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

Department of Electronics & Communication Engineering

SCHEME OF STUDIES & EXAMINATIONS

B.Tech. IVth YEAR (SEMESTER –VIII)

Choice Based Credit Scheme w.e.f. 2021-22

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1		Program Elective-6	3	0	0	25	75	-	100	3	3
2		Program Elective-7	3	0	0	25	75	-	100	3	3
3	ECE402C	Information Theory & Coding	3	0	0	25	75	-	100	3	3
4		Open Elective-III	3	0	0	25	75	-	100	3	3
5	ECE484C	Project Stage-II	0	0	16	25	-	75	100	8	-
6	GFECE490C	General Fitness for the Profession	-	-	-	-	-	100	100	-	-
Total			**12**	**0**	**16**	**125**	**300**	**175**	**600**	**20**	

Or

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	ECE488C	Internship	-	-	-	250	-	250	500	20	-
2	GFECE490C	General Fitness for the Profession	-	-	-	-	-	100	100	-	-
Total			**-**	**-**	**-**	**250**	**-**	**350**	**600**	**20**	

Note:

1. General Fitness For The Profession (GFECE490C) is a compulsory & qualifying course **(Audit Pass)** under which student will be evaluated for his performance in all types of activities like Academics, Cultural, Sports, NSS, organisation of camps, social activities etc., during his all 8 semesters, at the end of 8th semester. Regarding this course student will be motivated during the induction programme at the time of admission, so that he/she will be vigilant for motivation towards these activities. The evaluation of the student for his / her General Fitness for the Profession will be carried out 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
2. (i) Project coordinator and other assisting co-coordinators will be assigned the Project Stage-II **(ECE484C)** load of, maximum of 02 hrs. per week including their 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.
   (ii) * Project involving design, fabrication, testing, computer simulation, case studies etc., which has been commenced by students in semester-VII will be completed in semester –VIII **(*applicable for those students only who will not opt for internship in VIII Semester)**.
3. Students can opt for (minimum 16 weeks) Internship **(ECE488C)** in lieu of 8th Semester subjects for equivalent credits (20 credits), after fulfilling the conditions specified in **"Internship Guidelines".**
4. Students will be permitted to opt for any two elective courses from the list given below. The minimum strength of the students should be 20 to run an elective course.

S.No	Program Elective-6		Program Elective-7	
	Course No.	Course Title	Course No.	Course Title
1	ECE422C	Radar & Sonar Engineering	ECE430C	Reliability Engineering
2	ECE424C	Information Security	ECE432C	PLC & SCADA Systems
3	ECE426C	Telecommunication Switching Systems	ECE434C	CAD for VLSI
4	ECE428C	Digital Image Processing for Medical Applications	ECE436C	Multimedia Communication

5. Students will be permitted to opt for any one **Open Elective-III** course run by other department, from group of subjects given in table below. However, the department shall offer those elective for which they have expertise. The choice of the students for any elective shall not be binding for the department to offer, if the department does not have expertise. The minimum strength of the students should be 20 to run an elective course.

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	CSE340C	Artificial Intelligence & Expert Systems	3	0	0	25	75	-	100	3	3
2	EE452C	Electrical And Hybrid Vehicles	3	0	0	25	75	-	100	3	3
3	MGT401C	Entrepreneurship	3	0	0	25	75	-	100	3	3
4	ME452C	Fundamentals of Sustainable Manufacturing	3	0	0	25	75	-	100	3	3
5	CHE459C	Nano-Science And Nano-Technology	3	0	0	25	75	-	100	3	3
6	EE454C	Smart Grid	3	0	0	25	75	-	100	3	3

ECE402C Information Theory and Coding

B.Tech 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1 (9 Lectures)

Field Algebra: Basics of information theory, Information source , binary source, discrete & memoryless channel , channel capacity , source coding theory , Average information or entropy ,Mutual information, Field Algebra: binary operations, groups field, vector space, Galois field, Matrices.

Unit 2 (10 Lectures)

Block codes: Shannon fano coding, Huffman coding, arithmetic coding, run length coding, Block Codes: linear block code, convolution code, cyclic code, BCH code, Trellis code modulation, Syndrome, run length coding, generator & parity check matrices.

Unit 3 (12 Lectures)

Modulation & tradeoffs: Modulation and coding tradeoffs :Goals of communication system designer, error probability plane, Nyquist minimum bandwidth, Shannon Hartley capacity theorem, bandwidth efficiency plane, modulation and coding tradeoffs, designing and evaluating digital communication systems, bandwidth efficient modulation, modulation and coding for band limited channels, trellis coded modulation Performance of codes: Performance of linear block codes & convolution codes, Bounds on code performance, Bounds on error performance.

Unit 4 (12 Lectures)

Channel Coding & source coding: Waveform Coding, types of error control, structured sequences, error detecting and correcting capability, usefulness of standard array, interleaving and concatenated codes, coding and interleaving applied to the compact disc. Source Coding: Sources, amplitude quantizing, adaptive prediction, transform coding, source coding for digital data, examples of source coding.

Text/Reference Books:

1. N. Abramson, Information and Coding, McGraw Hill, 1963.
2. M. Mansurpur, Introduction to Information Theory, McGraw Hill, 1987.
3. Arijit Saha, Information Theory Coding & Cryptography, Pearson Education.
4. Shu Lin and D.J. Costello Jr., Error Control Coding, Pearson Education.
5. Bernard Skylark & Pabitra Kumar Ray, Digital communications Fundamentals and Applications, Pearson Education.
6. Ranjan Bose, information theory ,coding and cryptography third edition , Mc Graw Hill

Course Outcomes: After completing the course, student will be able to:

1. Understand the concept of information and entropy
2. Understand Shannon's theorem for coding
3. Calculation of channel capacity
4. Apply coding techniques

ECE422C Radar & Sonar Engineering

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1(10 Lectures)

Introduction To Radar: Radar Block Diagram & operation, Radar Frequencies, Radar development, Application of Radar. **Radar Equation:** Simple form of Radar Equation, Prediction of Range performance, Minimum detectable signal, Receiver noise, Signal to Noise ratio, Transmitter Power, Pulse repetition frequency & range ambiguities, System losses, Propagation effects.

Unit 2(12 Lectures)

CW & Frequency Modulated Radar: The Doppler Effect, CW Radar, Frequency-modulated CW Radar, Multiple Frequency CW Radar.

MTI & Pulse Doppler Radar: Introduction, Delay Line Cancellors, Multiple or staggered, Pulse repetition frequencies, range- Gated Doppler Filters, Digital Signal Processing, Other MTI delay line, Limitation of MTI performance, Noncoherent MTI, Pulse Doppler Radar, MTI from a moving platform.

Unit 3(10 Lectures)

Tracking Radar: Tracking with Radar, Sequential Lobbing, Conical Scan, Monopulse Tracking Radar, Tracking in range, Acquisition.

Receivers, Displays & Duplexers: Radar Receivers, Noise Figure, Mixer, Low-noise Front ends, Displays, Duplexer, Receiver protectors.

Unit 4(12 Lectures)

Introduction To Sonar: History of sonar,under water propagation:sound velocity profile, propagation mode, multipaths; Types of sonar system:active, generic active and passive.

Sonar Parameters: Basic Types of noise in sonar system,Detection of acoustic energy using sonar:detection criterion, sonarsystem performance, figure of merit; Sonar transducers.

Text Books:

1. Introduction to Radar Systems: Merrill I. Skolnik, ; MGH

Reference Books:

1. Electronic Communication Systems : Kennedy; TMH
2. Fundamental of DADAR, SONAR and Navigation Engineering:K.K. Sharma;Katson Books

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

1. Understand the basic concept of Radar Engineering and will be design mathematical model of RADAR for Global application such as automotive communication etc. in turn adds to concepts of smart surveillance.
2. Design modern RADAR such as FMCW,MTI RADAR, Pulse Doppler RADAR etc and will understand limitation,also improve the exciting design results in detection.
3. Understand tracking RADARS, RADAR Receivers and design its noise models.
4. Learn basic principal of Sonar system and apply detection & estimation theory on sonar problems .

ECE424C Information Security

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1 (10 Lectures)

Introduction to information systems: Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

Unit 2 (12 Lectures)

Application security: (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control.

Security Threats: Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Elementary Cryptography: Substitution Ciphers, Transpositions, The Data Encryption Standard, The AES Encryption Algorithms, Public Key Encryptions, Uses of Encryption.

Unit 3 (9 Lectures)

Data base Security: Security requirements, Reliability and integrity, Sensitive data, Inference, multilevel database, proposals formultilevel security.

Security in Network: Threats in Network, Network Security Controls, Firewalls, Intrusion Detection Systems, Secure E-Mail.

Unit 4 (10 Lectures)

Security Policies, Standards, Procedure and Guidelines: Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process-Corporate policies-Sample Security Policies, Publishing and Notification Requirement of the Policies.

Information Security Standards: ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law.

Text/Reference Books:

1. Mark Stamp: Information Security Principles ads Practices, 2nd edition, John Wiley & Sons, Inc., 2005.
2. V.K. Pachghare, Cryptography and information Security, PHI Learning Private Limited, Delhi India.
3. Chander, Harish, Cyber Laws And It Protection , PHI Learning Private Limited ,Delhi ,India.
4. Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla ,Introduction to Information Security and Cyber Law, Willey Dreamtech Press.
5. Charles P. Pfleeger, Shari Lawrence Pfleeger, Security in Computing, 3rd Edition. PHI.

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

1. Understand the importance of information security.
2. Understand the basic concept of cryptography and its applications.
3. Understand security requirements for data base security and network security.
4. Understand security policies standards and guidelines.

ECE426C Telecommunication Switching Systems

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1(12 Lectures)

Evolution Of Switching System: What is Switching, Types of Switching, Block Diagram of Telecommunication Network, Switching System Fundamentals, Classification of Switching System, Elements of a Switching System, Basic Function of Switching System, Basic Telephone Communication, Function of a Manual Switching System, Magneto or Local Battery Switchboard, Common Battery Switchboard, Limitations of Manual Switching System, Introduction to strowger switching system**.**

Crossbar Switching System: Introduction, Principle of Common Control, Touch Tone Dial Telephone, Crossbar Switch Mechanism, Principle of Crossbar Switching, Crossbar Switch Configurations, Organisation of a Crossbar Telephone Switch, A General Trunking, Electronic Switching, Classification Crosspoint Technology

Unit 2(12 Lectures)

Space Division Switching: Stored Program control, Centralised SPC, Distributed SPC, Software Architechture, Application software, Enhanced Services, Two Stage Networks, n-Stage Networks.

Time Division Switching: Introduction, Analog Time Division Switching, Digital Time Division Switching, A Digital Memory Switch, Time Stages in General, Two-Dimensional Switching, Multiple Stage Time and Space Switching

Unit 3(10 Lectures)

Packet Switching: Statistical Multiplexing, Local area & wide area networks, Large Scale Networks, Broadband Networks **Teletraffic Engineering:**Introduction, Network Traffic Load, CCITT Recommended Busy Hours, Traffic Terminology, The Unit of Traffic, Congestion, Grade of Service, Blocking Probability, Traffic Measurements, Modelling Switching System, Markov processes representing traffic. Calculation of blocking probability, stationary probability measures for Ergodic Markov processes. Combinatorial interpretation, calculation of blocking probability.

Unit 4(10 Lectures)

Control Of Switching Systems: Call Processing functions, common control, Reliability, Availability & Security. **Signalling:**Customer Line Signalling, Audio frequency junctions & trunk circuits, FDM carrier Systems, PCM signalling, Inter – register signalling, Common channnel Signalling Principles.

Text Books:

1. Thiagarajan Viswanathan, "Telecommunication Switching Systems and Networks", PHI
2. Syed Riffat Ali, "Digital switching Systems, system reliability and analysis", Tata MC Graw, 2002.
3. Flood, Telecommunication Switching, Traffic and Networks, Pearson Education.

Reference Books:

1. Keshav S, "An Engineering Approach to Computer Network Networking", Pearson Education.
2. Martin, "Telecommunication & Computer 3e", PHI

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

1. Describes the need for switching system and their solution from analogue to digital and describes the PSTN, Private Network and Integrated Network.
2. To compare telephone Network, date network, ISDN Network and analyze Transmitter and receiver circuit.
3. Compare and contest design issues advantages disadvantages and limitation of analog system and understand basic oftelecommunication networking and information technologies.
4. Continuously improve their technology knowledge and communication Skill.

ECE428C Digital Image Processing for Medical Applications

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1 (11 Lectures)

Introduction: Imaging systems, objects and images, the digital image processing system, applications of digital image processing.

Imaging Systems: The human visual pathway: brightness response and spatial resolution of the eye; Photographic film: response of film to light, spatial resolution of film; other sensors, Digitizing an image: spatial quantization, intensity quantization, Quality of a digital image: pixel size, spatial and brightness resolution, noise content; color images.

Unit 2 (11 Lectures)

Medical images obtained with ionizing radiation: medical imaging modalities, images from x-rays: Plain and Computed radiography, mammography, Fluroscopy and digital subtraction angiography, computed tomography,

images from γ-rays: Planer scintigraphy, SPECT imaging, PET imaging, Dose and risk.

Unit 3 (12 Lectures)

Medical images obtained with non-ionizing radiation: Ultrasound imaging: image Quality, Doppler imaging, clinical applications of ultrasound; Magnetic resonance imaging: nuclear magnetic resonance, MRI and pulse sequencing, picture archiving and communication systems: multimodal registration.

Unit 4 (12 Lectures)

Grey level histogram: Dynamic range and contrast, Entropy, signal to noise ratio, other histogram features; Histogram transformation and look up tables: Histogram stretch, histogram equalization, Histogram matching, local histogram transformations, other histogram transformations

Spatial domain image enhancement: image averaging, image subtraction, multiplication and division, logical operations.

Text/Reference Books:

1. G. Dougherty, " Digital Image Processing for medical applications", Cambridge University Press.
2. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 3rd Edition, Pearson Education, 2016.
3. M. K. Pakhira, "Digital Image Processing and Pattern Recognition", PHI.
4. Anil K Jain, "Fundamentals of Digital Image Processing", Pearson Education, 2015.
5. Keenneth R Castleman, " Digital Image Processing", Pearson Education.

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

1. Understand imaging and its applications in medical. How human visual system capture and analyse the images.
2. Understand the acquisition of medical images using ionized radiation, like x-rays and γ-rays.
3. Understand medical images using non ionized radiation like ultrasound and MRI, and their applications.
4. Interpret and enhance images by histogram processing and other spatial domain techniques.

ECE430C Reliability Engineering

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1(12 Lectures)

Introduction: Definition for Reliability, Need for reliability engineering, Causes of failures, catastrophic failures and degradation failures. Characteristic types of failures, useful life of components, Exponential case of chance failures, Reliability measures, Derivation for exponential distribution function, other kinds pf distributions, Binomial, Poisson uniform, Rayleigh, Weibull, Gamma distributions, Markov chains, failures data analysis.

Reliability in Systems: Reliability Block Diagrams, series systems, parallel systems, K-out of -M systems, Open and short circuit failures, standby systems. Reliability Analysis of Non-series Parallel system, Boolean Algebra Method, Cut-set approach, delta star method, logical signal relation method, Bayes Theorem Method

Unit 2(10 Lectures)

Reliability Prediction: Objective of reliability Prediction, Classification, information sources for failure rate data, prediction methodologies, general requirement, role and limitations of reliability prediction

Reliability Allocation: Subsystems reliability improvement, Apportionment for new units, criticality.

Unit 3(10 Lectures)

Redundancy Techniques for reliability: Forms of maintenance, measures of maintainability and availability, maintainability function, availability function, two unit parallel system with repair, Markov model for two unit systems, preventive maintenance, provisioning of spares.

Reliability Testing: Kinds of testing, component reliability measurements parametric methods, confidence limits, accelerate testing, equipment acceptance testing.

Unit 4(10 Lectures)

Economics of Reliability Engineering: Reliability cost, effect of reliability on cost. Reliability achievement cost models, reliability utility cost models, replacement policies.

Integrated performance measures for communication systems: Integration of reliability and capacity, Delay related reliability.

Text Books:

1. K.K Aggarwal, “Reliability Engineering”, Kluwer Academic Netherlands.

2. B Singh, "Quality Control and Reliability Analysis", Khanna Publishers.
3. Singiresu S. Rao, Reliability Engineering, Pearson Education, 2016.

Reference Books:

1. KB Mishra " Reliability Prediction & Analysis: A Methodology oriented treatment" ,Elseveir,Netherlands.
2. Ebeling, "Introduction to Reliability & Maintainability", TMH

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

1. Apply the reliability concepts to the real time systems at their job place.
2. Improve the existing designs by using various reliability models so as to improve the efficiency and comfort while working.
3. Understand the concept & importance of preventive maintenance as compared to corrective maintenance which furtherimproves the life of machines/systems.
4. Reduce the cost of a particular system which will reduce the financial liability on individual's pocket.

ECE332C PLC & SCADA Systems

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1 (10 Lectures)

Programmable Logic Controller (PLC) Basics: Introduction, Parts of PLC, Principles of operation, PLC size and applications, PLC advantages and disadvantages, PLC manufacturers, PLC hardware components, I/O section, Analog I/O modules, Digital I/O modules, CPU-Processor memory module, Programming devices, Devices which can be connected to I/O modules, Relay, Contactor, SPST, Push Buttons, NO/NC Concept.

Unit 2 (11 Lectures)

Programming of PLC: General PLC Programming Procedures, Contacts and Coils, Programming Languages, Ladder Programming, Relay Instructions, Instruction Addressing, Concept of Latching, Branch Instructions, Contact and Coil I/O Programming Examples, Relation of Digital Gate Logic to Contact/Coil Logic.

Unit 3 (12 Lectures)

PLC Functions: Timer Instructions: ON DEAY Timer and OFF DELAY timer, Counter Instructions: UP/DOWN Counters, Timer and Counter Applications, Program Control Instructions: Master Control Reset, Jump and Subroutine, Math Instructions: ADD, SUB. Data Handling: Data Move, Data Compare, Data Selection.

Unit 4 (9 Lectures)

SCADA: Introduction of SCADA, Need of SCADA, advantages and disadvantages of SCADA, Elements of SCADA System, Real Time Systems, Remote Control, SCADA communications, Brief introduction to RTU and MTU, Sensors, actuators and wirings, Applications of SCADA in Smart Grid.

Text Books:

1. Frank D. Petruzella: Programmable Logic Controllers, McGraw-Hill Book Company.
2. Stuart A. Boyer : Supervisors Control and Data Acquisition, 3rd Edition, ISA
3. John W. Webb and Ronald A. Reis: Programmable Logic Controllers: Principles and Applications, 5th Edition Pearson.

Reference Books:

1. William I. Fletcher: An Engineering Approach to Digital Design, Pearson.

2. Colin D. Simpson: Programmable Logic Controllers, Pearson
3. Gray Dunning : Introduction to Programmable Logic Controllers, Delmar Thompson Learning
4. John Stenerson : Fundamentals Logic Controllers Sensors, & Communications, Englewood Cliffs, NJ, 1993. Prentice Hall.
5. W.Bolton: Programmable Logic Controllers, 5th Edition, Elsevier

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

1. Understand basics of PLC.
2. Understand basic programming concepts related to PLC.
3. Perform basic PLC functions.
4. Understand SCADA system and its various application areas.

ECE434C CAD for VLSI

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1 (12 Lectures)

Introduction to VLSI Design Methodologies:The Design Domains, Design Methods and Technologies.VLSI Design Automation tools. Algorithmic Graph Theory and Computational Complexity: Data structures, Graph algorithms. Tractable and Intractable problems. General purpose methods for combinatorial optimization.

Unit 2 (11 Lectures)

Design Rules: Layout Compaction: Design rules, Problem formulation, Algorithms for constraint graph Compaction. Placement and partitioning: Circuit representation, Wire-length estimation, Types of placement problems, Placement algorithms, Classification of partitioning algorithm, Performance driven partitioning.

Unit 3 (11 Lectures)

Floor planning and Routing concept: Floor plan representation and optimization problems in floor planning, Shape functions and Floorplan sizing. Classification of Floor planning algorithms, Advancement s in Floor planning. Routing: Types of local routing problems, Area routing, Channel routing, Introduction to Global routing, Algorithms for global routing.

Unit 4 (11 Lectures)

Simulation: Type of simulations, Gate-level modeling and simulation, Switch-level modeling and simulation. Logic Synthesis and Verification: Introduction to combinational logic synthesis, Binary Decision Diagrams, Two Level Logic Synthesis. High- level synthesis: Hardware Models

Text/Reference Books:

1. S.H. Gerez, "Algorithms for VLSI Design Automation", John Wiley & Sons.
2. N.A. Sherwani, "Algorithms for VLSI Physical Design Automation", Kluwer Academic Publishers.
3. Sadiq M. Sait, Habib Youssef, “VLSI Physical Design automation: Theory and Practice”, World scientific press.
4. Stephen M. Trimberger, “An Introduction to CAD for VLSI” Kluwer Academic Publishers.

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

1. Understand various physical design methods in VLSI and use graph theory approach to VLSI problems.
2. Understand the concepts behind the VLSI design rules for Layout compaction and placement problems.
3. Apply the concepts of various algorithms used for floor planning and routing.
4. Perform the simulation at various levels in VLSI design flow.

ECE436C Multimedia Communication

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1 (11 Lectures)

Introduction and meaning of multimedia, Medium and its classification, Properties of a Multimedia System, Asynchronous, Synchronous, Isochronous Transmission mode, Data Stream Characteristics for Continuous media.

Basic Sound Concepts: Computer Representation of Sound, Audio Formats, Music: MIDI Basic concepts, devices, messages, MIDI and SMPTE Timing Standards, MIDI Software.

Unit 2 (11 Lectures)

Speech: Generation, Analysis and Transmission.

Images and Graphics: Digital Image Representation, Image Format; Computer Image Processing: Image Synthesis, Image Analysis, and Image Transmission.

Unit 3 (13 Lectures)

Video: Video Signal Representation, vertical Detail and Viewing Distance, Horizontal Detail and Picture Width, Flicker, Temporal Aspect of Video Bandwidth, Bandwidth of NTSC system, Color Encoding Approaches, Digitalization; Computer Video Format, Television-Conventional Systems, Enhanced Definition Systems, High Definition Systems, Composite Coding, Component Coding; Transmission.

Computer Based Animation:Basic Concepts, Animation Languages, Methods of Controlling Animation, Display of Animation, Transmission of Animation.

Unit 4 (13 Lectures)

Data Compression: Storage Space, Coding Requirements; Source, Entropy, and Hybrid Coding; Basic Compression Techniques; JPEG-Image Preparation, Lossy Sequential DCT-based Mode, Expanded Lossy DCT-based Mode, Lossless Mode, Hierarchical Mode.

H.261-Image Preparation, Coding Algorithms, Data Stream; MPEG-Video Encoding, Audio Encoding, Data Stream.

Text Books:

1. Ralf Steinmetz, Klara Nahstedt, "Multimedia: Computing, Communications, & Applications", Pearson.
2. Fred Halsall, "Multimedia Communications: Applications, Networks, Protocols and Standards", Pearson.

Reference Books:

1. Rao, Bojkovic & Milovanovic, "Multimedia Comm. System: Techniology , Std. & Network", PHI
2. John F. Koegel Bufod, "Multimedia Systems", Addison Wesley, Edition. 2000

Course Outcomes: After completing this course the students will have the ability to:

1. Understand different types of media and their representation in applications. Analyze and interpret synthetic sound and itsuse.
2. Generate, represent, analyze and transmit speech and audio.
3. Practically resolve the representation and transmission issues with digital videos for different applications with desiredquality.
4. Compress the data of different medias using suitable techniques as per requirement of application.

ECE484C Project Stage-II

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

L	T	P	Credits
0	0	16	8

Class Work	: 25
Examination	: 75
Total	: 100
Duration of Exam	: 3 Hours

The project started in VII Semester will be completed in VIII Semester **(*applicable for those students only who will not opt for internship in VIII Semester)** and will be evaluated through a panel of examiners consisting of the following:

Head/ Chairperson of Department : Chairperson
Project coordinator : Member
External examiner : To be appointed by the University

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. courses will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

Course Outcomes: After completing this course, the student will have:

1. Practical exposure of Industrial Projects Skill
2. Learn various aspects of software and hardware handling of industrial work.
3. Attitude more professionally inclined.
4. Better understanding about time management.

GFECE490C General Fitness for the Profession

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

L	T	P	Credits		
0	0	0	-	Examination	: 100
				Total	: 100
				Duration of Exam	: -

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.

G.P. (General Fitness For The Profession) is a compulsory & qualifying course **(Audit Pass)** under which student will be evaluated for his performance in all types of activities like Academics, Cultural, Sports, NSS, organisation of camps, social activities etc., during his all 8 semesters, at the end of 8th semester. Regarding this course student will be motivated during the induction programme at the time of admission, so that he/she will be vigilant for motivation towards these activities.The evaluation of the student for his / her General Fitness for the Profession will be carried out 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

CSE340C Artificial Intelligence & Expert Systems

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1(10 Lectures)

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 2(10 Lectures)

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 3(12 Lectures)

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

Unit 4 (12 Lectures)

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 Books/Reference 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.

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

1. Analyze and formalize problem and solve them using AI techniques
2. Use Heuristic search techniques for game playing and other problems
3. Represent diverse knowledge using AI and analyze
4. Understand and design an expert system

EE452C Electrical and Hybrid Vehicles

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1(10 Lectures)

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 2(10 Lectures)

Electric Propulsion: major requirements of EV motor drive, characteristics and control ofDC 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 3(12 Lectures)

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 4(12 Lectures)

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/ Reference Books:

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.

Course Outcomes: At the end of the 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.

MGT401C Entrepreneurship

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1 (9 Lectures)

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 2 (10 Lectures)

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 3 (10 Lectures)

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 4 (9 Lectures)

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.

Text Books:

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

Reference Books:

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.

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

1. Understand the concept of entrepreneurship, traits required to become an entrepreneur.
2. Design and formulate the basic principles of business plans, they can choose and present their business plan.
3. Know about the different types of entrepreneurs.
4. Understand the role of MSME in the development of Small Scale industries.

ME452C Fundamentals Of Sustainable Manufacturing

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

L	T	P	Credits
3	0	0	3

Class Work	: 25
Examination	: 75
Total	: 100
Duration of Exam	: 3 Hours

Unit 1 (9 Lectures)

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 2 (10 Lectures)

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 3 (10 Lectures)

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 4 (9 Lectures)

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.

Text Books:

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.
2. S. Asefa, The Economics of Sustainable Development, W.E. Upjohn Institute for Employment Research, 2005.

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

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

CHE459C Nano-Science And Nano-Technology

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1 (9 Lectures)

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 2 (10 Lectures)

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 3 (10 Lectures)

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

Unit 4 (9 Lectures)

Synthesis of Nanomaterials – ZnO and Fe3O4. 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 PublishingCompany 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.

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

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

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

Unit 1(10 Lectures)

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 2(10 Lectures)

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 3(12 Lectures)

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 4(12 Lectures)

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.

Course Outcomes: At the end of the 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.

ECE488C Internship

B.Tech. 4th YEAR (SEMESTER –VIII)

Electronics & Communication Engineering

L	T	P	Credits
0	0	0	20

Class Work	: 250
Examination	: 250
Total	: 500
Duration of Exam	: -

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 studentfor 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.