| SEVENTH SEMESTER | | | | | |
|---|---|---|---|---|---|
| **Theory / Practical / Sessional** | | | | | |
| **Subject Code** | **Subject Name** | **Hours/ Week L/T** | **Credit Theory** | **University Marks** | **Internal Evaluation** |
| PET7J001/ PET7J002/ PET7J003/ PET7J004/ PET7J005/ PET7J006 | Wireless Communication Systems/Satellite Communication Systems/Digital Image Processing/Adaptive Signal Processing/Advanced Control Systems/Embedded System Design | 3-0-0 | 3 | 100 | 50 |
| PET7J007/ PET7J008/ PET7J009/ PET7J010 | Wireless Sensor Networks/Optical Communication Networking/System Design Using Integrated Circuits/CMOS based Design | 3-0-0 | 3 | 100 | 50 |
| PCP7H007/ PCP7H008/ PCP7H009 | Internet of Things (IOT)/ NanoScience&BioTechnology/ IntellectualPropertyRights(IPR) | 3-0-0 | 3 | 100 | 50 |
| PCP7H010/ PCP7H011/ PCP7H012 | Soft Computing/ IntroductiontoManagement&Function/ MarketingManagement | 3-0-0 | 3 | 100 | 50 |
| PCP7H013/ PCP7H014/ PCP7H015 | Entrepreneurship Development/ E-Commerce & ERP / Business Regulatory Framework | 3-0-0 | 3 | 100 | 50 |
| **Total Credit/Marks (Theory)** | | | 15 | 750 | |
| **Practical** | | | | | |
| PET7N201 | Seminar | 0-0-2 | 2 | - | 100 |
| PET7N202 | Minor Project | 0-0-2 | 4 | - | 200 |
| PET7N203 | Comprehensive Viva | 0-0-1 | 2 | - | 100 |
| **Total Credit/Marks (Practical)** | | | **08** | **400** | |
| **Total Semester Credit/ Marks** | | | **23** | **1150** | |

| **Eighth Semester** | | | | | |
|---|---|---|---|---|---|
| **Sl. No.** | **Subject Category** | **Subject Name** | **Credit** | **University Marks** | **Internal Marks** |
| **Practical** | | | | | |
| 1 | PET8N201 | Internship/ Major Project | 10 | - | 500 |
| **Total Credit/Marks (Practical)** | | | **10** | **500** | |
| **Total Semester Credit/ Marks** | | | **10** | **500** | |

PET7J001 WIRELESS COMMUNICATION SYSTEMS 3-0-0

MODULE-I

History of wireless communication: Concept of mobile and personal communication, wireless cellular platform, the design fundamentals of cellular networks, frequency reuse, spectrum capacity enhancement techniques, co-channel and adjacent channel interference, location management, handoff management; Concept of mobile IP for mobility management issues.

MODULE-II

Propagation Models for Wireless Networks: Two-ray ground reflection model, a micro-cell propagation model, a macro-cell propagation model, shadowing model, large scale path loss and shadowing, multi path effects in mobile communication, linear time variant channel model; Concept of coherent bandwidth, Coherent time, Doppler Shift - Effect of velocity of the mobile, models for multi path reception, mobile communication antennas.

MODULE-III

Multiple access techniques in wireless communications: frequency division multiple access technology (FDMA), time division multiple access (TDMA), space division multiple access (SDMA), code division multiple access (CDMA); spectral efficiency of different wireless access technologies, spectral efficiency in FDMA system, spectral efficiency in TDMA system, spectral efficiency for DS-CDMA system.

MODULE-IV

Second Generation Mobile Networks-GSM: Architecture and protocols, access technology, call set up procedure, 2.5 G networks; evolution to GPRS, concept of data communication on GPRS, session management and PDP Context, data transfer through GPRS network and routing.

ADDITIONAL MODULE (Terminal Examination-Internal)

Evolution of modern mobile wireless communication systems: Personal area networks (PAN), Public wide-area wireless networks, wireless Local Area Networks; Brief introduction to 3G – The universal mobile telecommunication system (UMTS) Basic idea of satellite mobile communication systems.

Text Books

1. Wireless Communications- Principles and Practice, T S Rappaport, Pearson Education India, Second Edition 2003
2. Wireless Communication and Networks, Upen Dalal, Oxford university Press, First Edition, 2015.
3. Wireless Communication and Networks 3G and Beyond, Iti Saha Misra, Tata McGraw Hill Education Pvt. Ltd, Second Edition, 2009.
4. Mobile Communication Engineering – Theory and Applications W C Y Lee, TMH Publication, Second Edition, 2008.

Reference Books

1. Fundamentals of Wireless communication , David Tse and Pramod Viswanath, Cambridge University Press, 2005
2. Wireless Communication, Andrea Goldsmith, Cambridge University Press, 2005

PET7J003 DIGITAL IMAGE PROCESSING 3-0-0

MODULE-I

Fundamentals – Steps in digital image processing, sampling and quantization, relationship between pixels, imaging geometry

Image Transforms – Fourier Transform, Discrete Fourier Transform, Fast Fourier Transform, Discrete Cosine Transform, Walsh Transform, Hadamard Transform, Hotelling Transform.

MODULE-II

Image Enhancement – Point processing, spatial filtering (smoothing and sharpening filters), enhancement in frequency domain.

Filtering in the Frequency Domain: preliminary concepts, 2D DFT and its properties, basic filtering in the frequency domain, image smoothing and sharpening.

MODULE-III

Image Restoration and Reconstruction: Image restoration/degradation model, noise models, restoration in the presence of noise only, estimating the degradation function.

Color Image Processing: Color models, Color transformation.

MODULE-IV

Wavelets and Multi-resolution Processing: multiresolution expansions, wavelet transforms in one and two dimension.

Image Compression: Fundamentals, Some basic compression methods (Chapt: 8 of Text book 1)

ADDITIONAL MODULE (Terminal Examination-Internal)

Morphological Image Processing: Erosion and Dilation, opening and closing.

Text books

1) Digital Image Processing, R.C. Gonzalez, R.E. Woods, Pearson Education , 3rd Edition, 2007
2) Digital Image Processing, S. Sridhar, Oxford University Press,2011
3) Digital Image Processing And Analysis, B. Chanda, Dutta D. Majumder ,PHI

Reference Books

1) Digital Image Processing using MATLAB, Rafael C. Gonzalez, Richard E. Woods Pearson Education, Inc., Seventh Edition, 2004.
2) Digital Image Processing, William K. Pratt, John Wiley, New York, 2002

PET7J002 SATELLITE COMMUNICATION SYSTEMS 3-0-0

MODULE-I (12 Hours)

Introduction to satellite communication: Orbital mechanics and parameters look angle determination, Launches and Lunch vehicle, Orbital effects in communication system performance. Attitude and orbit control system (AOCS), TT&C, Description of spacecraft System ; Transponders,

Satellite Link Design: Basics of transmission theory, system noise temperature and G/T ratio, Uplink and Downlink design, design of satellite links for specified (C/N) performance.

MODULE–II (10 Hours)

Analog telephone and television transmission: Energy dispersal, digital transmission

Multiple Accesses: Multiplexing techniques for satellite links, Comprehensive study on FDMA, TDMA and CDMA; Spread Spectrum Transmission and Reception; Estimating Channel requirements, SPADE, Random access

MODULE-III (12 Hours)

5. Propagation on satellite: Earth paths and influence on link design; Quantifying attenuation and depolarization, hydrometric & non hydrometric effects, ionosphere effects, rain and ice effects.

Satellite Antennas: Types of antenna and relationships; Basic Antennas Theory – linear, rectangular & circular aperture; Gain, pointing loss,

MODULE-IV

Earth station Technology: Earth station design; Design of large antennas – Cassegrain antennas, optimizing gain of large antenna, antenna temperature, feed system for large cassegrain antennas,

Design of small earth station antennas: Front fed paraboloid reflector antennas, offset fed antennas, beam steering, Global Beam Antenna, equipment for earth station.

ADDITIONAL MODULE (Terminal Examination-Internal)

Equipment reliability and space qualification.

Application of Satellite communication: Network distribution and direct broad casting TV, fundamentals of mobile communication satellite

Text Books

1) Satellite Communication, T. Pratt, C. Bostian, John Wiley Co, 2nd Edition.
2) Satellite Communication, Principles & Applications, R.N.Mutagi, Oxford University Press, 1st Edition, 2016

Reference Books

1) Digital Communication with Satellite and Fiber Optic Application, HarlodKolimbins, PHI
2) Satellite Communication, Robert M. Gagliardi, CBS Publishers
3) Satellitte Communication Systems, Richharia. BSP BOOKS PVT LTD.
4) Satellitte Communication Engg., MichealKolawole, BSP BOOKS PVT LTD

PET7J004 ADAPTIVE SIGNAL PROCESSING 3-0-0

MODULE–I (10 Hours)

Introduction: Adaptive Systems – Definition and characteristics, General properties, Open and Closed Loop Adaptations, Applications.

The Adaptive Linear Combiner: Performance function, Gradient and Mean Square Error, Examples.

MODULE – II (14 Hours)

Theory of Adaptation with Stationary Signals: Properties of the Quadratic Performance Surface, Significance of eigen values, eigen vectors, correlation matrix.

Searching the Performance Surface: A simple gradient search algorithm, Stability and Rate of convergence, the learning curve.

MODULE-III (16 Hours)

Gradient Estimation and its effects on Adoption: The performance penalty, Variance of the gradient estimate, Misadjustment.

Adaptive Algorithms and Structures: The LMS Algorithm, Convergence, learning Curve, Performance analysis, Filtered X LMS algorithm,

MODULE-IV

Applications: Adaptive Modelling and System Identification using adaptive filter, Inverse Adaptive Modelling, Deconvolution, and equalization using adaptive filter.

ADDITIONAL MODULE (Terminal Examination-Internal)

Adaptive Control Systems using Filtered X LMS Algorithm, Adaptive Noise Cancellation using Adaptive filter

Text Books

1. Adaptive Signal Processing, Bernard Widrow and Samuel D. Stearns, Pearson Education, 2nd impression, 2009.

Reference Books

2. Adaptive Filter Theory, Simon Haykin, Pearson Education, 4th Edn.

PET7J005 ADVANCED CONTROL SYSTEMS 3-0-0

MODULE-I (15 Hours)

Discrete - Time Control Systems:

Introduction: Discrete Time Control Systems and Continuous Time Control Systems, Sampling Process.

Digital Control Systems: Sample and Hold, Analog to digital conversion, Digital to analog conversion.

The Z-transform: Discrete-Time Signals, The Z-transform, Z-transform of Elementary functions, Important properties and Theorems of the Z-transform. The inverse Z-transform, Z Transform method for solving Difference Equations.

Z-Plane Analysis of Discrete Time Control Systems:

Impulse sampling & Data Hold, Reconstruction of Original signals from sampled signals: Sampling theorem, folding, aliasing.

Pulse Transfer function: Starred Laplace Transform of the signal involving Both ordinary and starred Laplace Transforms; General procedures for obtaining pulse Transfer functions, Pulse Transfer function of open loop and closed loop systems.

Mapping between the s-plane and the z-plane, Stability analysis of closed loop systems in the z- plane: Stability analysis by use of the Bilinear Transformation and Routh stability critgion, Jury stability Test.

MODULE-II (15 Hours)

State Variable Analysis & Design:

Introduction: Concepts of State, State Variables and State Model (of continuous time systems): State Model of Linear Systems, State Model for Single-Input-Single-Output Linear Systems, Linearization of the State Equation.

State Models for Linear Continuous – Time Systems: State-Space Representation Using Physical Variables, State – space Representation Using Phase Variables, Phase variable formulations for transfer function with poles and zeros, State – space Representation using Canonical Variables, Derivation of Transfer Function for State Model.

Diagonalization: Eigen values and Eigen vectors, Generalized Eigen vectors.

MODULE -III (12 Hours)

Solution of State Equations: Properties of the State Transition Matrix, Computation of State Transition Matrix, Computation by Techniques Based on the Cayley-Hamilton Theorem, Sylvester's Expansion theorem.

Concepts of Controllability and Observability: Controllability, Observability, Effect of Pole-zero Cancellation in Transfer Function.

Pole Placement by State Feedback, Observer Systems. State Variables and Linear Discrete – Time Systems: State Models from Linear Difference Equations/z-transfer Functions, Solution of State Equations (Discrete Case), An Efficient Method of Discretization and Solution, Linear Transformation of State Vector (Discrete-Time Case), Derivation of z-Transfer Function from Discrete-Time State Model.

MODULE-IV
Nonlinear Systems:
Introduction: Behaviour of Non linear Systems, Investigation of nonlinear systems.

Common Physical Non Linearities: Saturation, Friction, Backlash, Relay, Multivariable Nonlinearity.

The Phase Plane Method:

Basic Concepts, Singular Points: Nodal Point, Saddle Point, Focus Point, Centre or Vortex Point Stability of Non Linear Systems: Limit Cycles,

Construction of Phase Trajectories: Construction by Analytical Method, Construction by Graphical Methods.

The Describing Function Method:

Basic Concepts: Derivation of Describing Functions: Dead-zone and Saturation, Relay with Dead- zone and Hysteresis, Backlash.

Stability Analysis by Describing Function Method: Relay with Dead Zone, Relay with Hysteresis, Stability Analysis by Gain-phase Plots.

ADDITIONAL MODULE (Terminal Examination-Internal)
Jump Resonance. Liapunov's Stability Analysis:
Introduction, Liapunov's Stability Criterion: Basic Stability Theorem, Liapunov Functions, Instability.
Direct Method of Liapunov& the Linear System: Methods of constructing Liapunov functions for Non linear Systems.

Text Books

1. Discrete-Time Control System, K.Ogata, PHI ,2nd Edition, 2009.
2. Control Systems Engineering, I.J. Nagrath and M.Gopal, New Age International (P) Ltd. Publishers, 5th Edition, 2007/ 2009.

Reference books

1) Design of Feedback Control Systems, Stefani, Oxford University Press, Fourth Edition,2009.
2) Modern Control Systems, K.Ogata, PHI, 5thEdition,2010.
3) Modern Control Systems Richard C. Dorf. And Robert, H.Bishop, Pearson Education Inc. Publication, 11thEdition,2008.
4) Control Systems (Principles & Design), M.Gopal, Tata Mc. Graw Hill Publishing Company Ltd, 3rdEdition,2008.

5) Control Systems Engineering, Norman S.Nise, Wiley India (P) Ltd, 4thEdition,2008.

PET7J006 EMBEDDED SYSTEM DESIGN 3-0-0

MODULE – I (8 Hours)

Embedded System: Understanding the Basic Concepts:

Introduction to Embedded System: Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems.

The Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System Components, PCB and Passive Components.

Characteristics and Quality Attributes of Embedded System.

Hardware Software Co-Design and Program Modelling: Fundamental Issues in Hardware Software Co-Design.

MODULE – II (8 Hours)

Design and Development of Embedded Product:

Embedded Hardware Design and Development: Analog Electronic Components, Digital Electronic Components, VLSI and Integrated Circuit Design, Electronic Design Automation (EDA) Tools.

Embedded Firmware Design and Development: Embedded firmware Design Approaches, Embedded firmware Development Languages.

MODULE – III (8 Hours)

Real Time Operating System (RTOS) based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling: Putting them altogether, Task Communication, Task Synchronisation, Device Drivers, How to choose an RTOS.

MODULE – IV (8 Hours)

Design and Development of Embedded Systems:

Integration and Testing of Embedded Hardware and Firmware: Integration of Hardware & Firmware, Board Power up.

The Embedded System Development Environment: Integrated Development Environment (IDE), Types of files generated on cross-compilation, Disassembler/Decompiler, Simulators, Emulators & Debugging, Target Hardware Debugging.

Embedded Product Development Life Cycle (EDLC): Definition and Objectives of EDLC, Different Phases of EDLC, EDLC Approaches (Modelling the EDLC).

ADDITIONAL MODULE (Terminal Examination-Internal) (8 Hours)

Major Application Areas of Embedded Systems.

Embedded Systems: Application and Domain Specific: Washing Machine: Application Specific Embedded System, Automotive: Domain Specific Example for Embedded System; Computational Models in Embedded Design, Introduction to Unified Modelling Language (UML), Hardware Software Trade-offs; Programming in Embedded 'C'.

An Introduction to Embedded System Design with VxWorks and MicroC/OS-II (µCOS-II) RTOS: VxWorks, MicroC/OS-II (µCOS-II); Boundary Scan;

Product Enclosure Design & Development: Product Enclosure Design Tools, Product Enclosure Development Techniques.

Trends in the Embedded Industry: Processor Trends in Embedded System, Embedded OS Trends, Development Language Trends, Open standards, Frameworks and Alliances, Bottlenecks.

Text Book:

1) Introduction to Embedded Systems, Shibu K.V., TMH Private Limited, New Delhi, 2009.

Reference Book:

2) An Embedded Software Primer, David E. Simon, Addison Wesley, 1999.

3) The Art of Designing Embedded Systems, Jack Ganssle, Newnes, 2000

4) Embedded Microprocessor System Design, K. Short, Prentice Hall, 1998.

5) Embedded System Applications, C. Baron, J. Geffroy and G. Motet, Kluwer, 1997.

6) Embedded Systems – Architecture, Programming and Design, Raj Kamal, Tata McGraw Hill Publishing Company Limited, New Delhi, 12th reprint 2007.

7) Embedded system design. Modeling synthesis and verification, Daniel Gajski. BSP BOOKS PVT LTD.

PET7J007 WIRELESS SENSOR NETWORK 3-0-0

MODULE-I (8 Hours)

Sensor Network Concept: Introduction, Networked wireless sensor devices, Advantages of Sensor networks, Applications, Key design challenges.

Network deployment: Structured versus randomized deployment, Network topology, Connectivity, Connectivity using power control, Coverage metrics, Mobile deployment.

MODULE-II (6 Hours)

Localization and Tracking: Issues and approaches, Problem formulations: Sensing model, collaborative localization. Coarse-grained and Fine-grained node localization. Tracking multiple objects.

MODULE-III (8 Hours)

Wireless Communications: Link quality, shadowing and fading effects

Medium-access and sleep scheduling: Traditional MAC protocols, Energy efficiency in MAC protocols, Asynchronous sleep techniques, Sleep-scheduled techniques, and Contention-free protocols.

MODULE-IV (6 Hours)

Routing: Metric-based approaches, Multi-path routing, Lifetime-maximizing energy-aware routing techniques, Geographic routing.
Sensor network Databases: Data-centric routing, Data-gathering with compression,

ADDITIONAL MODULE (Terminal Examination Internal) (8 Hours)

State space decomposition; Synchronization: Issues and Traditional approaches, Fine-grained clock synchronization, and Coarse-grained data synchronization; Querying; Data-centric storage and retrieval; the database perspective on sensor networks; Security: Privacy issues, Attacks and countermeasures.

Text Books

1) Wireless Sensor Networks: An Information Processing Approach- by Feng Zhao, Leonidas Guibas , Morgan Kaufmann Series in Networking 2004.

References Books

1) Networking Wireless Sensors: Bhaskar Krismachari, Cambridge University Press
2) Wireless Sensor Networks: Edited by C.S Raghavendra, Krishna M, Sivalingam, TaiebZnati, Springer.
3) Wireless Sensor Networks: Technology, Protocols, and Applications: Kazem Sohraby, Daniel Minoli, TaiebZnati, Wiley Inter Science.

PET7J008 OPTICAL COMMUNICATION AND NETWORKING 3-0-0

MODULE-I (9 Hours)

Introduction: Introduction, Ray theory transmission,Total internal reflection-Acceptance angle,Numerical aperture; Skew rays; Electromagnetic mode theory of optical propagation: EM waves, modes in Planar guide, phase and group velocity; cylindrical fibers , SM fibers.

MODULE-II (9 Hours)

Transmission characteristics of optical fibers: Attenuation – Material absorption losses in silica glass fibers, Linear and Non linear Scattering losses, Fiber Bend losses; Mid band and far band infrared transmission; Intra and inter Modal Dispersion – Over all Fiber Dispersion; Polarization: non linear Phenomena; Optical fiber connectors, Fiber alignment and Joint Losses; Fiber Splices, Fiber connectors, Expanded Beam Connectors : Fiber Couplers.

MODULE-III (9 Hours)

Sources and detectors: Optical sources: Light Emitting Diodes, LED structures, surface and edge emitters, mono and hetero structures: internal; quantum efficiency; injection laser diode structures; comparison of LED and ILD Optical Detectors: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties; Comparison of performance; Photo detector noise :Noise sources , Signal to Noise ratio , Detector response time.

MODULE-IV (9 Hours)

Fiber optic receiver and measurements: Fundamental receiver operation, Pre amplifiers, Error sources: Receiver Configuration Probability of Error Quantum limit; Fiber Attenuation measurements, Dispersion measurements, Fiber Refractive index profile measurements, Fiber cut- off Wave length Measurements, Fiber Numerical Aperture Measurements, Fiber diameter measurements.

ADDITIONAL MODULE (Terminal Examination-Internal) (9 Hours)

Optical networks: Basic Networks, SONET / SDH, Broadcast and select WDM Networks; Wavelength Routed Networks; Nonlinear effects on Network performance, Performance of WDM + EDFA system, Solutions; Optical CDMA; Ultra High Capacity Networks.

Text Books

1. Optical Fiber Communication, John M. Senior, Pearson Education, Second Edition, 2007.
2. Optical Fiber Communication, Gerd Keiser, McGraw Hill, Third Edition, 2000.
3. Optical Network, Rajib Ramaswamy & Kumar Sivarajan,M.K. Publication,2nd edition.

Reference Books

1. Optical Communication System, J. Gower, Prentice Hall of India, 2001.
2. Optical Networks, Rajiv Rama swami, Elsevier ,Second Edition, , 2004.
3. Fiber-optic communication systems, Govind P. Agrawal, John Wiley & sons, third edition, , 2004.
3. Fiber Optics and Optoelectronics, R.P. Khare, Oxford University Press, 2007.
4. Optical Communication Network, Viswanath Mukherjee, McGraw Hill Publication,2000

PET7J009 SYSTEM DESIGN USING INTEGRATED CIRCUITS 3-0-0

MODULE- I (8 Hours)

Linear IC- Operational amplifier: Introduction to linear ICs, Operational amplifier IC741, Block diagram and characteristics, DC and AC performance; Open loop configurations, Feedback configurations, Inverting, non inverting and differential amplifier, Summer, Subtractor, Integrator, Differentiator, Zero crossing detector, Schmitt trigger, Window detector; Astable and monostable multivibrators; V-I and I-V converters; Filter and its types, Instrumentation amplifier, Precision rectifiers, Logarithmic and antilog amplifiers; multiplier; Op amp voltage regulator, IC linear voltage regulator (series 7800 and 7900 ICs).

MODULE- II (8 Hours)

Other LICs and Data Converters: 555 timer, Block diagram and features, Astable multivibrator, applications, Square wave oscillator, Ramp generator, Triangular waveform generator and Voltage to frequency converter; Monostable multivibrator, applications, Frequency divider, PWM and PPM generators. XR2240 Programmable Timer/Counter,Block diagram and operation, applications,Free running oscillator and frequency synthesizer; PLL565, Principle, Building blocks, applications, Frequency multiplication, Frequency translation, AM and FM detection. Data converters, DAC characteristics, Binary weighted DAC, R-2R DAC, Monolithic DAC-08, ADC characteristics, Flash ADC, Successive approximation ADC, dual slope integrating type ADC, Monolithic ADC AD670,Variable Voltage Regulators(LM317).

MODULE- III (8 Hours)

Digital Integrated Circuits: Digital IC characteristics, Digital IC families,RTL and DTL, HTL, I2L, TTL, ECL, MOS and CMOS logic circuits, Comparison of digital IC families.

MODULE- IV (8 Hours)

Design of sequential machines: Analysis and design of synchronous sequential machines, Mealey and Moore machines, State table, State diagram, State reduction and assignments, Analysis and design of asynchronous sequential logic, Race conditions, Design problems from specifications, Hazards in combinational and sequential circuits.

ADDITIONAL MODULE (Terminal Examination-Internal) (8 Hours)

Processor and control unit design: Registers, Register transfer logic, inter register transfer, bus transfer and memory transfer, Arithmetic logic and shift micro operations, Macro operations; Processor logic design, Processor organization, Bus organization, Processor unit employing a scratch pad memory, Accumulator, Design of ALU, Design of status register, Design of processor unit with control variables, Design of accumulator , Control logic design, Single flip flop/state method, Sequence register and decoder method, PLA control, Micro program control.

Text Books

1) Operational Amplifiers and Linear Integrated Circuits, Robert. F. Coughlin and Frederick F. Driscoll, PHI Learning Pvt. Ltd, Sixth Edition, 2008.

2) Digital Logic and Computer design, M. Morris Mano, PHI Learning Pvt. Ltd, 2008

Reference Books

1) Opamp and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI Learning Pvt. Ltd, Fourth Edition, 2008.

2) Digital Design, M. Morris Mano and Michael D. Ciletti, PHI Learning Pvt. Ltd, Fourth Edition,2008.

PET7J010 CMOS BASED DESIGN 3-0-0

MODULE-I (8 Hours)

Introduction to MOS Device-MOS Transistor, MOS models;MOS Transistor under static conditions; threshold voltage; Resistive operation, saturation region,;channel length modulation; body effect; DC transfer characteristics; Tristate inverters, velocity saturation; Hot carrier effect, drain current Vs voltage charts, sub threshold conduction; MOS structure capacitance; CMOS logic, fabrication and layout, stick diagrams.

MODULE-II (8 Hours)

CMOS Processing-CMOS technologies, wafer formation photolithography channel formation, isolation, gate oxide, gate source, drain formation, contacts and metallization; layout design rules, design rule checking.

MODULE-III (8 Hours)

Circuit Characterization & Performance Estimation-Delay estimation; transistor sizing; power dissipation; Sheet resistance, area capacitance, design margin, reliability; Scaling models, scaling factor for device parameters, Advantages and Limitations of scaling.

MODULE-IV (6 Hours)

Design of Combinational Logic-Static CMOS design, complementary CMOS, static properties, complementary CMOS design, Power consumption in CMOS logic gates, dynamic or glitching transitions, Design to reduce switching activity; Radioed logic, DC VSL, pass transistor logic.

ADDITIONAL MODULE (Terminal Examination-Internal) (6 Hours)

Differential pass transistor logic;sizing of level restorer, sizing in pass transistor; Dynamic CMOS design; Domino logic, optimization of Domino logic; NPCMOS; Designing logic for reduced supply voltages.

Reference Books

1. CMOS VLSI DESIGN-Nail H.E. Weste & David Harris, Ayan Banerjee,Pearson Education,4th edition,2011
2. CMOS Digital integrated circuits , Sung-Mo-Kanga and Yusuf Leblebici,TataMc Graw Hill New Delhi -2003.
3. Modern VLSI Design,Wayne Wolf, Prentice Hall -2nd Edition, 1998.
4. CMOS VLSI Design: A Circuits and Systems Perspective, Nail H.E. Weste & David Money Harris,- Addison Wesley, 3rd edition,2005.

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:

· Able to understand the application areas of IOT

· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks

· Able to understand building blocks of Internet of Things and characteristics.

Module I

Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II

M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III

Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV

IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:

1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:

1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1- 118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

**Module -1(6 Hours)**

Fundamental and process of fabrication

The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)

Nano-Device and Components:

Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics (elastic, thermal and kinetic material properties).

Module-3 (10 Hours)

Quantum Electronics:

Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)

Bio-Device and application

Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)

Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:


1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives,
   Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, “Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.
Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)

Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)

Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)

Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)

Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

## PCP7H013 ENTREPRENEURESHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

Module III

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Reference Book:

1. Entrepreneurship Development and Management, Vasant Desai, HPH
2.Entrepreneurship Management, Bholanath Dutta, Excel Books

3 Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

## PCP7H014 E-Commerce & ERP

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, Building own Website,InternetSecurity

Module II

E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center) , Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices

- Business process Management, Functional modules.

Module IV

ERP IMPLEMENTATION: Planning Evaluation and selection of ERP systems, Implementation life cycle - ERP implementation, Methodology, Data Migration, Success and Failure factors of ERP Implementation. Extended ERP systems and ERP add-ons -CRM, SCM, Manufacturing prospective, Business analytics .

**Reference Book:**

1. E- Commerce and Enterprise Resource Planning ; CSV Murthy, HPH
2. Enterprise Resource Planning- Concepts and Practices ; V K Garg and N K Venkatkrishna, PHI
3. Enterprise Resource Planning; Alexix Leon ; TMH

## PCP7H015 Business Regulatory Framework

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

Module – II

Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

Module- III

Consumer Protection Law: Consumers, Rights of Consumers, Redressal Machinery under the Act, Procedure of Complaint, Relief available to the consumers, Procedure of filing appeal, Powers of Redressal agencies, Unfair Trade Practices. Overview of Competition Act,

Module – IV

Company Law:Indian Companies Act 2013, Salient features and Classes of Company. Lifting of corporate veil, Procedure of Incorporation and Certificate of commencement of business, Memorandum and Articles of Association, Doctrine of ultra vires and Indoor Management, Management of Company: Qualification, Appointment of Directors, Company Meetings, Resolutions, Winding-up of Companies and their modes.

Reference:

1. Business Regulatory Framework–Mohapatra and Patra,HPH
2. Business Law – N D Kapoor, SChand
3. Business Law – Pathak, Tata Mc GrawHill
4. Legal frame work,Oxford.