Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)

SCHEME OF STUDIES & EXAMINATIONS

B.Tech. 4th YEAR (SEMESTER –VII) COMPUTER SCIENCE AND ENGINEERING

Choice Based Credit System Scheme of Studies & Examinations w.e.f. 2021-22

Sl. No.	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credits	Duration of Exam
			L	T	P		Theory	Practical			
1.	PEC-IV	Program Elective-IV	3	0	0	25	75	0	100	3	3
2.	PEC-V	Program Elective-V	3	0	0	25	75	0	100	3	3
3.	PEC-VI	Program Elective-VI	3	0	0	25	75	0	100	3	3
4.	OEC-III	Open Elective-III	3	0	0	25	75	0	100	3	3
5.	BSC	Biology	3	0	0	25	75	0	100	3	3
6.	CSE481C	Professional Training Seminar (Level-3)	0	0	2	50	0	0	50	2	0
7.	CSE483C	Project-I	0	0	8	50	0	100	150	4	3
Total			**15**	**0**	**10**	**225**	**375**	**150**	**700**	**21**	**18**

For B.Tech (Hons) degree the students will study the following subjects in addition to the subjects mentioned above.

SEMESTER-VII											
Sl. No.	Course Code	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credits	Duration of Exam
			L	T	P		Theory	Practical			

B.Tech. (Hons.) in CSE with specialization in Blockchain (H1)											
1.	CSEH401C	Blockchain Technology and Applications	3	0	0	25	75	0	100	3	3
2.	CSEH481C	Project based on specialization	0	0	4	25	0	75	100	2	3
B.Tech. (Hons.) in CSE with specialization in Cyber Security (H2)											
1.	CSEH403C	Cyber Forensics and Cyber Laws	3	0	0	25	75	0	100	3	3
2.	CSEH481C	Project based on specialization	0	0	4	25	0	75	100	2	3
B.Tech. (Hons.) in CSE with specialization in Data Science (H3)											
1.	CSEH405C	Mathematical and Statistical Techniques	3	0	0	25	75	0	100	3	3
2.	CSEH481C	Project based on specialization	0	0	4	25	0	75	100	2	3
Total(H1/H2/H3)			**3**	**0**	**4**	**50**	**75**	**75**	**200**	**5**	**6**

Program Electives

Program Elective-IV		Program Elective-V		Program Elective-VI	
Course code	**Course title**	**Course code**	**Course title**	**Course code**	**Course title**
CSE401C	Cloud Architecture & Security[4]	CSE421C	Distributed Computing	CSE441C	Multimedia Technology
CSE403C	Machine Learning	CSE423C	Green Computing	CSE443C	Soft Computing
CSE405C	Software Design and Enterprise Computing	CSE425C	Software Agents	CSE445C	Software Measurements and Metrics
CSE407C	Natural Language Processing	CSEH403C	Cyber Forensics and Cyber Laws[2]	CSEH401C	Blockchain Technology and Applications[1]

[1]Not to be opted by B.Tech (Hons) students opting specialization in Blockchain

[2]Not to be opted by B.Tech (Hons) students opting specialization in Cyber Security

[4]Not to be opted by B.Tech (Hons) students opting specialization in IoT

NOTE:

1. Students will be permitted to opt for any one elective each from the list of Program Elective-IV, V and VI. The minimum strength of the students should be 20 to run an elective course.
2. The student pursuing B.Tech (Hons.) will choose subjects as per the specialization opted in the V semester.
3. The students pursuing B.Tech (Hons.) can choose one subject each from the list of Program Elective –IV, V and VI, except already opted as per the specialization (IoT (H1), Cyber security (H2) and Data Science (H3)). The students should choose different subjects.
4. Students will be permitted to opt for one elective from the list of Open Elective-III that is floated by other department. The minimum strength of the students should be 20 to run an elective course.
5. Assessment of Professional Training (Level-3) (CSE326C), undergone at the end of semester-VI, will be based on seminar, viva-voce, report and certificate of professional training obtained by the student from the industry/ institute/ research lab/ training centre etc.
6. Students will be allowed to use non-programmable scientific calculator. However, sharing of calculators will not be permitted in the examinations.

OPEN ELECTIVES

Open Elective-III		
S.No	**Course No.**	**Course Title**
1.	CSE340C	Artificial Intelligence & Expert Systems
2.	EE452C	Electrical and Hybrid Vehicles
3.	MGT401C	Entrepreneurship
4.	ME452C	Fundamentals of Sustainable Manufacturing
5.	CHE459C	Nano-Science and Nano-Technology
6.	EE454C	Smart Grid

CSE401C CLOUD ARCHITECTURE & SECURITY
B. Tech. Semester – VIII (Computer Science and Engg.)

L	T	P	Credits			
3	-	-	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To understand the basics of Cloud Computing and its delivery models.
2. To study the concepts, processes, and best practices needed to successfully secure information within Cloud Infrastructures.
3. To get through the risk and compliance responsibilities along-with challenges for each Cloud service delivery models.
4. To know of intuition of data intensive computing and its solutions.

UNIT- I

Cloud Computing Architecture:- Cloud introduction and overview, Requirements for Cloud Computing, Introduction of Cloud computing architecture, On Demand Computing, Novel applications of cloud computing, Pricing models of Cloud Computing and associated risks, Virtualization at the infrastructure level, Security in Cloud computing environments, CPU Virtualization, Hypervisor and its types, Storage Virtualization, The SPI Framework for Cloud Computing, The Traditional Software Model, The Cloud Services Delivery Models, Cloud Deployment Models, Key Drivers to Adopting the Cloud services, The Impact of Cloud Computing on Users, Barriers to Cloud Computing Adoption in the Enterprise, Cloud Computing v/s Grid Computing.

UNIT-II

Security Issues In Cloud Computing:- Infrastructure Security: The Network Level, The Host Level, The Application Level, Data Security and Storage, Aspects of Data Security, Data Security Mitigation, Provider Data and Its Security, Identity and Access Management, Trust Boundaries and IAM, IAM Challenges, Relevant IAM Standards and Protocols for Cloud Services, IAM Practices in the Cloud, Cloud Authorization Management.

UNIT-III

Security Management In The Cloud:- Security Management Standards in the Cloud,

Availability Management: SaaS, PaaS, IaaS. Privacy Issues, Data Life Cycle, Key Privacy Concerns in the Cloud, Privacy protection mechanisms in the Cloud Computing, Governance, Risk, and Compliance (GRC) in relation to Cloud Computing, Legal and Regulatory Implications, International Laws and Regulations, Cloud Security Alliance, Auditing the Cloud for Compliance.

UNIT-IV

Data Intensive Computing:- Map-Reduce Programming Models, Characterizing Data-Intensive Computations, Technologies for Data-Intensive Computing, Programming Platforms, Example Application, HDFS, HIVE, Introduction to Google App Engine, Fog Computing and its Architecture.

TEXT/ REFERENCES BOOK:

1. **Rajkumar Buyya, James Broberg, and Andrzej M. Goscinski, "Cloud Computing Principles and Paradigms," Wiley & Sons pub.**
2. **Michael J. Kavis, "Architecting the Cloud: Design Decisions for Cloud Computing Service Models", Wiley.**
3. **Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications", Cambridge University Press.**
4. **R. Buyya, C. Vecchiola and S. Thamarai Selvi, "Mastering Cloud Computing," McGraw Hill.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:

Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After completion of course, students would be able to:

1. Get well verse with the basic terminologies of Cloud Computing.
2. Identify security aspects of each Cloud model.
3. Develop a risk and compliance management strategy for moving to the Cloud.
4. Indentify the intuition of data intensive computing mechanisms.

CSE403C MACHINE LEARNING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To learn the concept of how to learn patterns and data without being explicitly programmed.
2. To design and analyses various clustering and machine learning algorithms with a modern outlook focusing on recent advances.
3. Explore modeling and estimation paradigms of machine learning.
4. To explore the use cases of learning technique.

UNIT-I

Basic methods:- Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes Linear models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Nonlinearity and Kernel Methods , Beyond Binary Classification: Multi-class/Structured Outputs, Ranking.

UNIT- II

Clustering:- K-means/Kernel K-means Dimensionality Reduction: PCA and kernel PCA Matrix Factorization and Matrix Completion, Generative Models (mixture models and latent factor models)

Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests)

UNIT- III

Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning.

UNIT- IV

Scalable Machine Learning (Online Learning and Inference, Recent trends classification methods. and Distributed Learning), Introduction to Bayesian in various learning techniques of machine learning

TEXT/REFERENCES BOOKS:

1. **Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012**
2. **Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)**
3. **Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007**
4. **Note:**

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Course Outcomes:

After successful completion of the course, a student should be able to:

1. Get verse with the concept of learning patterns.
2. Learn clustering and machine learning algorithms.
3. Understand modeling and estimation paradigms of machine learning.
4. Use learning technique for practical applications.

CSE405C SOFTWARE DESIGN AND ENTERPRISE COMPUTING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To make students aware of various issues like weak random number generation, information leakage, poor usability, and weak or no encryption on data traffic.
2. To learn techniques for successfully implementing and supporting network services on an enterprise scale and heterogeneous systems environment.
3. To learn methodologies and tools to design and develop secure software containing minimum vulnerabilities.

UNIT-I

Secure Software Design: Identify software vulnerabilities and perform software security analysis, Master security programming practices, Master fundamental software security design concepts.

UNIT-II

Enterprise Application Development: Describe the nature and scope of enterprise software applications, Design distributed N-tier software application, Research technologies available for the presentation, business and data tiers of an enterprise software application, Design and build a database using an enterprise database system, Develop components at the different tiers in an enterprise system, design and develop a multi-tier solution to a problem using technologies used in enterprise system, present software solution.

UNIT-III

Enterprise Systems Administration: Design, implement and maintain a directory-based server infrastructure in a heterogeneous systems environment, monitor server resource utilization for system reliability and availability, Install and administer network services (DNS/DHCP/Terminal Services/ clustering/ Web /Email).

UNIT-IV

Software containing minimum vulnerabilities and flaws, perform security testing and quality assurance. Managing software quality in an organization, software configuration management, software measurement and metrics.

TEXT/REFERENCE BOOKS:

1. **Theodor Richardson, Charles N Thies, Secure Software Design, Jones & Bartlett.**
2. **Kenneth R. van Wyk, Mark G. Graff, Dan S. Peter, Diana L. Burley, Enterprise Software Security, Addison Wesley.**

Nina S. Godbole, Software Quality Assurance: Principles and Practices, Narosa Publication

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Course Outcomes:

After successful completion of the course, a student should be able to:

1. Differentiate between various software vulnerabilities
2. Understand the Software process vulnerabilities for an organization.
3. Monitor resources consumption in a software.
4. Inter relate security and software development process.

CSE407C NATURAL LANGUAGE PROCESSING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To know the basic terminologies of natural language processing.
2. To understand the formalization mechanisms of grammars.
3. To explore the mechanisms for drawing inferences from the given logic.
4. To identify and apply the learning mechanisms to the NLP applications.

UNIT-1

Components of natural language processing: Linguistic Essentials: lexicography, parts of speech and morphology, syntax, semantics, pragmatics: word level representation of natural languages prosody & natural languages.

UNIT-II

Grammar formalisms and treebanks: chomsky hierarchy, Left-Associative grammars, ambiguous grammars, resolution of ambiguities, Efficient parsing for context-free grammars (CFGs), Statistical parsing and probabilistic CFGs (PCFGs), Lexicalized PCFGs. Computation linguistics: recognition and parsing of natural language structures: ATN & RTN, General techniques of parsing: CKY, Earley & Tomitas algorithm.

UNIT-III

Semantics-knowledge representation semantic networks logic and inference pragmatics, graph models and optimization, prolog for natural language semantic.

UNIT-IV

Application of NLP: intelligent work processors: Machine translation and learning, user interfaces, Man-Machine interfaces, natural language querying, tutoring and authoring systems, speech recognition, commercial use of NLP, Natural Language Generation.

TEXT/REFERENCE BOOKS:

1. **"Natural Language Understanding" James Allen ,Benjamin-1995, cummings Pub. Comp. Ltd., Reference Books.**
2. **"Speech And Language Processing: An Introduction to Natural Language Processing " Dan Jurafsky, James H. Martin, Prentice Hall, 2009.**
3. **"Foundations of Statistical Natural Language Processing" Christopher D. Manning, Hinrich Schütze, MIT press 1999.**
4. **Radford, Andrew et. al., Linguistics, An Introduction, Cambridge University Press, 1999.**

Note:

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Course Outcomes:

After successful completion of the course, a student should be able to:

1. Get verse with the basic terminologies of natural language processing.
2. Know the various types of formalization mechanisms of grammars.
3. Apply the inference mechanisms for drawing conclusions.
4. Use learning mechanism for solving NLP problems.

CSE421C DISTRIBUTED COMPUTING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To understand the basic terminologies of distributed computing systems.
2. To learn about the distributed operating system and its implications.
3. To explore the mechanisms of high performance computing.
4. To study the working mechanisms of contemporary distributed systems.

UNIT-I

Fundamentals of Distributed Computing: Architectural models for distributed and mobile computing systems. Basic concepts in distributed computing such as clocks, message ordering, consistent global states, and consensus. Basic Algorithms in Message: Passing Systems, Leader Election in Rings, and Mutual Exclusion in Shared Memory, Fault-Tolerant Consensus, Causality and Time. Message Passing: PVM and MPI.

UNIT-II

Distributed Operating Systems and network operating systems, Distributed File systems. Client/server model for computing, common layer application protocols (RPC, RMI, streams), distributed processes, network naming, distributed synchronization and distributed object-based systems. Simulation: A Formal Model for Simulations, Broadcast and Multicast, Distributed Shared Memory, Fault-Tolerant Simulations of Read/Write Objects Simulating Synchrony, Improving the Fault Tolerance of Algorithms, Fault-Tolerant Clock Synchronization.

UNIT-III

Advanced Topics: Randomization, Wait-Free Simulations of Arbitrary Objects, and Problems Solvable in Asynchronous Systems, Solving Consensus in Eventually Stable Systems, High Performance Computing-HPF, Distributed and mobile multimedia systems. Adaptability in Mobile Computing, Grid Computing and applications.

UNIT-IV

Distributed Environments: Current systems and developments (DCE, CORBA, JAVA).

Case study- Distributed information searching on the network- Mobile Agent Approach.

TEXT/REFERENCE BOOKS

1. **Hagit Attiya, Jennifer Welch, Distributed Computing: Fundamentals, Simulations, and Advanced Topics, 2nd Edition, March 2004.**
2. **R. B. Patel, Mobile Computing-A Practical Approach, 1st edition, Khanna Publishing House Delhi**
3. **Mullendar S. Distributed Systems, 2nd Ed. Addison, Wesley 1994.**
4. **Tannenbaum, A. Distributed Operating Systems, Prentice Hall 1995.**
5. **Helal, Abdelsalam A. et al. Anytime, Anywhere Computing: Mobile Computing Concepts and Technology, Kluwer Academic Publishers 1999.**
6. **George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems: Concepts and Design Third Edition Addison-Wesley, Pearson Education, 2001.**
7. **Cay S Horstmann and Gary Cornell, Java 2 Vol I and II-Sun Micro Systems-2001**

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For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:

Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course, a student should be able to:

1. Get verse with the basic terminologies of distributed computing systems.
2. Know the distributed operating system and its implications.
3. Understand the mechanisms of high performance computing.
4. Get familiar with working mechanisms of contemporary distributed systems.

CSE423C GREEN COMPUTING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. Give an account of the concepts pertaining to Green computing
2. Give an account of standards and certifications related to sustainable computing products
3. Relate Green computing to sustainable development
4. Discuss how the choice of hardware and software can facilitate a more sustainable operation

UNIT-I

Definition of the term, Origins, Fundamentals, Regulations and industry initiatives- Government, Industry. approaches to green computing- Middleware Support, Compiler Optimization, Product longevity.

UNIT-II

Algorithmic efficiency, High performance computing, Sustainable computing, Resource allocation, Virtualization, Server Consolidation.

UNIT-III

Terminal servers, Power management, Operating system support, Power supply, Storage, Video card, Display, Tools for monitoring.

UNIT-IV

Green mobile, optimizing for minimizing battery consumption, Web, Temporal and Spatial Data Mining Materials recycling, Telecommuting, metrics for green computing.

Text Book:

Green Computing and Green IT Best Practices on Regulations and Industry Initiatives, Virtualization, Power Management, Materials Recycling and Telecommuting by Jason Harris, Emereo Publishing.

TEXT/REFERENCE BOOKS:

1. **Green Data Center: The steps for the journey by A. Galea, M. Schafer, M. Ebbers, IBM Press.**
2. **The Greening of IT: How companies can make a difference for the environment by John Lamb, IBM Press**
3. **Green Computing: Large-Scale Energy Efficiency by Wu-chun Feng, Virginia Polytechnic Institute and State University, Blacksburg, USA (Eds.), CRC Press**
4. **Green Computing with Emerging Memory: Low-Power Computation for Social Innovation by Kawahara, Takayuki; Mizuno, Hiroyuki (Eds.), Springer Press**
5. **Sustainable ICTs and Management Systems for Green Computing by Wen-Chen Hu (University of North Dakota, USA) and Naima Kaabouch (University of North Dakota, USA), IGI Global Press**
6. **Green IT for Sustainable Business Practice: A Foundation Guide by Mark O'Neill, British informatics Society Limited.**

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For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:

Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course, a student should be able to:

1. Get verse with the concepts pertaining to Green computing
2. Get an understanding of standards and certifications related to sustainable computing products
3. Relate Green computing to sustainable development
4. Understand the hardware and software choices for facilitating in sustainable operations.

CSEH403C CYBER FORENSICS AND CYBER LAWS
B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To learn the overview of cybercrime.
2. To learn the issues of cybercrime.
3. To learn the various methods to investigate cybercrime and learn about digital forensics.
4. To understand the laws and acts behind.

UNIT- I

Introduction: Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime, Social Engineering, Categories of Cyber Crime, Property Cyber Crime. Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation ,Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses.

UNIT-II

Introduction to Digital Forensics: Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics.

UNIT- III

Introduction to Cyber Crime Investigation Investigation Tools, eDiscovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, Email Recovery, Hands on Case Studies, Encryption and Decryption Methods, Search and Seizure of Computers, Recovering Deleted Evidences, Password Cracking.

UNIT- IV

Cyber Laws and Ethics: Digital Evidence Controls - Evidence Handling Procedures - Basics of Indian Evidence ACT IPC and CrPC - Electronic Communication Privacy ACT - Legal Policies. Digital, Indian IT Act

TEXT/REFERENCE BOOKS:

1. **Bernadette H Schell, Clemens Martin, Cybercrime, ABC , CLIO Inc, California, 2004.**
2. **Understanding Forensics in IT , NIIT Ltd, 2005.**
3. **Nelson Phillips and Enfinger Steuart, Computer Forensics and Investigations, Cengage Learning, New Delhi, 2009.**
4. **Kevin Mandia, Chris Prosise, Matt Pepe, Incident Response and Computer Forensics, Tata McGraw -Hill, New Delhi, 2006.**
5. **Robert M Slade, Software Forensics, Tata McGraw - Hill, New Delhi, 2005.**

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For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:
Examination and evaluations of students shall be conducted as per guidelines AICTE Examinations reforms covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

Students should be able:

1. To have various ideas about cybercrime.
2. To have knowledge of the various issues of cybercrime.
3. To investigate and find the cybercrime.
4. To have clear idea of the various laws and acts.

CSE441C MULTIMEDIA TECHNOLOGY

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives

1. To understand the characteristics of different multimedia systems.
2. To identify the encoding and quantization mechanisms for images.
3. To explore the audio and video processing mechanisms.
4. To know the practical applications of multimedia systems.

UNIT-I

Basics of Multimedia Technology: Computers, communication and entertainment; multimedia an introduction; framework for multimedia systems; multimedia devices; CD- Audio, CD-ROM, CD-I, presentation devices and the user interface; multimedia presentation and authoring; professional development tools; LANs and multimedia; internet, World Wide Web & multimedia distribution network-ATM & ADSL; multimedia servers & databases; vector graphics; 3D graphics programs; animation techniques; shading; anti aliasing; morphing; video on demand.

UNIT-II

Image Compression & Standards: Making still images; editing and capturing images; scanning images; computer color models; color palettes; vector drawing; 3D drawing and rendering; JPEG-objectives and architecture; JPEG-DCT encoding and quantization, JPEG statistical coding, JPEG predictive lossless coding; JPEG performance; overview of other image file formats as GIF, TIFF, BMP, PNG etc.

UNIT-III

Audio & Video: Digital representation of sound; time domain sampled representation; method of encoding the analog signals; subband coding; fourier method; transmission of digital sound; digital audio signal processing; stereophonic & quadraphonic signal processing; editing sampled sound;

MPEG Audio; audio compression & decompression; brief survey of speech recognition and generation; audio synthesis; musical instrument digital interface; digital video and image compression; MPEG motion video compression standard; DVI technology; time base media representation and delivery.

UNIT-IV

Virtual Reality: Applications of multimedia, intelligent multimedia system, desktop virtual reality, VR operating system, virtual environment displays and orientation making; visually coupled system requirements; intelligent VR software systems. Applications of environment in various fields.

TEXT /REFERENCE BOOKS:

1. **An introduction, Villamil & Molina, Multimedia Mc Milan, 1997**
2. **multimedia: Sound & Video, Lozano, 1997, PHI, (Que)**
3. **Multimedia: Production, planning and delivery, Villamil & Molina,Que, 1997**
4. **Multimedia on the PC, Sinclair,BPB**
5. **Multimedia: Making it work, Tay Vaughan, fifth edition, 1994, TMH.**
6. **Multimedia in Action by James E Shuman, 1997, Wadsworth Publ.,**
7. **Multimedia in Practice by Jeff coate Judith, 1995,PHI.**
8. **Multimedia Systems by Koegel, AWL**
9. **Multimedia Making it Work by Vaughar, etl.**

Note:

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For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:

Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course, a student should be able to:

1. Get familiar with the characteristics of different multimedia systems.
2. Learn the encoding and quantization mechanisms for images.
3. Understand the audio and video processing mechanisms.
4. Learn the practical applications of multimedia systems.

CSE443C SOFT COMPUTING

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
2. To implement soft computing based solutions for real-world problems.
3. To give students knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.
4. To provide students a hand-on experience on MATLAB to implement various strategies.

UNIT-I

Introduction to soft computing:- Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics.

UNIT-II

Fuzzy Logic:- Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functisons: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT-III

Neural Networks:- Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks: Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks.

UNIT-IV

Genetic Algorithms & Matlab:- Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning: Machine Learning Approach to Knowledge Acquisition. Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic

TEXT AND REFERENCE BOOKS:

1. **George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications",PHI**
2. **Satish Kumar, "Neural Networks: A classroom approach" Tata McGrawHill.**
3. **Haykin S., "Neural Networks-A Comprehensive Foundations",PHI**
4. **Anderson J.A., "An Introduction to Neural Networks",PHI**
5. **M.Ganesh, "Introduction to Fuzzy sets and Fuzzy Logic" PHI.**
6. **N P Padhy and S P Simon, " Soft Computing with MATLAB Programming", Oxford University Press.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:

Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After completion of course, students would be able to:

1. Identify and describe soft computing techniques and their roles in building intelligent Machines.
2. Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.
3. Apply genetic algorithms to combinatorial optimization problems.
4. Evaluate and compare solutions by various soft computing approaches for a given problem.

CSE445C SOFTWARE MEASUREMENTS & METRICS

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To understand the characteristics of the different performance measurement techniques of software systems.
2. To identify the metrics and attributes for measuring the performance of software systems.
3. To explore the implications of reliability mechanisms.
4. To provide the knowledge of component based systems and dynamic metrics.

UNIT-I

Basics of measurement:- Measurement in everyday life, measurement in software engineering, scope of software metrics, representational theory of measurement, measurement and models, measurement scales, meaningfulness in measurement, goal-based framework for software measurement, classifying software measures, determining what to measure, software measurement validation, empirical investigation, types of investigation, planning and conducting investigations.

UNIT-II

Software: - Metrics data collection and analysis: What is good data, how to define the data, how to collect the data, how to store and extract data, analyzing software-measurement data, frequency distributions, various statistical techniques.

Measuring internal product attributes: Measuring size, aspects of software size, length, functionality and complexity, measuring structure, types of structural measures, control-flow structure, and modularity and information flow attributes, data structures.

UNIT-III

Measuring external product attributes: Modeling software quality, measuring aspects of software quality, software reliability, basics of software reliability, software reliability problem, parametric

reliability growth models, predictive accuracy, recalibration of software reliability growth predictions, importance of operational environment, wider aspects of software reliability.

Resource measurement: Measuring productivity, teams, tools, and methods.

UNIT-IV

Metrics for object-oriented systems: The intent of object-oriented metrics, distinguishing characteristics of object-oriented metrics, various object-oriented metric suites LK suite, CK suite and MOOD metrics.

Dynamic Metrics: Runtime Software Metrics, Extent of Class Usage, Dynamic Coupling, Dynamic Cohesion, and Data Structure Metrics.

Metrics for component-based systems: The intent of component-based metrics, distinguishing characteristics of component-based metrics, various component-based metrics.

TEXT/REFERENCE BOOKS:

1. **Software Metrics: A rigorous and Practical Approach by Norman E. Fenton and Shari Lawrence Pfleeger, International Thomson Computer Press (1997) 2nd ed.**
2. **Applied Software Measurement by Capers Jones, McGraw Hill (2008).**
3. **Object-Oriented Software Metrics by Mark Lorenz, Jeff Kidd, Prentice Hall (1994).**
4. **Practical Software Metrics For Project Management And Process Improvement byRobert B Grady, Hewlett Packard Professional Books (2004) 1st ed.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:

Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

After successful completion of the course, a student should be able to:

1. Get familiar with the performance measurement techniques of software systems.
2. Understand the metrics and attributes for measuring the performance of software systems.
3. Know the implications of reliability mechanisms.
4. Learn the component based systems and importance of dynamic metrics.

CSEH401C BLOCKCHAIN TECHNOLOGY AND APPLICATIONS

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To get acquainted with distributed computing,
2. To create distributed and replicated ledger of events.
3. To study the security and privacy concerns.
4. To know about applications of blockchain.

UNIT- I

Distributed System concepts: Need of distributed record keeping, Modeling faults and adversaries, Byzantine Generals problem, distributed consensus and atomic broadcast, Byzantine Models of fault-tolerance , Consensus algorithms and their scalability problems, reason for Blockchain based cryptocurrency, Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash etc.

UNIT- II

Hyperledger: Hyperledger-Fabric fundamentals: Nodes, channels, components in a blockchain solution, Hyperledger transaction flow, participants identities & access control, Hyperledger Fabric blockchain creation, the plug and play platform and mechanisms in permissioned blockchain, Exploring Hyperledger frameworks

UNIT -III

Privacy &Security issues: Zero Knowledge proofs and protocols in Blockchain - Succinct non interactive argument for Knowledge (SNARK) - pairing on Elliptic curves - Zcash , Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains – such as Sybil attacks, selfish mining, attacks - advent of algorand, and Sharding based consensus algorithms, Authenticated Agreement.

UNIT IV

Applications: Corda, Uses of Blockchain in E-Governance and other contract enforcement mechanisms, Land Registration, cyber security, integrity of information, supply chain, Medical Information Systems, Decentralized Internet of Things, Domain Name Service and prospects of Blockchain

TEXT/REFERENCES BOOKS

1. **Blockchain Technology: Cryptocurrency and Applications by S. Shukla, M. Dhawan, S. Sharma and S. Venkatesan, Oxford University Press, 2019.**
2. **Blockchain: The Blockchain for Beginnings, Guide to Blockchain Technology and Blockchain Programming by Josh Thompson, Create Space Independent Publishing Platform, 2017.**
3. **A Step by Step guide to Enterprise Blockchain with Hyperledger Fabric: Develop De-centralized applications with Hyperledger Fabric by Mustafa Husain , Sandeep Kumar, ebook**
4. **The Science of the Blockchain by Wattenhofer ebook**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:

Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcomes:

At the end of the course, students will develop understanding for:

1. Hyperledger and transaction flow.
2. Authenticated agreement
3. Privacy and security issues pertaining to blockchain
4. Blockchain in IoT and supply chain.

CSEH405C MATHEMATICAL AND STATISTICAL TECHNIQUES

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To understand mathematical foundation of Data science and Statistical Modelling
2. To analyze data using Statistics and Probability techniques
3. To understand the basic concepts sampling, distributions and hypothesis testing techniques
4. To understand of the key techniques and theory used in visualization, including data models, graphical perception and functions used for analysis of various data distributions.

Unit I

Statistics: Definition and scope, concepts of statistical population and sample, Data: quantitative and qualitative, Scales of measurement: nominal, ordinal, interval and ratio, Frequency distribution, Measures of Central Tendency: Mean, Median, Mode, Measures of Dispersion: range, mean deviation, standard deviation, coefficient of variation, Gini's Coefficient, Lorenz Curve. Moments, skewness and kurtosis, Quantiles, Box Plot. Outlier Detection, Quantile-Quantile Plot.

Unit-II

Inferential statistics: The Central Limit Theorem, distributions of the sample mean and the sample variance for a normal population, Sampling distributions (Chi-Square, t, F, z). Test of Hypothesis-Testing for Attributes – Mean of Normal Population – One-tailed and two-tailed tests, F-test and Chi-Square test - - Analysis of variance ANOVA – One way and two way classifications.

Unit-III

Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability–classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes' theorem and its applications.

Unit-IV

Random variables: Random variables: discrete random variables, probability mass function (p.m.f) and Cumulative Distribution Function (c.d.f), statement of properties of p.m.f, illustrations and properties

of random variables, Two dimensional random variables: discrete type, joint, marginal and conditional p.m.f and c.d.f., statement of properties of c.d.f, independence of variables, trinomial distribution.

Textbooks/Reference books:

1. **Sheldon Ross, Introduction to Probability and Statistics for Engineers, 5/e (2014), Elsevier**
2. **Morris H. DeGroot and Mark J. Schervish, Probability and Statistics (4/e)(2012), AddisonWesley.**
3. **Blitzstein and Hwang, Intoduction to Probability (2015), CRC Press.**
4. **William Feller, An Intoroduction to Probability, (3/e) (2008), Volume 1, Wiley.**
5. **Freedman, Pisani, Purves, Statistics (4/e)(2014), W. W. Norton & Company.**

Note:

In semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attempt only five questions selecting at least one question from each unit.

For students admitted in B Tech 1st year (C-Scheme) in 2019 and all training students:

Examination and evaluations of students shall be conducted as per guidelines *AICTE Examinations reforms* covering the entire syllabus. The students shall be made aware about the reforms.

Course Outcome:

After completing the course the student will be able to

1. Perform simple statistics methods for data analysis
2. Perform statistical analysis of data using Inferential statistics and test hypothesis
3. Perform probability models and evaluate event probabilities, conditional probability and Bayes theorem
4. Find relations between random variables

CSE481C PROFESSIONAL TRAINING SEMINAR (LEVEL-3)

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits			
-	-	2	2	**Examination**	:	**50 Marks**
				Total	:	**50 Marks**

Course Objectives:

1. Acquire knowledge of the industry in which the internship is done.
2. Apply knowledge and skills learned in the classroom in a work setting.
3. To decide the future application areas of Computer Science and Engineering.

At the end of 6th semester each student would undergo four weeks Professional Training in an Industry/ institute/ Professional / Organization/ Research Laboratory etc. with the prior approval. The student has to submit a typed report in the department along with a certificate from the organization. The typed report should be in a prescribed format.

The report will be evaluated in the 7th Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning. Teachers associated with evaluation work will be assigned 2 periods per week load.

Course Outcomes:

After completing the course the students will have:

1. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
2. An ability to work in a multidisciplinary team
3. An ability to identify, formulate, and solve engineering problems
4. An understanding of professional and ethical responsibility.

CSE483C PROJECT-I

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits	Class Work	:	50 Marks
-	-	8	4	Examination	:	100Marks
				Total	:	150 Marks

Course Objectives:

1. To align student's skill and interests with a realistic problem or project
2. To understand the significance of problem and its scope.
3. Students will make decisions within a framework

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. will be evaluated through a panel of examiners consisting of the following:

Chairman of Department	Chairperson
Project coordinator	Member Secretary
Respective project supervisor	Member

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

Course Outcomes:

After completing the course the students will be able to:

1. Develop the professional quality of employing technical knowledge obtained in the field of Engineering & Technology.
2. Design and make analysis augmented with creativity, innovation and ingenuity.
3. Develop an understanding on how to work in actual industry environment.
4. Utilise the technical resources and write the technical report.

CSEH481C PROJECT BASED ON SPECIALIZATION

B. Tech. Semester – VII (Computer Science and Engg.)

L	T	P	Credits	Class Work	:	25 Marks
-	-	4	2	Examination	:	75 Marks
				Total	:	100 Marks

Course Objectives:

1. To align student‟s skill and interests with a realistic problem or project
2. To understand the significance of problem and its scope.
3. Students will make decisions within a framework

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. will be evaluated through a panel of examiners consisting of the following:

Chairperson of Department	Chairman
Project coordinator	Member Secretary
Respective project supervisor	Member

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

Course Outcomes:

After completing the course the students will be able to:

1. Develop the professional quality of employing technical knowledge obtained in the field of Engineering & Technology.
2. Design and make analysis augmented with creativity, innovation and ingenuity.
3. Develop an understanding on how to work in actual industry environment.
4. Utilise the technical resources and write the technical report.

EEH452C ELECTRICAL AND HYBRID VEHICLES

(OPEN ELECTIVE-III)

L	T	P	Credits			
3	-	-	3	Class Work	:	25 Marks
				Examination	:	75 Marks
				Total	:	100 Marks

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

1. Understand the basic concept and history of EV and HEV.
2. Understand the models to describe hybrid vehicles and their performance.
3. Understand the different possible ways of energy storage.
4. Understand the different strategies related to energy management systems.

UNIT I

Introduction: History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern electric vehicles on energy supplies. Electric Vehicle Composition and Configurations, Basic concept of hybrid Electric vehicle, HEV configuration types – series, parallel, series-parallel and complex hybrid, Power flow control.

UNIT II

Electric Propulsion: major requirements of EV motor drive, characteristics and control of DC motor, Induction motor, Switched Reluctance motor and Permanent Magnet motor, power converters devices/topology, control hardware, software and strategy vehicle, power source characterization, transmission characteristics.

UNIT III

Energy Storage: Introduction to energy storage requirements in Hybrid and Electric Vehicles, Energy sources, Battery based energy storage and its analysis, Fuel fell based energy storage and its analysis, super capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis.

UNIT IV

Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies. Plug-in electric vehicles, Vehicle to grid (V2G) and Grid to vehicle (G2V) fundamentals

Text / References:

1. **C. Mi, M. A. Masrur and D. W. Gao, "Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives", John Wiley & Sons, 2011.**
2. **S. Onori, L. Serrao and G. Rizzoni, "Hybrid Electric Vehicles: Energy Management Strategies", Springer, 2015.**
3. **M. Ehsani, Y. Gao, S. E. Gay and A. Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design", CRC Press, 2004.**
4. **T. Denton, "Electric and Hybrid Vehicles", Routledge, 2016.**

NOTE:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students: Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

MGT401C ENTREPRENEURSHIP

(OPEN ELECTIVE-III)

L	T	P	External Marks: 75
3	0	0	Internal Marks: 25
			Total Marks : 100
			Duration of Examination: 3 Hours

Course Objective:

The main objective of the course is to expose the students to the growth of entrepreneurship in developing countries and acquaint with the establishment and running of a new enterprise

Unit-I

Entrepreneurship: Concept and Definitions of Entrepreneur & Entrepreneurship; Classification and Types of Entrepreneurs; Traits/Qualities of an Entrepreneurs; Entrepreneurship's Challenges; Factor affecting Entrepreneurial Growth – Economic &Non-Economic Factors; Entrepreneur Vs. Intrapreneur .EDP Programmes.

Unit-II

Innovation Technology Management: Entrepreneurial Opportunity Search and Identification; recognition of a good business opportunity; Conducting Feasibility Studies. Business Plan: Purpose of Business Plan; Contents of Business Plan; Presenting of Business Plan; Why Business plan Fails.

Unit –III

Indian Models in Entrepreneurship: Social Entrepreneur: Introduction; Characteristics, Need, Types and Motivations of Social Entrepreneur. Women Entrepreneurship: Role & Importance, Profile of Women Entrepreneur, Problems of Women Entrepreneurs, Women Entrepreneurship Development in India.

Unit-IV

Developments of Entrepreneur: Micro, Small and Medium Enterprises: Concept & definitions; Role & Importance; MSMED Act 2006, Current Scheme of MSME- Technology Up-gradation Scheme , Marketing Assistance Scheme ,Certification Scheme, Credit- rating scheme , Problems facing MSME.

Financing the venture: Introduction, features and process of Venture Capital, Funding from Banks.

Recommended Books

1. **Roy Rajeev, Entrepreneurship 2/e, Oxford University Press.**
2. **Charantimath, Poornima, "Entrepreneurship Development and Small Business Enterprises", Pearson Education, New Delhi.**

Suggested Readings

1. **Roy Rajeev, Entrepreneurship 2/e, Oxford University Press.**
2. **Charantimath, Poornima, "Entrepreneurship Development and Small Business Enterprises", Pearson Education, New Delhi.**
3. **Norman M. Scarborough, "Essentials of Entrepreneurship & Small Business Management", PHI, New Delhi.**
4. **Vasant Desai, "Entrepreneurial Development and Management", Himalaya Publishing House, New Delhi.**
5. **Kumar Arya, "Entrepreneurship: creating and leading an entrepreneurial organization", Seventh Impression, Pearson Education.**
6. **Holt, "Entrepreneurship: New Venture Creation", Prentice Hall, New Delhi.**
7. **Hisrich, Robert D., Michael Peters and Dean Shephered, "Entrepreneurship", Tata McGraw Hill, New Delhi.**
8. **Bridge, S et al., "Understanding Enterprise: Entrepreneurship and Small Business", Palgrave Publication.**
9. **Donald F. Kuratko, "Entrepreneurship: Theory, Process, and Practice", South Western College Publications.**

Note:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:
   Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

Course Outcomes:

At the end of the course:

1. Students will be able to understand the concept of entrepreneurship, traits required to become an entrepreneur.
2. Students will be able to design and formulate the basic principles of business plans, they can choose and present their business plan
3. Students will know about the different types of entrepreneur
4. Students will be aware of the role of MSME in the development of Small Scale industries.

ME452C FUNDAMENTALS OF SUSTAINABLE MANUFACTURING
(OPEN ELECTIVE-III)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Outcomes:

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

1. Summarize sustainability issues and driversof sustainability.
2. Understand various standards for Environmental Impact Assessment.
3. Apply various tools and technique to access manufacturing sustainability.
4. Comprehend sustainability advantages associated with various manufacturing initiatives.

UNIT I

Introduction: Introduction to sustainability and drivers for sustainable development and sustainable Sustainable Manufacturing - Concept of Triple bottom line, Environmental, Economic and Social Dimensions of Sustainability, Sustainable Product Development – Various Phases.

UNIT II

Tools and Techniques: Environmental Conscious Quality Function Deployment, Life cycle assessment, Design for Environment, R3 and R6 cycles, loop production systems, Reverse supply chain, product acquisition management Design for Disassembly.

UNIT III

EIA Standards: CML, EI 95 and 99, ISO 14001 EMS and PAS 2050 standards, Environmental Impact parameters Energy in manufacturing (assessment and minimization)the

Design for recycling: Eco friendly product design methods – Methods to infuse sustainability in early product design phases

UNIT IV

Sustainability Assessment: Concept, Models and Various Approaches, Toxic substances in industry, Product Sustainability and Risk/Benefit assessment– Corporate Social Responsibility, Industry cooperation for reducing Carbon footprint

Green Manufacturing: Dry and near-dry machining, edible oil-based cutting fluids, cryogenic machining, improving work environment, of lean manufacturing, Lean techniques for green manufacturing and strategies for waste reduction in green manufacturing.

Textbooks:

1. **G. Atkinson, S. Dietz, E. Neumayer —Handbook of Sustainable Manufacturing‖. Edward Elgar Publishing Limited, 2007.**
2. **D. Rodick, Industrial Development for the 21st Century: Sustainable Development Perspectives, UN New York, 2007.**

Reference Books

1. **P. Lawn, Sustainable Development Indicators in Ecological Economics, Edward Elgar Publishing Limited.**
3. **S. Asefa, The Economics of Sustainable Development, W.E. Upjohn Institute for Employment Research, 2005.**

Notes:

1. In Semester Examinations, the examiner will set two questions from each unit (total 8 questions in all) covering the entire syllabus. The students will be required to attend only five questions selecting atleast one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines “AICTE Examination Reforms”. Students shall be informed about these reforms.

CHE459C : NANOSCIENCE AND NANOTECHNOLOGY
(OPEN ELECTIVE-III)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Objectives:

1. To initiate the student in the area of development of new materials / nanomaterials for novel applications and devices.
2. To impart foundational knowledge of nanoscience and related fields.
3. To make the students acquire an understanding of the analytical techniques in nanoscience and nanotechnology fields.
4. To help them understand in broad application areas of nanoscienceand nanotechnology in engineering.

UNIT-I

Types of materials; bonding in materials; crystal structures and defects; amorphous materials; origins of properties of materials; Effect of nanostructures on properties of materials.

The science of materials – materials science; Historical use of nanoparticles; discovery of the carbon nanotubes; fullerenes; nanostructured materials

UNIT-II

Particle-wave duality; de-Broglie waves; Schrodinger equation in 1-Dimension; Superposition; Energy eigenstates; Interpretation of wave function; Fermions and Bosons; Electron density of states; Energy bandgaps; Fermi energy; Excitons and Bohr radius.

UNIT-III

AFM; STM; Transport in nanostructures; 0,1 and 2 dimensional nanostructures; Bandgap engineering; Molecular motors; MEMS and NEMS devices. Biomaterials and nano-biotechnology.

UNIT-IV

Synthesis of Nanomaterials – ZnO and Fe_3O_4. Characterization of phases and quantification of phases. Applications of Nanomaterials: In textile industry, in catalytic operations, in energy generation, in energy storage, in environmental remediation and in sensors and devices.

TEXT BOOKS:

1. **NANO:The Essentials Understanding Nanoscience and Nanotechnology, T. Pradeep, Tata McGraw Hill Publishing Company Limited, 2007, 0-07-154830-0.**
2. **Material Science and Engineering, 7th ed. , William D. Callister, Johan Wiley & Sons, Inc.**
3. **Nanostructured Materials and Nanotechnology, Hari Singh Nalwa, Academic Press, 2002.**
4. **Nanostructures and Nanomaterials, synthesis, properties and applications., Guozhong Cao, Imperial College Press, 2004.**

REFERENCE BOOKS:

1. **Introduction to Nanoscience, S.M. Lindsay, Oxford University Press, 2010, ISBN: 978–019–954421–9 (Pbk).**
2. **Nanoscience, Hans-Eckhardt Schaefer, Springer, 2010, ISBN 978-3-642-10558-6.**
3. **Chemistry of nanomaterials: Synthesis, Properties and applications. C.N.R. Rao, Achim Muller, A.K. Cheetham, Wiley-VCH, 2004.**

NOTES:

1. Part A: Till academic session 2020-2021:In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting at least one question from each unit.

   Part B: From Academic Session 2021-2022 onwards: For the semester examination, nine questions are to be set by the examiner. Question no. 1, containing 6-7 short answer type questions, will be compulsory & based on the entire syllabus. Rests of the eight questions are to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit. All questions will carry equal marks.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students:

Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

Course Outcomes:

After completing this course, students will be able to:

1. Learn about the background on nanoscience and give a general introduction to different classes of nanomaterials.
2. Develop an understanding of the science behind the nanomaterial properties.
3. Apply their learned knowledge to study and characterize nanomaterials.
4. Familiarize themselves with the variety of nanotechnology applications, and know how to approach the synthesis of nanomaterials with a set of desirable properties.

EE454C SMART GRID
(OPEN ELECTIVE-III)

L	T	P	Credits			
3	0	--	3	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

UNIT-I

Introduction: Concept of smart grid, smart grid control, Communications and Sensing in a Smart Grid, Hardware Architecture, Software architecture, Protocol detail, application & benefits, PLCs Vs RTUs, IED's, RTU Block diagram, PMU communication interface.

UNIT-II

Cyber Security of the Smart Grid: Smart Grid Threats, Vulnerabilities and Cyber Security Strategies, Cyber Security Environment, False Data Injection and Attacks in Electric Power Grids Cyber-Physical System Security.

UNIT-III

Smart Grid Technologies: Energy Management System, Demand side management: peak clipping, valley filling, load shifting etc., state estimation, load forecasting. Time of the day pricing(TOD), Time of use pricing(TOU).

UNIT-IV

Distributed Generation & Control: Concept of distributed generation, Introduction of various distributed generation sources like wind, solar, fuel-cell, micro-hydro, PHEV's etc., Grid integration and control of distributed generation sources.

TEXT BOOKS:

1. **T. Gönen, Electric Power Distribution System Engineering, McGraw-Hill, 1986. ISBN: 0- 8493-5806-X.**
2. **Distribution System Protection Manual, McGraw-Edison Power Systems, 1990.**
3. **Westinghouse Electric Utility Ref. Book, Vol.3, Distribution Systems, 1965.**
4. **R. E. Brown, Electric Power Distribution Reliability, Marcel Dekker Inc., 2002**

REFERENCE BOOKS:

1. IEEE Power and Energy Magazine, July/August 2007 Issue

2. James Burke, Power Distribution Engineering, Mercel Dekker, 1994.

3. A.J. Pansini, Electrical Distribution Engineering McGrawHill, 1983.

4. E. Lakervi, E.J.Holmes, Electricity Distribution Network Design, IEE series, 1989.

5. J. Gers and E. J. Holmes Protection of Electricity Distribution Networks 2nd Edition.

NOTE:

1. In Semester Examinations, the paper setter will set two questions from each unit (total 8 questions in all), covering the entire syllabus. Students will be required to attempt only five questions, selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator, mobile phones or other electrical/ electronic items will not be allowed in the examination.
3. For students admitted in B.Tech. 1st Year (C-Scheme) in 2019 & onwards and all trailing students: Examinations and evaluations of students shall be conducted, covering the entire syllabus, as per guidelines "AICTE Examination Reforms". Students shall be informed about these reforms.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Understand the features of Smart Grid.
2. Understand to make conventional grid more smart, reliable, and efficient.
3. Understand the technical expertise in the emerging area of smart grid.
4. Understand the concepts of distributed generation.

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