Programme- M.Tech.

Electronics & Communication Engineering

Scheme and Syllabi

w.e.f. Academic Session 2020-21

BUEST

SCHOOL OF ENGINEERING & EMERGING TECHNOLOGIES

BADDI UNIVERSITY OF EMERGING SCIENCES &TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MASTER OF TECHNOLOGY (ECE)

(Four Semesters / Full time)

SCHEME & SYLLABI

SEMESTER-I

Sr. No.	Course No.	Course Title	L	T	P	Cr.
1.	PEC-101	Data Communication Networks	4	0	0	4
2.	PEC-102	Embedded System Design	4	0	0	4
3.	PEC-103	Advanced Digital System Design	4	0	0	4
4.	PEC-104	Information Theory and Coding	4	0	0	4
5.	PEC-105	Embedded System Design Lab	0	0	2	1
6.	PEC-106	Project-I	0	0	6	3
					Total Credits	**20**

SEMESTER-II

Sr. No.	Course No.	Course Title	L	T	P	Cr.
1.	PEC-201	Neural Networks & Fuzzy Logic Based System Design	4	0	0	4
2.	PEC-202	VLSI Design	4	0	0	4
3.	PEC-203	Biomedical Electronics	4	0	0	4
4.	PMG-151	Research Methodology	4	0	0	4
5.	PEC-204	VLSI Design Lab	0	0	2	1
6.	PEC-205	Project-II	0	0	6	3
					Total Credits	**20**

SEMESTER-III

Sr. No.	Course No.	Course Title	L	T	P	Cr.
1.	PEC-301	Advanced Wireless Communication System	4	0	0	4
2.	PEC-302	Optical Networks	4	0	0	4
3	PEC-303	Digital Image Processing	4	0	0	4
4.	PEC-304	Wireless Technologies Lab	0	0	2	1
5.	PEC-305	Seminar	0	0	0	6

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

6.	PEC-306	Pre-Thesis	0	0	6	3
					Total Credits	**22**

SEMESTER-IV

Sr. No.	Course No.	Course Title	L	T	P	Cr.
1.	PXX-XXX	Elective	4	0	0	4
2	PEC-401	Dissertation/ Thesis	0	0	0	20
3	----------	Short Term Course	-	-	-	-
					Total Credits	**24**

List of Electives

ELECTIVE-I

Sr. No.	Course No.	Course Title	L	T	P	Cr.
1.	PEC-402	Microelectronics Technology	4	0	0	4
2.	PEC-403	Modeling & Simulation of Communication Systems	4	0	0	4
3.	PEC-404	Telecommunication Switching Systems and Networks	4	0	0	4
4.	PEC-405	Software Defined Radio	4	0	0	4
5.	PEC-406	Microwave and Antenna Theory	4	0	0	4
6.	PEC-407	Reliability of Electronics & Communication Systems	4	0	0	4
7	PEC-408	Adaptive Signal Processing	4	0	0	4
8.	PEC-409	Nano –Technology	4	0	0	4
9.	PEC-410	Parallel Processing	4	0	0	4
10.	PEC-411	Remote Sensing	4	0	0	4
11.	PEC-412	Multimedia Systems	4	0	0	4
12.	PMG-217	Total Quality management	4	0	0	4

Total Credits= 86

Total Number of Theory Courses = 12

Total Number of Practical Courses = 06

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

SEMESTER 1

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Data Communication Networks

Course Code :- PEC-101

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Introduction to Data Communication
Overview of Data Communication and networking, Analog and Digital Data Transmission, line coding, Transmission modes, Types of Transmission Media, Transmission Impairments. Asynchronous and Synchronous Transmission, Error Detection and correction techniques. FDM, WDM, Synchronous TDM, Statistical TDM, Comparison of all multiplexing techniques

Unit-2 Switching and Computer Networks
Communication Networks, Circuit Switching, Message Switching, Packet Switching, X.25, Virtual circuits and Data gram's, LAN/MAN/WAN Technologies, Medium Access control protocols (CSMA/CD, Token ring, FDDI, DQDB).

Unit-3 Computer Communication Architecture
IPv4 addresses, Structure and address space, IPv6 addresses, IPv4 to IPv6, User datagram protocol, Simple Network Management Protocol (SNMP).

Unit-4 Network security
Security Services, Message confidentiality, Message integrity, digital signature, entity authentication, passwords and challenge-response, key management with symmetric-key distribution and Public-key distribution, security Technologies.

Text Books:

1. Data and Computer Communication, William Stallings, Prentice Hall
2. Computer Networking, Andrew Tanenbaum, Prentice Hall
3. Data communications and networking, Forouzan, Tata McGraw-Hill

Reference Books:

1. Computer networks and internets, Douglas E. Comer, Pearson Education
2. Engineering Approach to Computer Networking, Srinivasan Keshav, Pearson Education
3. Related IEEE/IEE Publications

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Embedded System Design

Course Code :- PEC-102

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Introduction to Embedded system
Embedded Computing: Introduction, Complex Systems and Microprocessor,The Embedded System Design Process, Formalisms for System Design, Design Examples.

Unit-2 The 8051 Architecture

The 8051 Architecture: Introduction, 8051 Micocontroller Hadware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

Unit-3 Programming techniques

Basic Assembly Language and Embedded C Programming Concepts: The Assembly Language and Embedded C Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions.

Unit-4 Programming techniques using interrupts
Arithmetic Operations, Decimal Arithmetic, Jump and Call Instructions, details on Interrupts.

Unit-5 Applications
Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication.

Unit-6 Introduction to Real Time system
Introduction to Real – Time Operating Systems: Basic Design Using a Real-Time Operating System

Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

Unit-7 Introduction to Advanced Architectures
Introduction to advanced architectures: ARM, PIC etc .Detail study of PIC Microcontroller, Input/Output Ports , External Memory, Counter and Timers, Serial data Input/Output, Interrupts,

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Processor and memory organization and Instruction level parallelism; Networked embedded systems: Internet-Enabled Systems.

Unit-8 Applications

Applications: Interfacing with Stepper motor, D/A and A/D Conversions, Interrupts, Serial Data Communication etc, I2C protocol, Design Example-Elevator Controller.

Text Books:

1. Computers and Components, Wayne Wolf, Elseveir
2. The 8051 Microcontroller, Kenneth J. Ayala, Thomson
3. The 8051 Microcontroller and Embedded System using assembly & C, Muhammad Ali Mazidi,, Pearson Education
4. The PIC Microcontroller & Embedded System using assembly & C.,Muhammad Ali Mazidi Pearson Education
5. An Embedded Software Primer, David E. Simon, Pearson Education

Reference Books:

1. Embedding system building blocks, Labrosse, CMP publishers
2. Embedded Systems, Raj Kamal, Tata McGraw Hill
3. Micro Controllers, Ajay V. Deshmukhi, Tata McGraw Hill
4. Embedded System Design, Frank Vahid, John W
5. Microcontrollers, Raj Kamal, Pearson Education

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Embedded System Design Lab

Course Code :- PEC-105

Evaluation Components for Practical Courses (Students are required to perform at least 8 practical mandatorily from the given list of practical)	
Lab Performance	10
Lab file work	10
Viva – Voce	10
Total	**30**

L T P Cr
0 0 2 1

LIST OF EXPERIMENTS: -

1. Data Transmission using 8051 microcontroller in different modes.
2. Look up tables for 8051.
3. Timing subroutines for 8051- Real time times and Applications.
4. Keyboard interface to 8051.
5. ADC, DAC interface to 8051.
6. LCD interface to 8051.
7. Stepper motor interface to PIC microcontroller.
8. Drivers writing for internal devices available on PIC.
9. Case Studies- Any one

   (a) Design of RTOS Kernel.
   (b) Cross Compiler/ Assembler.
   (c) Vx Works.

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Digital System Design

Course Code :- PEC-103

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1. Review of Digital electronics concept

Unit-2. MSI and LSI Circuits and Their Applications
Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR And ANDOR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay.

Unit-3. Sequential Machines
The Concept Of Memory, The Binary Cell, The Cell And The Bouncing Switch, Set / Reset, D, Clocked T, Clocked JK Flip Flop, Design Of Clock F/F, Conversion, Clocking Aspects, Clock Skew, State Diagram Synchronous Analysis Process, Design Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Out Put Decoders, Counters, Shift Registers and Memory.

Unit-4. Multi Input System Controller Design
System Controllers, Design Phases And System Documentation, Defining The System, Timing And Frequency Considerations, Functional, Position And Detailed Flow Diagram Development, MDS Diagram, Generation, Synchronizing Two System And Choosing Controller, Architecture, State Assignment, Next State Decoders And Its Maps, Output Decoders, Clock And Power Supply Requirements, MSI Decoders, Multiplexers In System Controllers, Indirect Addressed Multiplexers Configurations, Programmable System Controllers, ROM, PLA And PAL Based Design.

Unit-5. Asynchronous Finite State Machines
Scope, Asynchronous Analysis, Design Of Asynchronous Machines, Cycle And Races, Plotting And Reading The Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEV Approaches To Asynchronous Design, Hazards In Circuit Developed By MEV Method, Electromagnetic Interference And Electromagnetic Compatibility Grounding And Shielding of Digital Circuits. Interfacing digital system with different media like fiber cable, co-axial cable etc.

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Text Books:

1. An Engineering Approach to Digital Design, Fletcher, PHI

Reference Books:

1. Designing with TTL Circuits, Texas Instruments, Texas Instruments
2. Related IEEE/IEE publications

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Information Theory and Coding

Course Code :- PEC-104

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Introduction to Information Theory
Information sources, Information content of symbol & discrete memoryless source (DMS), Source coding theorem, Huffman coding, Channel coding theorem, channel capacity theorem, Shenon fano theorem, entropy.

Unit-2 Sampling Process
Sampling of band pass signal and band limited signal, sampling Theorem and reconstruction from samples (Interpolation formula), Different sampling techniques, Practical aspects of sampling.

Unit-3 Waveform Coding Techniques
Quantization, PCM Channel noise and error probability, effect of noise on PCM system, DPCM and DM Coding speech at low bit rates Prediction and adaptive filters. Base band shaping for data transmission, PAM signals and their power spectra, Nyquist criterion, ISI and eye pattern Equalization.

Unit-4 Digital Modulation Techniques
ASK, FSK & PSK, QPSK & MSK, Binary and M-ary modulation techniques, Coherent and non-coherent modulation techniques, Bit Vs symbol error probability and bandwidth efficiency. Bit error analysis, using orthogonal Signaling, Comparison of all digital Modulation Techniques.

Unit-5 Error Control Coding
Parity coding, vertical redundancy check(VRC), Linear block codes, Hamming codes, error detection and correction capabilities of Hamming codes, Syndrome decoder for(n,k) Block code, cyclic codes and convolution codes, Viterbi decoding algorithm and trellis codes.

Text & Reference Books:

1. Principles of Digital communication, J. Dass., S.K. Malik & P.K. Chatterjee, Wiley
2. Introduction to the theory of Error correcting codes, Vera Pless Wiley
3. Information Theory and Reliable Communication, Robert G. Gallanger, McGraw Hill

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

SEMESTER 2

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Neural Network & Fuzzy Logic Based system Design

Course Code :- PEC-201

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1
Neural networks characteristics, History of development in neural networks principles, Artificial neural net terminology, Model of a neuron, Topology, Learning, types of learning, Supervised, Unsupervised, Re-inforcement learning. Knowledge Representation and Acquisition.

Unit-2
Basic Hop field model, Basic learning laws, Unsupervised learning, Competitive learning, K-means clustering algorithm, Kohonen`s feature maps.

Unit-3
Radial basis function neural networks, Basic learning laws in RBF nets, Recurrent back propagation, Introduction to counter propagation networks, CMAC network, and ART networks.

Unit-4
Applications of neural nets such as pattern recognition, speech and decision-making. VLSI implementation of neural networks.

Unit-5
Fuzzy Logic: Basic concepts of fuzzy logic, Fuzzy vs. Crisp set, Linguistic variables, Membership functions, Operations of fuzzy sets, Fuzzy IF-THEN rules, Variable inference techniques, De-Fuzzification, Basic fuzzy inference algorithm, Fuzzy system design, FKBC & PID control, Antilock Breaking system (ABS), Various Industrial applications.

Text Books:

1. Neural Networks, Simon Haykin, Prentice Hall
2. Fuzzy logic with engineering application, ROSS J.T, TMH
3. Neural Computing Theory & Practice, P.D. wasserman, ANZA PUB

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Reference Books:

1. Introduction to applied Fuzzy Electronics, Ahmad M. Ibrahim, Phi.
2. An introduction to Fuzzy control,D. Driankor, H. Hellendorn, Narosa Pub.
3. Fuzzy Neural Control, Junhong Nie & Derek Liners, Phi
4. Related IEEE/IEE Publications

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- VLSI Design

Course Code :- PEC-202

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Overview
Overview of combinational and sequential circuits, timing analysis of combinational and sequential circuits, meta-stability, methods to eliminate meta-stability single synchronizer and double synchronizer, MTBF Clocking strategies.

Unit-2 Sequential Machine Design
State diagram, state minimization, state assignments, design of Mealy and Moore machines,

Unit-3 Programmable logic Devices
Basic concepts, programmable logic array (PLA), Programmable Array Logic (PAL), Structure of standard PLD's Complex (PLD's), Complex PLD's (CPLD), Xilinx Spartan 3 & Vertex 3. Introduction to field programmable gate arrays-types of FPGA's, Configurable logic Block (CLB) Input/ Output Block (IOB). Introduction to Xilinx series. FPGA, XC4000 family, Implementation of Design in PLD's.

Unit-4 VHDL
Need for HDL's, Design flow, overview of VHDL, data types, Logic Operators, Data flow Modeling, Structural Modeling, Behavioral Modeling, Mixed Modeling, Modeling of combinational and sequential circuits.

Unit-5 Verilog
Verilog as HDL, HDL model abstraction-behavioral, RTL, structural, switch model, verification, Modeling of combinational logic, sequential logic, tasks and functions, Advanced Modeling concepts, User defined primitives.

Practice Task:
Design & Simulation of combinational and sequential circuits using:
1. Front End VLSI tools like Xilinx ISE, ISE simulator or Modelsim simulator.
2. Back End VLSI Tools like Microwind, Mentor Graphics, Synopsis, Cadence.

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Text Books:

1. Fundamentals of Digital Design, H. Roth, Jr., Jaico, Jaico Publishing
2. Digital Design Principle & Practice, John. F. Wakerly, PHI

Reference Books:

1. Verilog HDL: Digital Design & Synthesis, Samir Palnitker, PHI
2. VHDL Analysis & Modeling of Digital Systems,Z Navabi,TMH

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- VLSI Design Lab

Course Code :- PEC-204

Evaluation Components for Practical Courses (Students are required to perform at least 8 practical mandatorily from the given list of practical)	
Lab Performance	10
Lab file work	10
Viva – Voce	10
Total	**30**

L T P Cr
0 0 2 1

LIST OF EXPERIMENTS: -

1. Write Verilog programs for the following circuits, check the waveforms and the hardware generated
   (a) Multiplexer.
   (b) Demultiplexer.
2. Write Verilog programs for the following circuits, check the waveforms and the hardware generated
   (a) Decoder.
   (b) Encoder.
3. Write a VHDL program for a 2x2 unsigned multiplier and check the waveforms and the hardware generated
4. Write a VHDL program for an 8bit-ALU and check the waveforms and the hardware generated
5. Write a VHDL program for a 8-bit RAM and check the waveforms and the hardware generated
6. Write a Verilog programs for a comparator and check the waveforms and the hardware generated
7. Write a Verilog programs for a flip-flop and check the waveforms and the hardware generated.
8. Write a Verilog programs for a counter and check the waveforms and the hardware generated.
9. Write a Verilog programs for a code converter and check the waveforms and the hardware generated.
10. Write a Verilog programs for a following circuits and check the waveforms and the hardware generated.
    (a) Register
    (b) Shift register
11. Implement any three (given above) on FPGA/CPLD kit.

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- BIOMEDICAL ELECTRONICS

Course Code: - UEC-403

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1

BIOELECTRIC SIGNALS:- Origin of Biomedical signals. Sources of origin of various biomedical signals.

TRANSDUCERS AND BIOSENSORS: - Transducer definition, Classification of transducers. Study of various types of Temperature, pressure and displacement transducers (LVDT, STRAIN GAUGE etc.).

Sensors for measurement of various body parameters. Chemical Biosensors. Concept of lab-on-chip.

PATIENT SAFETY: - Electric shock Hazards, Leakage currents, Safety Codes for Electro medical equipment.

Unit-2

RECORDING SYSTEM:- Basic recording system, sources of noise in low level recording circuits, pre amplifiers, drivers, **various types of recorders**-Inkjet, Potentiometer, UV, thermal array, electrostatic, light gate array.

BIOMEDICAL RECORDS:- Electrocardiograph, phonocardiograph, Electroencephalograph, Electromyograph, Vector cardiograph.

Unit-3

MEDICAL DISPLAY SYSTEM: - Oscilloscopes, cardio scope, multichannel Display, Non-fade display system.

BIOMEDICAL SIGNAL AND IMAGE PROCESSING.: - Introduction to Basic Principle & Block Diagram of X-ray Machine, Computer Tomography and Nuclear Magnetic Resonance (NMR) Tomography, Ultrasonic Imaging Systems, Ultrasound, Fetal Monitoring System. Fundamentals of digital image processing. Storage and display operation properties of digital image. Image preprocessing by statistical and probabilistic methods.

Image enhancement and restoration. Segmentation of images by applying Thresh hold, Edge based and Region based techniques. Image feature extraction, analysis of medical images.

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Unit-4

CARDIAC PACEMAKERS: - External Pacemaker, implantable & Programmable pacemakers, power sources for implantable pacemakers, Leads and electrodes.
CARDIAC DEFIBRILLATOR: - DC Defibrillators, Implantable defibrillators.
BIOMEDICAL TELEMETRY: - Wireless telemetry system, Single Channel telemetry, multichannel wireless telemetry, **Telemedicine.**
PATIENT MONITORING SYSTEM:-Cardiac Monitor, Patient monitoring systems, Central monitors, Measurement of Heart rate, Measurement of Pulse rate

Text Books

1. Hand Book of Biomedical instrumentation: R.S. Khandpur**:** TMH
2. Biomedical Electronics**:** Cromwell: PHI
3. D.L. Wise,Applied Biosensors, Butterworth Publishers, Boston, 1989.

Reference Books:

1. Biomedical Instruments Theory and design**:** Walter Welko Witiz **:** Academic Press
2. R S C Cobbold, Transducers for Biomedical Instruments, Prentice Hall

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Research Methodology

Course Code :- PMG-151

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Research Concepts
Concepts, meaning, objectives, motivation, types of research, approaches, research (Descriptive research, Conceptual, Theoretical, and Applied & Experimental). Formulation of Research Task – Literature Review, Importance & Methods, Sources, quantification of Cause Effect Relations, Discussions, Field Study, Critical Analysis of Generated Facts, Selection of Research task.

Unit-2 Statistical Methods of Analysis
Descriptive statistics: Meaning, graphical representations, mean, range and standard deviation, characteristics and uses of normal curve.
Inferential statistics: Parametric tests of Hypothesis, t-test, z-test, Chi-square tests, correlation & Regression, ANOVA (one way, two way), Latin Squares.

Unit-3 Design of experiment
Definition of Experimental Design, Examples, Design using Orthogonal arrays, Taguchi's robust parameter design.

Unit-4 Report Writing
Types of reports, layout of research report, interpretation of results, style manual, layout and format, style of writing, typing, references, tables, figures, conclusion, appendices.

Text Books:
1. Research Methodology, C. R. Kothari, New Age Publishers
2. Statistical Method for Management, Richard I. Levin and David S. Rubin, Pearson Education
3. Probability and Statistics, R. H. Myers and S.L. Myers, Pearson Education
4. Formulation of Hypothesis, K. L, Bandera P. L, Himalaya Publication

Reference Books:
1. Theories of Engineering Experiments, Schank Fr.,Tata Mc Graw Hill
2. Design of Experiments, Douglas Montgomary, Statistical Consulting Services
3. Research in Education, John W. Besr and James V. Kahn, PHI Publication
4. Related IEEE/IEE Publications

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

SEMESTER 3

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Advanced Wireless Communication System

Course Code :- PEC-301

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1

Introduction to wireless network: Terms used in wireless communication, Types of network, The wireless channel, Point to Point Communication: detection, diversity and channel uncertainty, Cellular systems: multiple access and interference management, Capacity of wireless channels, Multiuser capacity and opportunistic communication.

IEEE 802.11: System architecture, Protocol architecture, Physical layer, MAC, 802.11 b, 802.11a, HIPERLAN.

Unit-2

Types of Wireless Data Transmission, Types of wireless devices used.

Bluetooth: Architecture, Applications, Radio layer and Baseband layer.

Zigbee: Fundamentals of Zigbee, Difference between Zigbee and Bluetooth, Applications of Zigbee.

Global system for mobile (GSM): Architecture, Radio subsystem, GSM channels and channel modes.

CDMA: Frequency and channel specifications, Services and security aspects, Recent developments.

Unit-3

Introduction to Sensor Networks: components of WSN, Communication in WSN, Protocol Stack in WSN, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Wireless Sensor node and network Architecture, WSN operating systems such as TinyOS and NesC.

Execution environment for WSN such as NS2, GloMoSim, OpNet. OMNet++, Gateway concepts. Routing protocols: Design constraints for routing in WSN, Classification of routing protocols, Brief introduction to LEACH Protocol and Greedy Algorithm.

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Unit-4

Mobile Ad-hoc Networks (MANETs): Challenges, Advantages and Application of MANET'sRouting Protocols: Classification such as Reactive, Pro-active and Hybrid, Ad-Hoc on demand distance vector routing protocol, Dynamic Source Routing Protocol, Zone Routing Protocol.Introduction to some Wireless Networks such as Vehicular Ad-hoc Networks(VANET's) and Flying Ad-hoc Networks(FANET's), Internet of Things (IoT's)

Text Books

1. Fundamentals of Wireless Communication by David Tse and Oramod Viswanath.
2. Protocols and Architectures for Wireless Sensor Network by H. Kerl, A. Willig, John Wiley and Sons.

Reference Books:

1. Wireless Sensor Network, Raghavendra, Cauligi S, Sivalingam, Krishna M., Z. Taieb. Springer
2. Networking Wireless Sensors, N. P. Mahalik, Springer Verlag.
3. Ad-Hoc Networks, Technologies and protocols, Editors: Mohapatra**,** Prasant, Krishnamurthy, Srikanth (Eds.)

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Optical Networks

Course Code :- PEC-302

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Introduction to optical fibers
The evolution of Optic System, Optical Fiber Modes, Mode theory for waveguides, losses and non-linear effects

Unit-2 Signal Degradation in Optical Fibers
Attenuation, Signal Distortion in Optical Waveguides, Pulse Broadenning in Graded-Index Waveguides, Mode Coupling, Design Optimization of Single Mode Fibers.

Unit-3 Optical transmitters
LEDs, Semiconductor lasers and their characteristics, Transmitter Design, Partition and Reflection Noise, Reliability Considerations.

Unit-4 Optical receiver
Photo detectors and their characteristics, Receiver Design, Noise and Sensitivity in Optical Receivers, Sensitivity degradation, Temperature effect of Avalanche Gain.

Unit-5 Optical Amplifiers
Semiconductor Optical Amplifier, Raman Amplifier. EDFA.

Unit-6 WDM Concepts and Components
Operational Principles of WDM, Passive Components, Tunable Sources, Tunable Filters

Unit-7 Optical Networks
Basic Networks, SONET/SDH, Broadcast-and –Select WDM Networks, Wavelength Routed Networks, Nonlinear Effects on Network Performance, Performance of WDM + EDFA Systems, Solitons, optical CDMA, Ultrahigh capacity Networks.

Text Books:

1. Optical Fiber Communication, Gerd Keiser, TMH
2. Fiber-Optic Communication Systems, Mynbev, John Wiley & Sons

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

3. Optical Communication, John M. Senior, Prentice Hall

Reference Books:

1. Fiber-Optic Communication Systems, GP Aggarwal, John Wiley & Sons
2. Related IEEE/IEE Publications

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Digital Image Processing

Course Code :- PEC-303

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Review of Signal Processing
Analysis of discrete time systems: Convolution, Correlation, Discrete Fourier Transform (DFT) and Inverse Discrete Fourier Transform (IDFT), Review of Filter design. Linear phase FIR filters. Methods of FIR filter design. Methods of IIR filter design.

Unit-2 Introduction to Image Processing
Image Formation, Inside the Camera – Projection, Sensitivity, and Color, Human Visual System and Mach bands, Digital Image Formation, Sampling, Quantization, (R,G,B) Parameterization of Full Color Images, Grayscale and Binary Images, Images as Matrices

Unit-3 Processing of Images
Gray level image processing: Intensity transformation functions, Histogram processing, Spatial filter. Image Transforms: 1-D & 2-D Discrete Fourier Transform(DFT) and their properties, Walsh-Hadamard, Discrete Cosine, Haar and Slant transforms and their properties, Image restoration: Model of image restoration process, Noise models, inverse filtering, Wiener filtering, constrained least squares filter, blind convolution, Geometric transformations and image registration.

Unit-4 Wavelets and Image Compression
Wavelet and Inverse Wavelet transform for image processing, Redundancy, Image Compression Models, Error free Compression: Variable Length Coding and LZW Coding, Lossy Compression: Predictive Coding and Wavelet Coding.

Unit-5 Image Segmentation and Object recognition
Point, Line and Edge detection, Line detection using Hough transform, Thresholding, Region-based segmentation, Boundary and Region descriptors. Object Recognition based on decision theoretic methods: Minimum distance classifier, Correlation, Optimum Statistical Classifier, Adaptive Learning System; Structural recognition.

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Text Books:

1. Digital Signal Processing, Proakis & Manolakis, Prentice Hall
2. Digital Image Processing, Gonzalez & Woods, Pearson Education
3. Essential Guide to Image Processing, A. L. Bovik,, Apress

Reference Books:

1. Digital Image Processing, K. R. Castleman, Pearson Education
2. Related IEEE/IEE Publications

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Wireless Technologies Lab

Course Code :- PEC-304

Evaluation Components for Practical Courses (Students are required to perform at least 8 practical mandatorily from the given list of practical)	
Lab Performance	10
Lab file work	10
Viva – Voce	10
Total	**30**

L T P Cr
0 0 2 1

LIST OF EXPERIMENTS: -

1. To operate GSM using various command set.
2. To interface microcontroller with GSM modem.
3. To operate the Bluetooth modem using various command set.
4. To interface microcontroller with Bluetooth modem.
5. To operate Zig-Bee using various command set.
6. To interface microcontroller with Zig-Bee modem.
7. To develop simulation of a network scenario using network software as NS2 or OPNET.
8. To design a GSM based/Bluetooth based project.

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

ELECTIVES

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Microelectronics Technology

Course Code :- PEC-402

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Review of MOS technology
Basic MOS transistors, enhancement and depletion model transistors, N-MOS and C- MOS processor, thermal aspects of processing and production of masks.

Unit-2 Electrical properties of MOS circuit
Parameters of MOS transistors, pass transistor, N-MOS inverter, pull-up to pull down ratio for an N-MOS inverter, C-MOS inverters, AND and OR, MOS transistor circuit model, latch up on C-MOS circuits.

Unit-3 Design processes
MOS layers, stick diagram, design rules, AWA OX C-MOS process description, double metal single poly silicon C-MOS process.

Unit-4 Basic circuit concepts
Sheets resistance, area capacitance delay unit, inverter delay, super buffers, propagation delays.

Unit-5 Subsystem design & layout
Architectural issues, switch logic, gate logic, examples of combinational logic, clocked sequential circuits, and other system consideration.

Unit-6 Scaling of MOS circuits
Scaling factor, limitations, scaling of wires and inter connections

Text Books:

1. Basic VLSI design systems & circuits, DA. and Eshrachian K, PHI
2. VLSI design techniques for analog & digital circuit Geigar BR, Allen PE & Strader ME, TMH

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Modeling & Simulation of Communication System

Course Code :- PEC-403

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1. Introduction
Concept of Simulation, System, Model, Types of Model, Univariat & Multivariat Models, Deterministic & Stochastic models, Continuous & Discreet Models, Analog & Digital Simulation, Real Time Simulation, Hybrid Simulation, Advantages & Limitations of Simulation, Steps in Simulation Study

Unit-2. Random Number
Psedue Random Numbers, Generation of random numbers, properties & testing of random numbers, generation of random variables using common distributions, Bounds and approximations of Random processes.

Unit-3. Signal and System
Review of signals and systems, Continuous & discrete LT systems. Simulation of random variables & random processors, Transformation functions, transformations of random processes, sampling & quantization for simulation

Unit-4. Modeling of communication system
Information sources encoding/decoding, base band modulation and mapping, RF and optical modulation demodulation, Filtering communication channels and models, Noise interference and error, Control coding, Synchronization, Spread spectrum techniques.

Unit-5. Simulation and modeling methodology
Simulation environment, Modeling consideration, Performance evaluation techniques, Error sources in simulation, design of simulation experiment – length of run, replication, elimination of initial bias, variance reduction techniques.

Unit-6. PSpice
Simulation of analog systems using PSpice

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Unit-7. Case studies
Case study of 64-OAM equalized digital radio link in a fading environment and satellite system.

Text Books:

1. Simulation of Communication Systems, M.C. Jeruchim & Others, Plenum Press

Reference Books:

1. Modern Digital and Communication Systems, Lathi B.P
2. System Simulation, DS Hira
3. Discreet Event System Simulation, Banks, Carsen, Nelson, Pearson Edu. Asia

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Telecommunication Switching System And Networks

Course Code :- PEC-404

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Introduction
Evolution of Telecommunications, basics of switching system, Telecommunication Networks. Strowger Switching Systems, Crossbar Switching, Electronic Space Division Switching.
Data Transmission:
Speech Digitization and Transmission, Time Division Multiplexing Switching, Applications of Optical Fiber Systems in Telecommunications.

Unit-2 Traffic Engineering
Network traffic Load and Parameters,Grade of servicing and Blocking Probability, Modelling Switching Systems, incoming Traffic and service Time Characteristics, blocking Models and Loss Estimates, Delay Systems.
Telephone Networks
Subscriber Loop Systems, Transmission Plan and Systems, Numbering and Charging Plan, Signaling Techniques, cellular Mobile Telephony.

Unit-3 Data Networks
Data Transmission in PSTNs, switching Techniques for Data Transmission, Data Communication Architecture, Link to Link and End to End Layers, Satellite Based Data Networks, LAN, MAN, Fiber Optic Networks, Data Network Standards, Protocol Stacks and Internetworking.

Unit-4 Integrated Services Digital Networks
Network and Protocol Architecture, Transmission Channels, User Network Interfaces, Signaling, Numbering and addressing, ISDN Standards, Expert Systems in ISDN, Broadband ISDN.

Text Books:

1. Telecommunication Switching Systems and Networks,Thiagarajan Viswanathan, PHI
2. Telecommunication Switching, Traffic and Networks, Flood Pearson Education, PHI
3. ISDN and Broadband ISDN, Stallings

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Software Defined Radio

Course Code :- PEC-405

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Introduction
Software Defined Radio – A Traditional Hardware Radio Architecture – Signal Processing Hardware History – Software Defined Radio Project Complexity.

Unit-2 A Basic Software Defined Radio Architecture
Introduction – 2G Radio Architectures- Hybrid Radio Architecture- Basic Software Defined Radio Block Diagram- System Level Functioning Partitioning-Digital Frequency Conversion Partitioning.

Unit-3 RF System Design
Introduction- Noise and Channel Capacity- Link Budget- Receiver Requirements- Multicarrier Power Amplifiers- Signal Processing Capacity Tradeoff.

Unit-4 Analog-to-Digital and Digital-to-Analog Conversion
Introduction – Digital Conversion Fundamentals- Sample Rate- Bandpass Sampling- Oversampling- Antialias Filtering – Quantization – ADC Techniques-Successive Approximation-Figure of Merit-DACs- DAC Noise Budget- ADC Noise Budget.

Unit-5 Digital Frequency Up- and Down Converters
Introduction- Frequency Converter Fundamentals- Digital NCO- Digital Mixers- Digital Filters-Halfband Filters- CIC Filters- Decimation, Interpolation, and Multirate Processing-DUCs - Cascading Digital Converters and Digital Frequency Converters.

Unit-6 Signal Processing Hardware Components
Introduction- SDR Requirements for Processing Power- DSPs- DSP Devices- DSP Compilers-Reconfigurable Processors- Adaptive Computing Machine- FPGAs

Unit-7 Software Architecture and Components
Introduction- Major Software Architecture Choices – Hardware – Specific Software Architecture-Software Standards for Softwar Radio-Software Design Patterns- Component Choices- Real Time Operating Systems- High Level Software Languages- Hardware Languages.

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Unit-8 Smart Antennas Using Software Radio

Introduction- 3G smart Antenna Requirements- Phased Antenna Array Theory- Applying Software Radio Principles to Antenna Systems- Smart Antenna Architectures- Optimum combining/ Adaptive Arrays- DOA Arrays- Beam Forming for CDMA- Downlink Beam Forming.

Text Books

1. Software Defined Radio for 3G, Paul Burns, Artech House

Reference Books:

1. RF and DSP for SDR, Tony J Rouphael, Elsevier Newnes Press
2. Digital Synthesizers and Transmitter for Software Radio, Jouko Vanakka, Springer
3. RF and Baseband Techniques for Software Defined Radio, P Kenington, Artech House

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Microwave and Antenna Theory

Course Code :- PEC-406

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Introduction
RF and Microwaves, Review of Maxwell equations, properties of RF and Microwaves, Applications of RF/Microwave – Communications, Radar, Navigation, Remote sensing, Wireless applications.

Unit-2 RF and Microwave Circuit design
Low RF Circuit design considerations, high RF and microwave circuits, lumped and distributed circuit elements. S-parameters description of passive and active networks, Network concepts: obstacles in wave guides, waveguide function, excitations of wave guides and cavities.

Unit-3 RF Electronic concepts
Resonant circuits; Analysis of a simple circuit in Phasor domain; loaded Q, Impedance transformation, Insertion loss, Impendence transformers: Tapped-C transformer, Tapped-L Transformer. RF Impedance Matching: The L-Network, the Absorption Method, and the Resonance Method.

Unit-4 Microwave Antenna Theory
Concepts of radiation, Dipoles, Aperture Antennas, Reflectors, Horns, Slot antennas, printed antennas, broad -band antenna, mutual coupling, arrays and phase arrays. Lens antennas low frequency active antenna. Antennas and wireless communication.

Text Books:

1. Radio Frequency & Microwave ElectronicsMathew. M. Radmanesh, Pearson Edu.
2. Foundation of Microwave Engineering, RE Collin, McGraw-Hill
3. Antenna and Radio Wave Propagation, RE Collin, McGraw-Hill

Reference Books:

1. Antennas: Theory and Practice, R. Chatterjee, New Age Inter.
2. Related IEEE/IEE Publications

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Reliability of Electronics & Communication Systems

Course Code :- PEC-407

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Concept of Reliability
Failures of systems and its modes. Measure of Reliability, Reliability function, Hazard rate MTBF and their interrelations.

Unit-2 Reliability Data and System Reliability and Modeling
Data sources. Data collection, use of Reliability Data, Reliability Analysis, Performance Parameters, calculation of failure rate, Application of Weibill distribution.Series systems, Parallel system, series parallel systems. Time dependence, Reliability Determination, Stand by systems, r out of n, Configurations, Methods of tie set and cut sets of Or reliability evaluation, simulation and Reliability prediction. Monte Carlo method, concepts of network topology. Overall reliability evolution

Unit-3 Maintainability and Availability
Maintainability and its equation. Factors Affecting maintainability. Measures of Maintainability, Mean Down Time, Availability Intrinsic availability equipment availability & Mission availability. Replacement processes and Policies.

Unit-4 Life Testing of Equipments
Non-destructive tests, destruction tests and their Mathematic modeling. Quality and Reliability, Measurement & prediction of Human Reliability, Reliability and safety, safety margins in critical Devices, case studies.

Unit-5 Value Engineering
Techniques in value Engg, Structure of value Engg, Reliability Management.

Text Books:

1. Reliability Engineering & Technology, K.Gupta, Macmilla India Ltd, Delhi
2. Introduction Reliability Engineering, E. S. Lewis, John Wiley & Sons, New York

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name: - Adaptive Signal Processing

Course Code :- PEC-408

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Adaptive filter structures
Introduction- The Filtering Problem- Linear Optimum Filters- Adaptive Filters- Linear Filter Structures- Approaches to the Development of Linear Adaptive- Adaptive Beam Forming- Four Classes of Applications.

Unit-2 Discrete time stochastic processes
Probability and Random variables- Partial characterization of a Discrete Time Stochastic Process- Mean Ergodic Theorem- Correlation Matrix- Correlation Matrix of Sine Wave Plus Noise- Stochastic Models- Wold Decomposition- Asymptotic Stationary of an Autoregressive process- Yule Walker Equations- Complex Gaussian Processes- Power Spectral Density- Properties of Power Spectral Density- Power Spectrum Estimation- Spectral Correlation Density.

Unit-3 Weiner Filter
Linear Optimum Filtering- Principle of Orthogonality- Minimum Mean Square Error- Wiener Hopf Equations- Error Performance Surface- Multiple Linear Regressive Model- Linearly Constrained Minimum Variance Filter- Generalized Side-lobe Canceller.

Unit-4 Search Methods and The LMS Algorithm
Overview of the structure and Operation of the Least Mean Square Algorithm- LMS Adaptation Algorithm- Statistical LMS Theory- Directionality of Convergence of the LMS Algorithm for Non White Inputs- Robustness of the LMS Filter.

Unit-5 Convergence and Stability Analysis
Variants of the LMS Algorithm, Vector Space Framework for Optimal Filtering, Lattice Filter and Estimator, RLS Lattice Filter.

Text Books:

1. Adaptive Filter atheory, Simon Haykin, Prentice Hall, Englewood Cliffs
2. Adaptive Filters Theory and Applications, B. Farhang- Boroujeny, John Wiley and Sons

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Nano Technology

Course Code :- PEC-409

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Introduction
Introduction to Nano scale systems, Length energy and time scales, Top down approach to Nano lithography, Spatial resolution of optical, deep ultraviolet, X-ray, electron beam and ion beam lithography, Single electron transistors, coulomb blockade effects in ultra-small metallic tunnel junctions

Unit-2 Quantum Mechanics
Quantum confinement of electrons in semiconductor nano structures, Two dimensional confinement (Quantum wells), Band gap engineering, Epitaxy, Landaeur – Buttiker formalism for conduction in confined geometries, One dimensional confinement, Quantum point contacts, quantum dots and Bottom up approach, Introduction to quantum methods for information processing.

Unit-3 Molecular Techniques
Molecular Electronics, Chemical self assembly, carbon nano tubes, Self assembled mono layers, Electromechanical techniques, Applications in biological and chemical detection, Atomic scale characterization techniques, scanning tunneling microscopy, atomic force microscopy

Text Books:

1.Quantum Transport in Semiconductor Nanostructures in Solid state Physics, Beenaker and Van Houten, Ehernreich and Turnbell, Academic press

Reference Books:

1. Transport in Nano structures, David Ferry, Cambridge University press
2. Introduction to Mesoscopic Physics, Y. Imry, Oxford University press
3. Electron Transport in Mesoscopic systems, S. Dutta, Cambridge University press
4. Single charge Tunneling, H. Grabert and M. Devoret, Plenum press
5. Related IEEE/IEE Publications

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Parallel Processing

Course Code :- PEC-410

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1. Theory of Parallelism
Parallel computer models - the state of computing, Multiprocessors and Multicomputers and Multivectors and SIMD computers, PRAM and VLSI models, Architectural development tracks. Program and network properties Conditions of parallelism, Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures. Principles of scalable performance - performance matrices and measures, parallel processing applications, speedup performance laws, scalability analysis and approaches.

Unit-2. Hardware Technologies
Processor and memory hierarchy advanced processor technology, superscalar and vector processors, memory hierarchy technology, virtual memory technology, bus cache and shared memory - backplane bus systems, cache memory organisations, shared memory organisations, sequential and weak consistency models.

Unit-3. Pipelining and Superscalar Technologies
Parallel and scalable architectures, Multiprocessor and Multicomputers, Multivector and SIMD computers, Scalable, Multithreaded and data flow architectures.

Unit-4. Software and Parallel Programming
Parallel models, Languages and compilers, Parallel program development and environments, UNIX, MACH and OSF/1 for parallel computers.

Text Books:

1. Advanced Computer Architecture, Kai Hwang, McGraw, Hill International
2. Computer Organization and Architecture, William Stallings, Macmillan, Publishing Company
3. Designing Efficient Algorithms for Parallel Computers, M. J. Quinn, McGraw, Hill International
4. Computer Architecture A Quantitative approach, John L. Hennessy and David A. Patterson, Morgan Kaufman Publishers

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Remote Sensing

Course Code :- PEC-411

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Remote Sensing Methodology
Meaning, significance, need, types & applications of remote sensing, requirements of remote sensing data collection, spatial, spectral, radiometric & temporal resolution, scan identification by aerial & ground surveys, atmospheric measurement stations & atmospheric connections, aerial photography, photographic systems, photographic films & their types, electro-optical systems-scanning & non-scanning systems, photographic image recording, aircraft imaging radar system.

Unit-2 Remote Sensing Detector and Scanner
Thermal detectors, quantum detectors, characteristic & hyper of detectors, thermal IR line scanners, environmental effect on thermal IR images, return beam vidicon camera (RBV camera), heat capacity, mapping, radiometer (HCMR), interaction of earth's surface with EM radiation, multi-pretation scanner imager & their characteristics, interpretation of aerial images, passive unware systems, geo-stationary geo-synchronous satellites, weather satellite sensors, visible and infra-red spin scan radiometer.

Unit-3 Remote Sensing Source and Satellite
Introduction to LEO, DELTA, NOAA, ATALAS, AEM, TIROS satellites, nimbus series, French spot satellite & USSR satellite systems, LANDSET systems, Indian Remote Sensing Systems, marine observation satellite, geographic information systems, geo-launch vehicles.

Unit-4 Registration And Interpretation of Image Data

Sources of radiometric distortion and effect of the atmosphere on radiation, instrumentation errors of atmospheric effects on remote sensing imagery, correction of atmospheric effect and instrumentation errors, earth curvature, scan time skew, sensors & non-linearity, re-sampling and interpolation, image registration, approach to interpretation, computer processing for photo interpretation, pixel vectors & labeling.

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Text Books

1.Remote Sensing: Optics & Optical Systems, Philip N. Slater, Addison- Wesley Publishing Company.

Reference Books:

1. Remote Sensing Digital Image Analysis, John A. Richards & Xinping Jia, Springer
2. Fundamentals of Digital Image Processing, Anil K Jain, PHI
3. Digital Image Processing, K R Castleman, Prentice Hall

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Multimedia System

Course Code :- PEC-412

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1 Digital Communication and protocols
Source encoding, Channel encoding, Circuit switched Networks; Packet switched networks, Broad band ATM, Frame Relay, TCP/IP protocol suite.

Unit-2 Multimedia Communication Basics
Introduction to various multimedia comm. Techniques, Applications, Networks, bandwidth and compression issues, Multimedia System Architecture, Multimedia Transmitter.

Unit-3 Multimedia Information Representation
Different types of multimedia information, Information representation.

Unit-4 Compression Techniques
Encoding and decoding techniques, Text compression techniques, Image compression techniques, Audio and Video Compression, Standards for Multimedia Compression, Huffman, Run length, Variable length, Lossy / Lossless compression.

Unit-5 Hypermedia
Multimedia Authoring & User Interface, Hypermedia messaging, Mobile Messaging, Hypermedia message component, Creating Hypermedia message, Integrated multimedia message standards, Integrated Document management, Distributed Multimedia Systems.

Unit-6 Multimedia File Formats
Various files formats for multimedia and their applications, BMP, TIFF, JPEG, MPEG Audio/ Video Standards, Challenges for encryption and Decryption, Security.

Text Books:

1. Multimedia Communications, Fred Halsall, Prentice Hall
2. Digital Communication, Proakis, Prentice Hall

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Course Name :- Total Quality Management

Course Code :- PMG-217

Assessment and Evaluation Components	
Quizzes /Assignments/ Presentation/Class Test/ Open Book Test/ Case Study	25
Mid Term Tests (MTE)	20
Attendance Marks	05
End Term Examination	50
Total	**100**

L T P Cr
4 0 0 4

Unit-1
Achieving Excellence through TQM; Concept & definition of quality, Total Quality and TQM, Role and importance of TQM in Indian business industry, TQM Thinkers and their Contributions, TQM Vs management, Cost of Quality, Cost of Poor Quality, Applications of TQM in Service and manufacturing Sectors in India.

Unit-2
Problem solving and QC tools; Statistical Process Control, SQC Vs SPC, Control Charts, Process capability, Failure mode effect analysis (FMEA), Design of experiments (DOE), Just in Time (JIT).

Unit-3
Total employees involvement, Kaizen, Quality Circles, Team Work for Quality, Customer's Satisfaction, Menchmarking.

Unit-4
Leadership and Communication for Quality, Creating Quality Culture, Quality Planning Process, Housekeeping for Quality.

Unit-5
Inspection Vs Prevention, Total Productive and Preventive Maintenance, RFT, QFD, Daily Process. Management, PDCA Cycle, BPR, Quality of Product Design and Service.

Unit-6
Acceptance Sampling, Six Sigma, Value Engineering, Lean Manufacturing, SMED, ISO 14000, Implementing TQM, Quality Audit, Quality Awards, Quality Information System, Quality of People, Quality in Marketing, Future of TQM in India.

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.

Text Books:

1. Total Quality Management, D.D. Sharma, Sultan Chand & Son
2. Quality Control Handbook, Joseph M. Juran, McGraw-Hill
3. Total Quality Control, Sarv Singh Soni, McGraw-Hill
4. Total Quality Management, D.H Besterfield et.al, Pearson Education
5. Total Quality Mangement, Poornima M. Charantimath, Pearson Education
6. Statistical Process Control, J.S.Oakland, John Wiley & Sons
7. Introduction to Quality Engineering, G.Taguchi, John Wiley & Sons
8. Guide to Quality Control, K. Ishikawa

Reference Books:

1. Total Quality Control, Armadv Feigen baum, Pearson Education
2. Fundamentals of Quality Control and Improvement, Amitava Mitra, Oxford University press
3. The Six Sigma Way, Peter S.Pande et. Al, Tata McGraw Hill
4. Design for six Sigma in Technology and Product Development, CM Crevaling, Pearson Education
5. Quality Planning & Analysis, JM Juran and FM Gryna, McGraw Hill
6. Kaizen-he Key to Japan's Competitive Success, I Mai M
7. Out of Crisis, W.E. Deming
8. Quality is Free, P.B.Crosby, Mc Graw Hill
9. Creating Culture Change, P.E.Atkinson
10. Just-in-Time, Hutchings
11. System of Experimental Design, G. Taguchi

Note for End Term Examination: Attempt five questions in all, selecting one question each from the sections A, B, C and D. Section E is compulsory.