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

SCHEME OF STUDIES & EXAMINATIONS

B.Tech. 4th YEAR ELECTRICAL ENGINEERING (SEMESTER – VIII)
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	EE402C	Power System Dynamics & Control	3	0	0	25	75	0	100	3	3
2	PE8	Program Elective - 8	3	0	0	25	75	0	100	3	3
3	PE9	Program Elective - 9	3	0	0	25	75	0	100	3	3
4	OE3	Open Elective - 3	3	0	0	25	75	0	100	3	3
5	EE484C	Project Stage-II	0	0	16	25	0	75	100	8	3
6	EE482C	General Fitness for the Profession	0	0	0	0	0	100	100	0	3
Total			**12**	**00**	**16**	**125**	**300**	**175**	**600**	**20**	

OR

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	EE490C	Internship	0	0	28	250	0	250	500	20	3
2	EE482C	General Fitness for the Profession	0	0	0	0	0	100	100	0	3
Total			**00**	**00**	**28**	**250**	**0**	**350**	**600**	**20**	

L= Lecture, T = Tutorial, P = Practical,& MC = Mandatory Course (Audit)

1. The students will be allowed to use non-programmable scientific calculator in the examination. However, Sharing/exchange of calculator is prohibited in the examination.
2. Electronics gadgets including Cellular phones are not allowed in the examination.

PROGRAM ELECTIVE-8 (PE8)

EE422C	Computational Intelligence
EE424C	Electric Power Quality & FACTS
EE426C	Machine Learning
EE428C	Internet of Things

PROGRAM ELECTIVE-9 (PE9)

EE432C	Advanced Control Systems
EE434C	Big Data Analysis
EE436C	Biomedical Instrumentation
EE438C	Advanced Instrumentation

OPEN ELECTIVE-3 (OE3)

CSE340C	Artificial Intelligence & Expert Systems
EE452C	Electrical and Hybrid Vehicles
MGT401C	Entrepreneurship
ME452C	Sustainable Manufacturing
CHE459C	Nano-Science and Nano-Technology
EE454C	Smart Grid

EE402C **POWER SYSTEM DYNAMICS & CONTROL**

B.TECH. (ELECTRICAL ENGINEERING, EEE)

SEMESTER- VIII

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

OUTCOMES: At the end of this course, students will demonstrate the ability to understand the problem of power system stability and its impact on the system. Model different power system components for the study of stability, methods to improve stability.

UNIT-I

Modeling of Synchronous Machines and Associated Controllers (10hours): Modeling of synchronous machine: Physical Characteristics, Rotor position dependent model, D-Q Transformation, Flux equations, Voltage equations, Steady State Analysis Performance, Transient analysis. Conversion of one frame to other frame of reference. Modeling of rotor circuit in d-q frame of reference. Modeling of Prime Mover Systems. Modeling of induction machine. General Load Modeling.

UNIT-II

Stability Analysis (10hours): Stability problem of synchronous generator connected to Infinite Bus System. Operation States of power Systems, Swing Equations. Power angle curve. Equal Area Criterion:- Description of the phenomena of loss of synchronism in a single-machine infinite bus system following a disturbance like a three--phase fault, fault clearance angle and fault clearance time.

UNIT-III

Transient Stability and Torsional Oscillations (12hours): Analysis using numerical integration of swing equations using step by step method. Angular Stability in multi-machine systems. Dynamic Analysis of Swing equation with unregulated synchronous machine and considering the effect of damper winding and Governor's action. Intra-plant, Local and Inter-area modes. Methods of enhancing power transfer capability of Power system. Problems associated with compensation of Transmission line. Sub Synchronous Resonance phenomena, Torsional Oscillations, Counter measure to SSR problems.

UNIT-IV

COMPENSATION (10hours): SVC compensation Systems, Controlled Series Compensation, SSS compensation, Modeling of Transmission line with SSSC, UPFC and its modeling, Thyristor controlled phase shift transformer, Power flow modeling of transmission line, Modeling of transmission line with TCSC

TEXT BOOKS:

1. K.R. Padiyar, "Power System Dynamics, Stability and Control", B. S. Publications, 2002.
2. P. Kundur, "Power System Stability and Control", McGraw Hill, 1995.
3. P. Sauer and M. A. Pai, "Power System Dynamics and Stability", Prentice Hall, 1997.
4. S. K. Gupta, " Power System Operation & Control", Wiley Publication 2019.

REFERENCE BOOKS:

5. A A Fouad, " Power System Control & Stability, Galgotia Publications
6. Power Generation, operation and control by Alen J. Wood by Wiley

NOTE:

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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.

EE422C COMPUTATIONAL INTELLIGENCE

B.TECH. (ELECTRICAL ENGINEERING, EEE)

SEMESTER- VIII

L	T	P	Credits	Class-work Marks	: 25
3	0	0	3	Exam Marks	: 75
				Total Marks	:100
				Duration of Examination	3 Hrs

Aim of this course is to provide the students with the knowledge and skills required to design and implement effective and efficient Computational Intelligence solutions to problems for which a direct solution is impractical or unknown. Specifically, students will acquire the basic concepts of fuzzy, evolutionary and neural computation. The expression computational intelligence (CI), commonly considered a synonym of soft computing, usually refers to the ability of a computer to learn a specific task from data or experimental observation.

Course Objectives:

1. Know the scope of Computational Intelligence (CI), and the types of tasks that can be tackled with CI methods
2. Know the most important modern computational intelligence techniques
3. Learn the fundamentals of neural computation and apply them effectively to develop correct and efficient solutions to a computational intelligence task.
4. Learn the fundamentals of evolutionary computation and apply them correctly to develop correct and efficient solutions to computational intelligence tasks.
5. Learn the fundamentals of fuzzy computation and apply them correctly to develop correct and efficient solutions to computational intelligence tasks

UNIT-I

Introduction (08 hours): Introduction to Computational Intelligence: definition and paradigms. Soft computing v/s hard computing. Brief historical sketch. Overview and basic concepts / characteristics of Intelligence and computational intelligence, modern application examples.

UNIT-II

Foundations of Neural Computation (12 hours):

Introduction to neural computation; Adaptation, Self-organization and Evolution; Biological and artificial neuron; Neural Networks Basic Concepts; Single Layer perceptron; Multilayer perceptron; Concepts of learning; Supervised and unsupervised learning; Back propagation networks; Neural network models; Architectures and training algorithms. Learning and generalization.

UNIT-III

Foundations of Evolutionary Computation (10 hours):

Introduction to evolutionary computation; Evolutionary processes in nature, Fitness Function; Classical Genetic operators; Evolutionary optimization algorithms; Genetic algorithms; Evolution Strategies.

UNIT-IV

Foundations of Fuzzy Computation (12 hours):

Introduction to fuzzy computation; Fuzzy sets and fuzzy systems; Properties of fuzzy sets; Membership functions; Structure / Block Diagram of Fuzzy System; Fuzzy inference systems: composition-based inference and Individual-rule-based Inference.

TEXT BOOKS/ REFERENCES:

1. Russell C. Eberhart and Yuhui Shi, Computational Intelligence: Concepts to Implementations, Morgan Kaufmann Publishers, 2007.
2. Andries P. Engelbrecht, Computational Intelligence: An Introduction, Wiley Publishing.
3. David Poole, Alan Mackworth, Randy Goebel, “Computational intelligence: A logical approach,” Oxford University Press.
4. A Konar, “Computational Intelligence: Principles, Techniques and Applications”, Springer - Verlag, 2005.
5. J.S. Saini, Editor Proceedings of STTP on Fuzzy Control; Aug. 2004.
6. Simon Haykin, Neural Networks: A Comprehensive Foundation, Prentice Hall
7. David E. Goldberg, Genetic Algorithm in Search Optimization and Machine Learning, Pearson Education.
8. S. Rajeskaran, G.A. Vijaylakshmi Pai, “Neural Networks, Fuzzy Logic, Genetic Algorithms Synthesis and Applications”.
9. J.S. Roger Jang, C.T.Sun, E. Mizutani, “Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning & Machine Intelligence”, PHI, 2002.
10. Computational intelligence in biomedical engineering - Begg, R.; Lai, D.T.H.; Palaniswami, M, CRC/Taylor & Francis, 2008.
11. Neural networks and learning machines - Haykin, S, Prentice Hall, 2009.
12. Evolutionary algorithms in theory and practice: evolution strategies, evolutionary programming, genetic algorithms - Bäck, T, Oxford University Press, 1996.
13. Laurence Fausett, “Fundamentals of Neural Networks”,Prentice Hall,1994.
14. Timothy J Rose, “Fuzzy Logic with Engineering Applications”, Third Edition, Wiley, 1995.

Web links

- IEEE Computational Intelligence Society http://cis.ieee.org/

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EE424C ELECTRIC POWER QUALITY & FACTS

B.TECH. (ELECTRICAL ENGINEERING, EEE)

SEMESTER-VIII

L	T	P	Credits	Class-work Marks	: 25
3	0	0	3	Exam Marks	: 75
				Total Marks	:100
				Duration of Examination	:3 Hrs

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

1. Understand the basic concepts of power quality.
2. Understand voltage sag, Interruptions, Transient overvoltages with their applications.
3. Understand Power Quality Monitoring objectives, equipments and Evaluation
4. Understand the working principles of FACTS devices to improve power quality and their operating characteristics.

UNIT-I

Introduction to Electric Power Quality (10 Hours): Power Quality, Concern in Power System, Power Quality Problems: Transient and Steady state variations in voltage and frequency. Unbalance, Sags, Swells, Interruptions, Wave-form Distortions: harmonics, noise, notching, dc-offsets, fluctuations, Flicker etc., Tolerance of Equipment: CBEMA curve. Standards of Power Quality and their applications.

UNIT- II

Voltage Sags and Interruptions (5 Hours): Sources of Sags and Interruptions, Fundamental Principles of Protection, Solutions at End User Level, Comparison of Different Ride-Through Alternatives.

Transient Overvoltages (5 Hours): Sources of Transient Overvoltages, Principles of Overvoltage Protection, Devices for Overvoltage Protection, Strategies for Utility System Lightning Protection, Switching Transient Problems with Loads.

UNIT- III

Harmonics (5 Hours): Harmonics Distortion, Power System Quantities under Nonsinusoidal Conditions, Harmonic Indices, Harmonics Sources from Commercial and Industrial Loads, Effects of Harmonic Distortion on Power System Equipments.

Power Quality Monitoring and Evaluation (5 Hours): Power Quality Monitoring and its Objective, Power Quality Measurement Equipments, Power Quality Evaluation, Different Power Quality Indices used in Power Quality Evaluation.

UNIT- IV

FACTS-Electric Power Quality Conditioner (10 Hours):

Principle of operation and applications of:Passive filters, Active Filters, Static VAR Compensator (STATCOM), Dynamic Voltage Restorer(DVR), Unified Power Quality Conditioner (UPQC).

Text / References:

1. Electric Power Systems Quality : R.C. Dugan, M. F. McGranaghan and H.W. Beaty, McGraw-Hill.
2. Power System Harmonics: J. Arrillaga, D.A. Bradely and P.S. Bodger, Wiley.
3. Electric Power Quality: G.T. Heydt, Stars in a Circle.
4. Embedded Generation: N. Jenkins, R. Allan, P. Crossley, D. Kirschan and G. Strbac, IEEE Power and Energy Series.
5. Power Quality: C. Sankaran, CRC press.
6. Understanding FACTS: Concepts and Technology of FACTS System, N. G. Hingorani and L. Gyugyi, Wiley-IEEE Press.
7. IEEE Recommended Practices and Requirements for Harmonic Control in Electric Power Systems, IEEE Std. 519, 1992.
8. IEEE Recommended Practices on Monitoring Electric Power Quality, IEEE Std.1159, 1995.

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EE426C **MACHINE LEARNING**

B.TECH. (ELECTRICAL ENGINEERING, EEE)

SEMESTER- VIII

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

COURSE OUTCOMES:

Students will be able to:

1 Design neural network to solve classification and function approximation problems.
2 Build optimal classifiers using genetic algorithms.
3 Comprehend probabilistic methods for learning.
4 Apply reinforcement learning for classification and prediction tasks.

UNIT - I

SUPERVISED LEARNING (12 hours)**:** Basics of machine learning, Artificial neural network, k-Nearest neighbour classifier, Support vector machine classifier, Decision tree classifier, Naive Bayes classifier, Bagging,Boosting, Improving classification with the AdaBoost meta algorithm.

UNIT – II

UNSUPERVISED LEARNING (10 hours)**:** Clustering: K-means clustering, Gaussian mixture model, EM algorithm for Gaussian mixture model; Dimensionality reduction: Principal component analysis, Independent component analysis, Factor analysis, EM algorithms for factor analysis.

UNIT – III

GENETIC ALGORITHMS (10 hours)**:** Basics of genetic algorithm, Representing hypotheses, Genetic operators, Fitness function and selection, Population evolution, Genetic programming, Representing programs, Models of evolution and learning: Lamarckian evolution and Baldwin effect.

UNIT – IV

REINFORCEMENT LEARNING (11 hours)**:** Markov decision process (MDP), Bellman equations, Value iteration and policy iteration, Linear quadratic regulation, Linear Quadratic Gaussian, Q-learning, Value function approximation, Policy search, Reinforce, Partially observable Markov decision process

TEXT BOOKS:

1. E. Alpaydin, Introduction to Machine Learning, MIT Press, 2009.
2. P. Langley, Elements of Machine Learning, Morgan Kaufmann, 1995.
3. T. M. Mitchell, Machine Learning, McGraw-Hill, 1997.

REFERENCE BOOKS:

Stephen Marsland, Machine Learning: An Algorithmic Perspective, CRC Press, 2009.

C. Bishop, Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.

P. Harrington, Machine learning in action, Manning Publications Co, 2012.

Csaba Szepesvári, Algorithms for Reinforcement Learning, Morgan & Claypool, 2010.

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EE428C **INTERNET OF THINGS**

B.TECH. (ELECTRICAL ENGINEERING, EEE)

SEMESTER- VIII

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

COURSE OUTCOMES:

Students will be able to:

1. Interpret the effect and challenges posed by IoT networks leading to new architecturalmodels.
2. Compare and contrast the deployment of smart objects and the technologies to connect themto network.
3. Appraise the role of IoT protocols for efficient network communication.
4. Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

UNIT - I

INTRODUCTION TO IOT (10 hours): What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT andIoT, IoT challenges, IoT network architecture and design, Drivers behind newnetwork architectures, Comparing IoT architectures, A simplified IoT architecture,The core IoT functional stack, IoT data management and compute stack.

UNIT – II

SMART OBJECTS (12 hours): The “Things” in IoT, Sensors, Actuators, and Smart objects, Sensornetworks, Connecting smart objects, Communications criteria, IoT accesstechnologies.

IP AS IOT NETWORK LAYER: Business case for IP, The need for optimization,Optimizing IP for IoT, Profiles and compliances, Application protocols for IoT, Transport layer, IoT application transport methods.

UNIT – III

DATA AND ANALYTICS FOR IOT (12 hours): An introduction to data analytics for IoT, Machinelearning, Big data analytics tools and technology, Edge streaming analytics,Network analytics.

SECURING IOT: A brief history of OT security, Common challengesin OT security, How IT and OT security practices and systems vary, Formal riskanalysis structures: OCTAVE and FAIR, Phased application of security in anoperational environment.

UNIT – IV

IMPLEMENTATION OF IOT (12 hours): IoT physical devices and endpoints - Arduino UNO: Introduction to Arduino, ArduinoUNO, Installing the software, Fundamentals of Arduino programming. IoTphysical devices and endpoints-RaspberryPi: Introduction to RaspberryPi, About theRaspberryPi board: Hardware layout, Operating systems on RaspberryPi, ConfiguringRaspberryPi, Programming RaspberryPi with Python, Wireless temperature monitoringsystem using Pi, DS18B20 temperature sensor, Connecting Raspberry Pi via

SSH,Accessing temperature from DS18B20 sensors, Remote access to RaspberryPi, Smartand connected cities, An IoT strategy for smarter cities, Smart city IoT Architecture,Smart city security architecture, Smart city use-case examples.

TEXT BOOKS:

David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton and Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, Cisco Press, 2017.

K. G. Srinivasa, G. M. Siddesh, Raju R. Hanumantha, Internet of Things, Cengage Learning India Pvt. Ltd., 2017

Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, “From Machine-to-Machine to the Internet ofThings: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press,2014.

REFERENCE BOOKS:

Peter Waher, Learning Internet of Things, PACKT publishing, 2015.

Bernd Scholz-Reiter, Florian Michahelles, Architecting the Internet of Things, Springer, 2011.

Daniel Minoli, Building the Internet of Things with IPv6 and MIPv6: The EvolvingWorld of M2M Communications, Willy Publications, 2013.

Vijay Madisetti and ArshdeepBahga, Internet of Things (A Hands-onApproach), 1st Edition, VPT, 2014.

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EE432C **ADVANCED CONTROL SYSTEMS**

B.TECH. (ELECTRICAL ENGINEERING, EEE)

SEMESTER- VIII

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

COURSE OUTCOMES: After successful completion of the course, the students will be able to

- Analyze the physical systems in State Variable Form
- Design modern control systems with state observers
- Analyze the linear and nonlinear systems using Phase Plane Approach and Describing Function method.
- Design the Optimal Controller using Lyapunov's method.

UNIT-I

STATE VARIABLE TECHNIQUES (10 hours): Concept of state, state variables and state model, non-uniqueness of state variables, state models for linear continuous time systems, mathematical modeling of physical and electrical systems in state space, State variable representation of systems using physical variables, phase variables and canonical variables .derivation of transfer function from state model, Diagonalization, Vander Monde matrix, important properties of eigen values of a matrix, generalized eigenvectors, Solution of state equations, state transition matrix, properties of state transition matrix, methods of computing state transition matrix.

UNIT-II

ANALYSIS AND DESIGN OF MODERN CONTROL SYSTEMS (11 hours): Concepts of Controllability and observability of control systems, Gilbert's, Kalman's, Factors cancellation and Popov-Belevitch-Hautus (PBH) methods to test controllability and observability of continuous time systems, Duality property, similarity transformation matrix from controllability matrix and observability matrix, pole placement design through state feedback, state observer, design of state observer, condition for the existence of observer, full order state observer, minimum order observer, design of control systems with observers, Ackermann's Formula.

UNIT-III

PHASE PLANE ANALYSIS (06 hours): Concept of phase plane and Phase plane portrait. Method of isoclines and Delta method for constructing phase plane trajectories, phase plane portrait of linear and nonlinear second order systems, concept of limit cycles and singular points, stability analysis of nonlinear systems using phase plane analysis. Salient features of nonlinear control systems, Overview of various nonlinear components.

DESCRIBING FUNCTION ANALYSIS (05 hours): Definition, limitations, Derivation of describing function for ideal relay, relay with hysteresis and dead zone, saturation/coulomb friction, backlash and other nonlinear components, use of describing function for stability analysis of control systems.

UNIT-IV

LYAPUNOV'S STABILITY ANALYSIS (07 hours): First and second method of Lyapunov, significance of Lyapunov function, Construction of Lyapunov Functions using different methods, Lyapunov stability definitions,

various stability theorems of Lyapunov for linear and nonlinear systems,Lyapunov's stability analysis of discrete time linear systems.

OPTIMAL CONTROL (05 hours): Concept of optimal control systems, Performance Indices, quadratic performance index, relationship between quadratic performance index and Lyapunov function, state regulator problem, output regulator problem, state regulator design using Lyapunov equation. Riccati equation, Optimal digital control systems.

TEXT BOOKS:

1. Digital Control & State Variable Methods: M.Gopal ; TMH.
2. Control Systems Engineering: Nagrath & Gopal, New Age Publisher.
3. Modern Control Engineering: Katsuhiko Ogata, Fifth Edition, Pearson Education

REFERENCE BOOKS:

1. Modern Control Theory: M.Gopal; Wiley International.
2. Applied non-linear control: J.E.Slotine & W.P.Li; Prentice Hall, USA,
3. ModernControl Theory:K.R.Varmah, CBS Publishers
4. Modern Control Engineering: D. Roy Choudhury, PHI

PROGRAM OUTCOMES:

1. Graduates shall be able to stay abreast with recent developments in the field of Electrical Engineering.
2. Graduates shall possess critical thinking abilities, problem solving skills and familiarity with the necessary computational tools and procedures.
3. Graduates shall have the ability to pursue research and provide innovative solutions.
4. Graduates shall continue to upgrade the skills and possess the motivation for continuing education and professional growth.

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EE434C **BIG DATA ANALYSIS**

B.TECH. (ELECTRICAL ENGINEERING, EEE)

SEMESTER- VIII

L	T	P	Credits	Class-work Marks	: 25
3	0	0	3	Exam Marks	: 75
				Total Marks	:100
				Duration of Examination	3 Hrs

COURSE OUTCOMES:

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

1. explain different issues involved in the design and implementation of a database system.
2. explain the physical and logical database designs & modeling.
3. identify Big Data and its Business Implications.
4. explain the algorithms for dealing with big data.
5. manage job Execution in Hadoop Environment.

UNIT- I

DATABASE SYSTEM ARCHITECTURE: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

DATA MODELS: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

UNIT-II

RELATIONAL QUERY LANGUAGES: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS – MYSQL.

RELATIONAL DATABASE DESIGN: Domain and data dependency, Armstrong's axiom, Normal forms, Dependency preservation, Lossless design.

QUERY PROCESSING AND OPTIMIZATION: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

UNIT- III

INTRODUCTION TO BIG DATA AND HADOOP: Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Spark, Analysing Data with Hadoop.

HDFS (HADOOP DISTRIBUTED FILE SYSTEM): Design of HDFS, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression and Serialization.

UNIT- IV

MAP REDUCE & CLASSIFICATION METHODS:

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

Overview of Clustering – K-means: Use Cases–Overview of the Method, Determining the Number of Clusters, Diagnostics – Reasons to Choose and Cautions, Classification: Decision Trees

Introduction to streams concepts and NoSQL databases

TEXT BOOKS:

- "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.
- "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.
- "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education
- "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley
- Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.
- Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
- Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications,CRC press, 2013.

REFERENCE BOOKS:

- Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
- Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007
- ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game", MC Press, 2012

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NOTE: For examiner for paper setting:-

In semester examinations, examiner is required to set up question paper covering the entire syllabus in accordance with the examination reforms circulated by the AICTE & approved under item No. 14_18 of academic council.

EE436C **BIOMEDICAL INSTRUMENTATION**

B.TECH. (ELECTRICAL ENGINEERING, EEE)

SEMESTER- VIII

L	T	P	Credits	Class-work Marks	: 25
3	0	0	3	Exam Marks	: 75
				Total Marks	:100
				Duration of Examination	3 Hrs

COURSE OUTCOMES:

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

1. evaluate the performance of Bio-medical instruments.
2. make use of bio-medical measurements and monitoring systems.
3. use telemetry in medical applications.
4. use computer networks in healthcare.

UNIT- I

INTRODUCTORY CONCEPTS (08 hours):

a. Introduction: Role of technology and biomedical Engineers in modern healthcare, origin of Bio signals, classification of biomedical instruments, performance parameters of instruments, basics of anatomy and physiology of the body.

b. Bioelectric potentials: Action and resting potentials, propagation of action potential, Physiological potentials- EEG, ECG, EMG, etc. and Evoked responses

UNIT- II

BIO-POTENTIAL ELECTRODES, AMPLIFIERS AND MEASUREMENTS SYSTEMS (12 hours):

a. Electrode theory, Bio-Potential electrodes-Electrode-Electrode interface, Half-cells and their potentials, Silver-Silver chloride electrodes, biomedical Recording electrodes, circuit model of electrode. Bioelectric amplifiers-carrier amplifiers, chopper amplifiers, phase sensitive or lock-in amplifiers, isolation amplifiers, instrumentation amplifiers, Microelectrodes.

b. Cardiovascular Measurements: Electrocardiography (ECG):Electrodes and leads, ECG recorders, ECG System for stress testing, Blood pressure measurement, Heart sound measurement, Pacemakers and Defibrillators.

UNIT- III

PATIENT CARE AND MONITORING SYSTEMS (12 hours):

a. Elements of intensive care monitoring, displays, diagnosis, Calibration of patient monitoring equipment. Sensory and behavioral measurements & patient monitoring systems. audiometer, galvanic skin Response (GSR), biofeedback instrumentation.

b. Computer-assisted patient monitoring system: Bedside monitors, central monitors ., measurement of heart rate, measurement of blood pressure, measurement of respiratory rate, impedance pnuemography, apnea detectors, Intelligent patient monitoring: Intelligent monitoring system architecture.

UNIT- IV

DIGNOSTIC TECHNIQUES AND BIO- TELEMETRY (10 hours):

a. Ultrasonic diagnosis, Ecocardiology, Eco-encephalography, Ophthalmic scans, X-ray & Radio-isotope diagnosis and therapy, CT-Scan, MRI.

b. Telemedicine & Medical Informatics. Components of a Bio-telemetry system, Telemedicine and its applications: Teleradiology, telecardiology, telepsychiatry, teledermatology, telesurgery, advantages and disadvantages of telemedicine. Hospital Information systems, Computer Networks in healthcare.

TEXT BOOKS:

1. R.S. Khandpur, “Handbook of Biomedical Instrumentaion,” TMH.
2. Mandeep Singh, “Introduction to Biomedical Instrumentation,” PHI.
3. Cromwell, “Biomedical Instrumentation and Measurements”, PHI

REFERENCE BOOKS:

1. Rangayyan , “Biomedical Signal Analysis: A case-study Approach,” Wiley.
2. Webster, “Bioinstrumentation,” Wiley.
3. Webster, “Medical Instrumentation: Application and Design,” Wiley.
4. Carr, “Introduction to biomedical equipment technology,” Pearson.
5. S. Ananthi, “A Text Book of Medical Instruments (2005)”, New Age International.
6. Pandey & Kumar,” Biomedical Electronics and Instrumentation”, Kataria

NOTE:

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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.

EE438C **ADVANCED INSTRUMENTATION**

B.TECH. (ELECTRICAL ENGINEERING, EEE)

SEMESTER- VIII

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

COURSE OUTCOMES:

Students will be able to:

Select and use correct sensors for their different applications.
Do the representation and analysis of signals acquired through sensors.
Design new and robust sensors using basic principles of measurement.
Make use of virtual instruments in different industrial applications.
Extract the correct information from the sensor signals.

UNIT - I

SENSORS FUNDAMENTALS(12 hours): Sensor Classification, Thermal Sensors, Humidity Sensors, Capacitive Sensors, Planar Electromagnetic Sensors, Light Sensing Technology, Moisture Sensing Technology, Sensors Parameters, Range, Sensitivity, Accuracy, Stability, Repeatability, Static and Dynamic Characteristics, Energy Harvesting, Compensation due to change of temperature and other environmental parameters, Selection of Sensors, Factors affecting performance of sensors, Effect of temperature, Degradation of Sensors.

UNIT – II

SELF GENERATING SENSORS(12 hours): Thermoelectric Sensors, Thermocouples: reversible thermoelectric effects, common thermocouples, practical thermocouple laws, cold junction compensation in thermocouple circuits; Piezoelectric Sensors: piezoelectric effect, piezoelectric materials, applications; Pyroelectric Sensors: pyroelectric effect, pyroelectric materials, radiation laws, applications; Photovoltaic Sensors: photovoltaic effect, materials and applications; Electrochemical Sensors; Introduction of Intelligent Sensors, Classification, Smart Sensors, Cogent Sensors, Soft or Virtual Sensors, Self-adaptive Sensors, Self-validating Sensors, VLSI Sensors, Temperature compensating Intelligent Sensors, Indirect Sensing. **UNIT – III**

SENSOR SIGNAL PROCESSING TECHNIQUES(12 hours): Normalization, Feature extraction, Dimensionality reduction, Signal processing techniques for information extraction from sensor data: Deriving

information from sensor data, Finding patterns in sensor data, Classifying sensor data, Detecting trends, Characterizing sensor data, Annotation Methods. Digital Signal Conditioning in Instrumentation: Introduction, Digital filters and z-transform, Some simple DSP Algorithms, Discrete and Fast Fourier Transforms and their applications: Use of data windows to improve spectral resolution, Use of DFT to characterize random signals and noise, Fast Fourier Transform, Digital routines for interpolating discrete data, Estimating missing data at sampling instants.

UNIT – IV

VIRTUAL INSTRUMENTATION(12 hours): Introduction to Graphical System Design, Graphical System Design (GSD) Model:Design, Prototype and Deployment, Design flow with GSD, Virtual Instrumentation, Comparison of Virtual Instrument and Traditional Instrument, Role of Hardware in Virtual Instrumentation, Role of Software in Virtual Instrumentation, VirtualInstrumentation for Test, Virtual Instrumentation for Industrial I/O and Control, Virtual Instrumentation for Design, Virtual Instrumentation in the Engineering Process, Research and Development, Development Test and Validation, Manufacturing Test,Virtual Instruments beyond Personal Computer, Graphical Programming and Textual Programming.

TEXT BOOKS:

S. C. Mukhopadhyay, *Intelligent Sensing, Instrumentation and Measurements*, Springer, 2013.

R. Pallas-areny and J. G. Webster, *Sensors and Signal Conditioning*, 2nd Ed., John Wiley & Sons, 2001.

M. Bhuyan, *Intelligent Instrumentation: Principles and Applications*, CRC Press, 2011.

R. B. Northrop, *Introduction to Instrumentation and Measurements*, 3rd Ed., CRC Press, 2014.

J. Jerome, *Virtual Instrumentation using LabVIEW*, PHI Learning Private Limited, 2010.

REFERENCE BOOKS:

D.Placko, *Fundamentals of Instrumentation and Measurement*, ISTE Ltd., 2007.

M. J. Usher and D. A. Keating,*Sensors and Transducers: Characteristics, Applications, Instrumentation, Interfacing*, 2nd Ed., 1996.

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OPEN ELECTIVE-III

CSE340C ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM

B. Tech. Semester – VIII (Electrical Engg., EEE)

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 concepts of AI and problem solving
2. To analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search techniques to solve them
3. To represent knowledge and draw inferences
4. To explore learning techniques and existing expert systems

UNIT- I

Introduction: The AI problems; what is an AI technique; Characteristics of AI applications Problem Solving, Search and Control Strategies General Problem solving; Production systems; Control strategies: forward and backward chaining Exhaustive searches: Depth first Breadth first search.

UNIT- II

Heuristic Search Techniques: Hill climbing; Branch and Bound technique; Best first search and A* algorithm; AND/OR Graphs; Problem reduction and AO* algorithm; Constraint Satisfaction problems Game Playing Minmax search procedure; Alpha-Beta cutoffs; Additional Refinements

UNIT- III

Knowledge Representation & Reasoning:- Propositional logic, First order predicate logic, Inferencein FOPL, Skolemnisation; Resolution Principle and Unification; Forward & Backward chaining, Inference Mechanisms Horn's Clauses; Semantic Networks; Frame Systems and Value Inheritance; Conceptual Dependency

UNIT- IV

Learning Techniques: - Supervised and unsupervised learning, Decision trees, Statistical learning models, Reinforcement learning.

Expert Systems: Introduction to Expert Systems, Architecture of Expert Systems; Expert System Shells; Knowledge Acquisition; Case Studies: MYCIN, Learning, Rote Learning; Learning by Induction; Explanation based learning.

TEXT/REFERENCES BOOKS:

1. Elaine Rich and Kevin Knight: Artificial Intelligence- Tata McGraw Hill.
2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems- Prentice Hall of India.
3. Nils J.Nilsson: Principles of Artificial Intelligence- Narosa Publishing house.
4. Artificial Intelligence : A Modern Approach, Stuart Rusell, Peter Norvig, Pearson Education
5. Artificial Intelligence, Winston, Patrick, Henry, Pearson Education

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:

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MGT401C ENTREPRENEURSHIP

(OPEN ELECTIVE-III)

L	T	P	
3	0	0	**External Marks: 75**
			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:

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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.

PURAN
MURTI
CAMPUS

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:

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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.

EE484C PROJECT STAGE-II

B. Tech. Semester – VIII (Electrical Engg.)

L	T	P	Credits			
-	-	16	8	Class Work	:	25 Marks
				Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

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. Internal evaluation will be carried out four times in a semester.

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.

EE482C General Fitness for the Profession
B. Tech. Semester – VIII (Electrical Engg.)

L	T	P	Credits			
-	-	2	1	Class Work	:	100 Marks
				Examination	:	-
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

Evaluation of the General Fitness

The evaluation of the General Fitness will be made by the committee of examiners constituted as under:

1. Chairperson of the Department : Chairperson
2. Final Year Coordinator of the Department : Member
3. External Examiner : Appointed by the University

EE490C Internship

B. Tech. Semester – VIII (Electrical Engg.)

L	T	P	Credits			
-	-	28	20	Class Work	:	250 Marks
				Examination	:	250 Marks
				Total	:	500 Marks
				Duration of Examination	:	3 Hours

Guidelines for Internship

A student can opt for Internship (minimum 16 weeks) in 8th semester, in lieu of course work of 8th semester, in joint supervision of internal supervisor (allotted by the Department) and the supervisor/official of the organization under whom the candidate is associated for internship.A student can arrange the internship at his/her own and arranging internship for a student by the Department is never his/her right.

Pre-requisite conditions:

a) The student has got selected through on-campus/off-campus placement and the same employer is willing to take that student for the Internship.

b) The student has got offer of pursuing Internship from Government research organization/govt. sponsored projects IIT'S/IIIT'S/IIMs/CDAC.

c) The student has got offer of pursuing Internship from reputed private organization.

For pursuing Internship, student will require the prior approval of the Director/Principal of the institute or Chairperson of the University Department. While allowing Internship, the institute/department concerned must insure that the proposed Internship schedule does not disturb the academic calendar in force.The candidate should submit a synopsis of the proposed work to be done during Internship. This synopsis should be submitted to the Department before the start of the internship semester. The synopsis received will be examined/evaluated by the Departmental committee. The student will be allowed for internship only after approval of synopsis by the Departmental committee.

Intimation of commencement of internship shall be submitted to the Chairperson concerned before the commencement of the ongoing semester.

They will have to further deposit the 8th Semester fee. The internship will not be permitted through online mode

If a student feels that the internship work is not of high quality/not-related to their field of interest, then he/ she should submit the application to the Department within two weeks and can re-join the institute to carry out the course work of 8th Semester.

The internal supervisor will monitor the student specific progress of the internship. The overall monitoring of industrial training has to be done by a Departmental Faculty Co-coordinator for Internship.

The Departmental Faculty Co-coordinator will be allotted total weekly teaching load of 2 periods, while each internal supervisor will be allotted total weekly teaching load of 1 period (supervising upto 4 students), and 2 periods , if supervising more than 4 students.

Evaluation Process:

Each student will submit 3 copies of the detailed internship report to the Department in prescribed format at the conclusion of training.

Internal assessment/Sessional of Internship will be made jointly by the Departmental Faculty Co-coordinator for Internship, the concerned organization training supervisor/official and internal supervisor.

Assessment by the External supervisor/Mentor = 40% of Internal Assessment Marks
Assessment by the internal supervisor and Departmental Faculty Co-coordinator for Internship = 60% of Internal Assessment Marks

Practical Examination Assessment of Internship will be made by the committee consisting of the Chairperson of the Department, Departmental Faculty Co-coordinator for Internship and one external examiner appointed by the University.