTP	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-2	
Sockets Introduction – socket address structures, value-result arguments, byte ordering and manipulation functions, address conversion functions, Elementary TCP Sockets – socket, connect, bind, listen, accept , fork and concurrent server design, getcsockname and getpeername functions and TCP Client/Server Exampleclient/server programming through TCP sockets, Normal startup, termination, POSIX signal handling, Signal	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-3	
I/O Multiplexing and Socket Options, Elementary SCTP Sockets- Interface Models, sctp_xx functions, shutdown function, Notifications, SCTP Client/Server Examples – One-to-Many, Head–of-Line Blocking, Controlling number of streams and Termination, IPv4 and IPv6 Interoperability–different interoperability scenarios.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-4	
Daemon Processes, syslogd, daemonizing functions and the inetd super server, Advanced I/O functionsreadv, writev, sendmsg and recvmsg, Ancillary data, Advanced polling, Unix domain protocols- socket address structure, functions and communication scenarios, Nonblocking I/O – connect and accept examples.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-5	
ioctl operations- socket, file, interface configuration information, ARP cache and routing table operations, Routing sockets- data link socket address structure, reading and writing, sysctl operations, interface name and index functions, Key Management functions – reading, writing, SADB, SA, Dynamically Maintaining SA's, Out-of-Band data, Threads- basic thread functions, TCP echo server using threads, Mutexes and Conditional variables.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one** **Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

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

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

.Suggested Learning Resources:

Text Books

1. UNIX Network Programming W. Richard Stevens, Bill Fenner, Andrew M. Rudoff Pearson Volume 1, Third Edition, 2004

Reference Books:

1. Network Programming in C Barry Nance PHI 2002

2. Windows Socket Network Programming Bob Quinn, Dave Shute Pearson 2003

3. UNIX Network Programming Richard Stevens Second Edition.

Web links and Video Lectures (e-Resources):

https://archive.nptel.ac.in/courses/106/105/106105183/

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

Course outcome (Course Skill Set)

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

Sl. No.	Description	Blooms Level
CO1	Explain the concept of Networking and Transport Layer: TCP, UDP and SCTP.	L3
CO2	Illustrate the working of Sockets	L1
CO3	Demonstrate the Daemon Processes and No blocking I/O	L2
CO4	Explain the ioctl operations- socket SAD	L1

Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	Po1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			x							x		
CO2							x					x
CO3			x			x						
CO4	x	x			x							

Semester- III

SEMANTIC WEB AND SOCIAL NETWORKS			
Course Code	**22SCN332**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

- Explore the Web Intelligence, Artificial Intelligence and Semantic Road Map
- Illustrate the Semantic Web Ontologies and their role in the semantic web,RDF,OWL
- Define the Ontology Engineering
- Able to study the Semantic Web Applications and Social Network Analysis.

Module-1	
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-Learning Process	Chalk and talk/PPT/case study/web content

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-Learning Process	Chalk and talk/PPT/case study/web content

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-Learning Process	Chalk and talk/PPT/case study/web content

Module-4	
Semantic Web Applications, Services and Technology Semantic Web applications and services, Semantic Search, elearning, 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-Learning Process	Chalk and talk/PPT/case study/web content

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-Learning Process	Chalk and talk/PPT/case study/web content

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one** **Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

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

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books:

- Thinking on the Web Berners Lee, Godel and Turing, Wiley inter science, 2008
- Social Networks and the Semantic Web ,Peter Mika, Springe,r 2007
- Semantic Web and Semantic Web Services, Liyang Lu Chapman and Hall CRC Publishers
- Programming the Semantic Web, T.Segaran, C.Evans, J.Taylor O'Reilly.

Reference Books

- Artificial Intelligence: A Modern Approach, Stuart Rusell, Peter Norving, Pearson Education 2nd Edition.
- Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems – Prentice Hal of India.
- G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem Solving", Fourth Edition, Pearson Education, 2002.
- Artificial Intelligence and Expert Systems Development by D W Rolston-Mc Graw hill.
- N.P. Padhy "Artificial Intelligence and Intelligent Systems" , Oxford University Press-2015

Web links and Video Lectures (e-Resources):

- https://youtu.be/tbRF_ELh0Nc

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.

Course outcome (Course Skill Set)

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

Sl. No.	Description	Blooms Level
CO1	Demonstrate the semantic web technologies like RDF Ontology and others	L2
CO2	Explain the various semantic web applications	L2
CO3	Illustrate the architectures and challenges in building social networks	L2
CO4	Analyse the performance of social networks using electronic sources(can be attained through assignment or CIE)	L3

Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and 24odelli complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and 24odelling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

Mapping of COs and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x					x					
CO2	x											x
CO3			x		x							
CO4		x					x					

Semester- III

WEB SERVICES			
Course Code	**22SCN333**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:
- Explore the working of RPC,TP monitors and Object oriented middleware
- Explain different WSDL document
- Illustrate the Service Co-ordination Protocol
- Study BPEL Concepts

Module-1	
Middleware: Understanding the middle ware, RPC and Related Middle ware, TP Monitors, Object Brokers, and Message-Oriented Middleware.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-2	
Web Services: Web Services Technologies, Web Services Architecture	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-3	
Basic Web Services Technology: WSDL Web Services Description Language, UDDI Universal Description Discovery and Integration, Web Services at work interactions between the Specifications, Related Standards..	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-4	
Service Coordination Protocols: Infrastructure for Coordination Protocols, WS- Coordination, WSTransaction, Rosetta Net and Other Standards Related to Coordination Protocols.	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-5	
Service Composition: Basic of Service Composition, A New Chance of Success for Composition, Services Composition Models, Dependencies between Coordination and Composition, BPEL: Business Process Execution Language for Web Services, Outlook, Applicability of the Web Services, Web services as a Problem and a Solution : AN Example	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

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

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Test Books

1. *Web Services :Concepts, Architectures and Applications*, Gustavo A, F Casati, Harumi Kuno, Vijay M, Springer International,1st Edition, 2009.

Reference Books:

1. *Web Services: Theory and Practice,* Anura Guruge, Digital Press, 1st Edition ,2004

Web links and Video Lectures (e-Resources):

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

Course outcome (Course Skill Set)

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

Sl. No.	Description	Blooms Level
CO1	Develop WSDL document (can be attained through assignment or CIE)	L3
CO2	Implement web service client to call public service	L2
CO3	Implement a service and exposing it as public service.	L2
CO4	Bind and unbind services in UDDI. (can be attained through assignment or	L3

Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	Po1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				X				X				X
CO2		X										X
CO3									X			
CO4					X							X

Semester- III

MANAGING BIG DATA			
Course Code	**22SCN334**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:
- Define Hadoop, YARN.
- Illustrate MapReduce Applications Configuration.
- Able to Install and run Pig.

Module-1
Meet Hadoop: Data!, Data Storage and Analysis, Querying All Your Data, Beyond Batch, Comparison with Other Systems: Relational Database Management Systems, Grid Computing, Volunteer Computing Hadoop Fundamentals MapReduce A Weather Dataset: Data Format, Analysing the Data with Unix Tools, Analysing the Data with Hadoop: Map and Reduce, Java MapReduce, Scaling Out: Data Flow, Combiner Functions, Running a Distributed MapReduce Job, Hadoop Streaming The Hadoop Distributed Filesystem The Design of HDFS, HDFS Concepts: Blocks, Namenodes and Datanodes, HDFS Federation, HDFS High-Availability, The Command-Line Interface, Basic Filesystem Operations, Hadoop Filesystems Interfaces, The Java Interface, Reading Data from a Hadoop URL, Reading Data Using the FileSystem API, Writing Data, Directories, Querying the Filesystem, Deleting Data, Data Flow: Anatomy of a File Read, Anatomy of a File Write.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-2
YARN Anatomy of a YARN Application Run: Resource Requests, Application Lifespan, Building YARN Applications, YARN Compared to MapReduce,Scheduling in YARN: The FIFO Scheduler, The Capacity Scheduler, The Fair Scheduler, Delay Scheduling, Dominant Resource Fairness Hadoop I/O Data Integrity, Data Integrity in HDFS, LocalFileSystem, ChecksumFileSystem, Compression, Codecs, Compression and Input Splits, Using Compression in MapReduce, Serialization, The Writable Interface, Writable Classes, Implementing a Custom Writable, Serialization Frameworks, File-Based Data Structures: SequenceFile

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-3
Developing a MapReduce Application The Configuration API, Combining Resources, Variable Expansion, Setting Up the Development Environment, Managing Configuration, GenericOptionsParser, Tool, and ToolRunner, Writing a Unit Test with MRUnit: Mapper, Reducer, Running Locally on Test Data, Running a Job in a Local Job Runner, Testing the Driver, Running on a Cluster, Packaging a Job, Launching a Job, The MapReduce Web UI, Retrieving the Results, Debugging a Job, Hadoop Logs, Tuning a Job, Profiling Tasks, MapReduce Workflows: Decomposing a Problem into MapReduce Jobs, JobControl, Apache Oozie How MapReduce Works Anatomy of a MapReduce Job Run, Job Submission, Job Initialization, Task Assignment, Task Execution, Progress and Status Updates, Job Completion, Failures: Task Failure, Application Master Failure, Node Manager Failure, Resource Manager Failure, Shuffle and Sort: The Map Side,

The Reduce Side, Configuration	
Teaching- Learning Process	Chalk and talk/PPT/case study/web content

Module-4
Input, Binary Input, Multiple Inputs, Database Input (and Output) Output Formats: Text Output, Binary Output, Multiple Outputs, Lazy Output, Database Output, Flume Installing Flume, An Example,Transactions and Reliability, Batching, The HDFS Sink, Partitioning and Interceptors, File Formats, Fan Out, Delivery Guarantees, Replicating and Multiplexing Selectors, Distribution: Agent Tiers, Delivery Guarantees, Sink Groups, Integrating Flume with Applications, Component Catalogue

Teaching- Learning Process	Chalk and talk/PPT/case study/web content

Module-5
Pig Installing and Running Pig, Execution Types, Running Pig Programs, Grunt, Pig Latin Editors, An Example: Generating Examples, Comparison with Databases, Pig Latin: Structure, Statements, Expressions, Types, Schemas, Functions, Data Processing Operators: Loading and Storing Data, Filtering Data, Grouping and Joining Data, Sorting Data, Combining and Splitting Data. Spark An Example: Spark Applications, Jobs, Stages and Tasks, A Java Example, A Python Example, Resilient Distributed Datasets: Creation, Transformations and Actions, Persistence, Serialization, Shared Variables, Broadcast Variables, Accumulators, Anatomy of a Spark Job Run, Job Submission, DAG Construction, Task Scheduling, Task Execution, Executors and Cluster Managers: Spark on YARN.

Teaching- Learning Process	Chalk and talk/PPT/case study/web content

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

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

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Text Books

1. *Hadoop: The Definitive Guide* ,Tom White, O'Reilley, Third Edition, 2012

Reference Books:

1. *SPARK: The Definitive Guide*, MateiZaharia and Bill Chambers, Oreilly, 2018

- *Apache Flume: Distributed Log Collection for Hadoop*, .D'Souza and Steve Hoffman, Oreilly 2014

Web links and Video Lectures (e-Resources):

- https://www.digimat.in/nptel/courses/video/106104189/L01.html

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

Course outcome (Course Skill Set)

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

Sl. No.	Description	Blooms Level
CO1	Define managing big data using Hadoop and SPARK technologies	L2
CO2	Explain HDFS and MapReduce concepts	L2
CO3	Install, configure, and run Hadoop and HDFS	L2
CO4	Perform map-reduce analytics using Hadoop and related tools	L2
CO5	Explain SPARK concepts	L2

Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	Po1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

Mapping of COS and POs

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**CO1**	x		x									x
CO2	**CO2**			x									
CO3	**CO3**		x			x							
CO4	**CO1**	x		x									
CO5	x								x				

Cryptography and Network Security

Course Code	22SCN335	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:
- Define the basics of Cryptography and Network Security
- Demonstrate how to secure a message over insecure channel by various means.
- Apply how to maintain the Confidentiality, Integrity and Availability of a data.
- Explain various protocols for network security to protect against the threats in the networks.

Module-1

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-2

Symmetric key Ciphers: Block Cipher principles & Algorithms(DES, AES, Blowfish), Differential and Linear Crypt analysis, Block cipher modes of operation, Stream ciphers, RC4,Location and placement of encryption function, Key distribution

Asymmetric key Ciphers: Principles of public key cryp to systems, Algorithms(RSA, Diffie-Hellman, ECC), Key Distribution.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-3

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm

Authentication Applications: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-4

E-Mail Security: Pretty Good Privacy, S/MIME

IP Security: IP security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management.

Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Module-5

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction

Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related threats, Countermeasures, Firewall design principles, types of firewalls

Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual E lections	
Teaching-Learning Process	Chalk and talk/PPT/case study/web content

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

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

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Text Books:

- Cryptography and Network Security : William Stallings, Pearson Education,4″' Edition
- Cryptography and Network Security : Atul Kahate, Mc Graw Hill Edition

Reference Books

- Cryptography and Network Security: C K Shyamala, N Harin i, Dr T R Padmanabhan, Wiley India, **1"**
- Cryptography and Network Security : Forouzan Mukhopadhyay, MC Graw Hill, 2″" Edition
- Information Security, Principles and Practice: Mark Stamp, Wiley India.
- Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
- Introduction to Network Security: Neal Krawetz, CENGAGE Learning
- Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

Web links and Video Lectures (e-Resources):

- http://nptel.ac.in/courses/106105031/lecture by Dr. Debdeep MukhopadhyayIIT Kharagpur
- https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-033- computer-system-engineering-spring-2009/video-lectures/
- lecture by Prof. Robert Morris and Prof. Samuel Madden MIT.

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.

Course outcome (Course Skill Set)

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

Sl. No.	Description	Blooms Level
CO1	To Understand Document as Vector Student will be able to understand basic cryptographic a algorithms, message and web authentication and security issues.	L2
CO2	Ability to identify information system requirements for both of them such as client and server.	L2
CO3	Ability to understand the current legal issues towards information security.	L2

Program Outcome of this course

Sl. No.	Description	POs
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10
11	Project management and finance: Demonstrate knowledge and understanding of the engineering, business and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	PO11
12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	PO12

Mapping of COS and POs

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

PROJECT WORK			
PHASE – 1			
Course Code	22SCN34	CIE Marks	100
Number of contact Hours/Week	6	SEE Marks	--
Credits	03	Exam Hours	--

Course objectives:
- Support independent learning.
- Guide to select and utilize adequate information from varied resources maintaining ethics.
- Guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly.
- Develop interactive, communication, organisation, time management, and presentation skills.
- Impart flexibility and adaptability.
- Inspire independent and team working.
- Expand intellectual capacity, credibility, judgement, intuition.
- Adhere to punctuality, setting and meeting deadlines.
- Instil responsibilities to oneself and others.
- Train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas.

Project Phase-1 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.

Seminar: 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.

Course outcomes:
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 forms.
- Demonstrate the knowledge, skills and attitudes of a professional engineer.

Continuous Internal Evaluation
CIE marks for the project report (50 marks), seminar (30 marks) and question and answer (20 marks) 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 three faculty from the department with the senior most acting as the Chairperson.

Societal Project				
Course Code	22SCN35	CIE Marks	100	
Number of contact Hours/Week	6	SEE Marks	__	
Credits	3	Exam Hours	03	

Course objectives:
- Build creative solutions for development problems of current scenario in the Society.
- Utilize the skills developed in the curriculum to solve real life problems.
- Improve understanding and develop methodology for solving complex issues.

Some of the domains to choose for societal projects:
- Infrastructure
- Health Care
- Social security
- Security for women
- Transportation
- Business Continuity
- Remote working and Education
- Digital Finance
- Food Security
- Rural employment
- Water and land management
- Pollution,Financial Independence
- Agricultural Finance
- Primary Health care
- Nutrition ,Child Care
- E-learning,Distance parenting
- Mentorship Etc

Course outcomes:
At the end of the course the student will be able to:
- Building solution for real life societal problems.
- Improvement of their technical/curriculum skills

Continuous Internal Evaluation:
Identifying the real life problems and producing literature report : 20 marks
Data sampling and Cleaning :10 Marks
Establishing the right Objective: 10 Marks
Developing the solution : 20 Marks
Propagating the solution to the stake holders 1)Lectures 2)Social Meetings 3)Social media 4)Street plays 5)Advertisement Either of the 3(evidence of the work through geo tag photo) Certified by stake holders and authorized by concerned government authorities
Project Report: 20 marks. The basis for awarding the marks shall be the involvement of the student in the project and in the preparation of project report. To be awarded by the internal guide in consultation with external guide if any.
Project Presentation: 10 marks.
The Project Presentation marks of the Project Work Phase -II shall be awarded by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculty from the department with the senior most acting as the Chairperson.
Evalution: 10 marks.
The student shall be evaluated based on the ability in the Question and Answer session for 10 marks.

INTERNSHIP			
Course Code	22SCN36	CIE Marks	50
Number of contact Hours/Week	3	SEE Marks	50
Credits	06	Exam Hours	03

Course objectives:

Internship/Professional practice provide students the opportunity of hands-on experience that include personal training, time and stress management, interactive skills, presentations, budgeting, marketing, liability and risk management, paperwork, equipment ordering, maintenance, responding to emergencies etc. The objective are further,

To put theory into practice.

To expand thinking and broaden the knowledge and skills acquired through course work in the field. To relate to, interact with, and learn from current professionals in the field.

To gain a greater understanding of the duties and responsibilities of a professional. To understand and adhere to professional standards in the field.

To gain insight to professional communication including meetings, memos, reading, writing, public speaking, research, client interaction, input of ideas, and confidentiality.

To identify personal strengths and weaknesses.

To develop the initiative and motivation to be a self-starter and work independently.

Internship/Professional practice: Students under the guidance of internal guide/s and external guide shall take part in all the activities regularly to acquire as much knowledge as possible without causing any inconvenience at the place of internship.

Seminar: Each student, is required to

- Present the seminar on the internship orally and/or through power point slides.
- Answer the queries and involve in debate/discussion.
- Submit the report duly certified by the external guide.
- 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.

Course outcomes:

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

- Gain practical experience within industry in which the internship is done.
- Acquire knowledge of the industry in which the internship is done.
- Apply knowledge and skills learned to classroom work.
- Develop a greater understanding about career options while more clearly defining personal career goals.
- Experience the activities and functions of professionals.
- Develop and refine oral and written communication skills.
- Identify areas for future knowledge and skill development.
- Expand intellectual capacity, credibility, judgment, intuition.
- Acquire the knowledge of administration, marketing, finance and economics.

Continuous Internal Evaluation

CIE marks for the Internship/Professional practice report (30 marks), seminar (10 marks) and question and answer session (10 marks) 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 three faculty from the department with the senior most acting as the Chairperson.

Semester End Examination
SEE marks for the internship report (20 marks), seminar (20 marks) and question and answer session (10 marks) shall be awarded (based on the quality of report and presentation skill, participation in the question and answer session) by the examiners appointed by the University.

PROJECT WORK PHASE -2			
Course Code	22SCN41	CIE Marks	100
Practical /Field work/Week	8	SEE Marks	100
Credits	18	Exam Hours	03

Course objectives:

- To support independent learning.
- To guide to select and utilize adequate information from varied resources maintaining ethics.
- To guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly.
- To develop interactive, communication, organization, time management, and presentation skills.
- To impart flexibility and adaptability.
- To inspire independent and team working.
- To expand intellectual capacity, credibility, judgement, intuition.
- To adhere to punctuality, setting and meeting deadlines.
- To instill responsibilities to oneself and others.
- To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas.

Project Work Phase - II: Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, and external guide and prepare the project report as per the norms avoiding plagiarism.

- Follow the Software Development life cycle
- Data Collection ,Planning
- Design the Test cases
- Validation and verification of attained results
- Significance of parameters w.r.t scientific quantified data.
- Publish the project work in reputed Journal.

Course outcomes:

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

- Present the project and be able to defend it.
- Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.
- Habituated to critical thinking and use problem solving skills
- Communicate effectively and to present ideas clearly and coherently in both the written and oral forms.
- Work in a team to achieve common goal.
- Learn on their own, reflect on their learning and take appropriate actions to improve it.

Continuous Internal Evaluation:

Project Report: 20 marks. The basis for awarding the marks shall be the involvement of the student in the project and in the preparation of project report. To be awarded by the internal guide in consultation with external guide if any.

Project Presentation: 20 marks.

The Project Presentation marks of the Project Work Phase -II shall be awarded by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculty from the department with the senior most acting as the Chairperson.

Project Execution: 50 Marks

The Project Execution marks of the Project Work Phase -II shall be awarded by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculty from the department with the senior most acting as the Chairperson.

Question and Answer: 10 marks.

The student shall be evaluated based on the ability in the Question and Answer session for 10 marks.

Semester End Examination

SEE marks for the project report (60 marks), seminar (30 marks) and question and answer session (10 marks) shall be awarded (based on the quality of report and presentation skill, participation in the question and answer session) by the examiners appointed by the University.