RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

IV B.Tech. I Sem.

L	T	P	C
3	1	0	3

(A0424157) OPTICAL COMMUNICATIONS

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. To learn the basic concepts of fibre optics communications.
2. To make the students learn the system with various components or process for various applications.
3. To enlighten the student with latest trends in optical communications.

COURSE OUTCOMES:

1. Attain the knowledge of basic optical fiber communication systems and learn the latest trends in optical communications.
2. Recognize and classify the structures, types and channel impairments like losses and dispersion in optical fibers.
3. Classify optical sources and detectors and analyze various coupling losses.
4. Understand the design issues in deploying an optical communication system.

Mapping COs with POs & PSOs:

CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	1	-	-	-	-	-	-	-	-	-	1	-	2
CO2	1	3	2	-	-	-	-	-	-	-	-	-	2	1	-
CO3	1	2	3	-	-	-	-	-	-	-	-	-	2	-	2
CO4	1	2	3	-	-	-	-	-	-	-	-	-	-	2	-

UNIT-I OVERVIEW OF OPTICAL FIBER COMMUNICATION

: historical development, the general system, advantages of optical fiber communications. Optical fiber wave guides introduction, ray theory transmission, total internal reflection, acceptance angle, numerical aperture, skew rays.

UNIT-II CYLINDRICAL FIBERS

Modes, vnumber, mode coupling, step index fibers, graded index fibers. Single mode fibers cut off wavelength, mode field diameter, effective refractive index. Fiber materials:glass, halide, active glass, chalcogenide glass, plastic optical fibers.

UNIT-III SIGNAL DISTORTION IN OPTICAL FIBERS

Attenuation, absorption, scattering and bending losses, core and cladding losses. Material dispersion, waveguide dispersion, polarization mode dispersion, intermodal dispersion. Pulse broadening

UNIT-IV OPTICAL SOURCES AND DETECTORS

Optical sources leds, structures, materials, quantum efficiency, power, modulation, power bandwidth product. Injection laser diodes modes, threshold conditions, external quantum efficiency, laser diode rate equations, resonant frequencies. Reliability of led&ild. Optical detectors physical principles of pin and apd, detector response time, temperature effect on avalanche gain, comparison of photo detectors.

UNIT-V OPTICAL FIBER CONNECTORS

Connector types, single mode fiber connectors, connector return loss. Fiber splicing splicing techniques, splicing single mode fibers. Fiber alignment and joint loss multimode fiber joints, single mode fiber joints,.

UNIT-VI OPTICAL SYSTEM DESIGN

Considerations, component choice, multiplexing. Pointto point links, system considerations, link power budget with examples. Overall fiber dispersion in multi mode and single mode fibers, rise time budget with examples. Wdm, necessity, principles, types of wdm, measurement of attenuation and dispersion

TEXT BOOKS:

1. Optical Fiber Communications – Gerd Keiser, Mc GrawHill International edition, 3rd Edition, 2000
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

REFERENCE BOOKS:

1. Fiber Optic Communications – D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

e-Resources and Digital Material:

1. https://archive.nptel.ac.in/courses/108/106/108106167/

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(A0425157) CELLULAR AND MOBILE COMMUNICATIONS

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. To enable the student to learn basic analog cellular system and its working operation.
2. To enable the student to study the design and evaluation of AMPS system.
3. To enable the student to understand various digital cellular systems.
4. To enable the student to understand various multiple access techniques.

COURSE OUTCOMES:

1. Attain the knowledge of fundamentals in cellular radio system design and its evolution.
2. Measure the co channel interference in the system designed and can evaluate the cell coverage in various environments.
3. Understands the concepts of antenna design in cellular systems.
4. Gain knowledge of numbering the radio channels, channel sharing and hand off in cellular.
5. Ability to work in advanced research wireless and mobile cellular systems.

Mapping COs with POs & PSOs:

CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	1	3	2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	2	2	1	-	-	-	-	-	-	-	-	-	1	-	1
CO4	2	3	1	-	-	-	-	-	-	-	-	-	-	-	2
CO5	2	2	3	-	-	-	-	-	-	-	-	-	-	1	-

UNIT-I INTRODUCTION TO CELLULAR MOBILE SYSTEMS

A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, hexagonal shaped cells, elements of mobile radio system design, general description of the problem, concept of frequency channels, cochannel interference reduction factor, desired c/i from a normal case in a omni directional antenna system, cell splitting,

UNIT-II INTERFERENCE

Introduction to cochannel interference, real time cochannel interference, cochannel measurement, design of antenna system, antenna parameters and their effects, non cochannel interference. Cell site and mobile antennas: omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

UNIT-III CELL COVERAGE FOR SIGNAL AND TRAFFIC

Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

UNIT-IV FREQUENCY MANAGEMENT, CHANNEL ASSIGNMENT AND HANDOFF

:: numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells. Handoff: types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff

UNIT-V MULTIPLE ACCESS TECHNIQUES IN MOBILE COMMUNICATIONS

Fdma/tdma,cdma, fdm/tdm cellular systems ,cellular cdma, comparison. Soft capacity, erlang capacity.

UNIT-VI DIGITAL CELLULAR SYSTEMS

Global system for mobile (gsm), gsm architecture, gsm air specifications, gsm channels, mobility management, network signaling,

TEXT BOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rdEdn., 2006.
2. Wireless Communications Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

REFERENCE BOOKS:

1. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.
2. Wireless Communication and Networking – Jon W. Mark and WeihuaZhqung, PHI, 2005.
3. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

e-Resources and Digital Material:

1. https://onlinecourses.nptel.ac.in/noc21_ee66/preview

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(A0426157) VLSI DESIGN

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. To know the fabrication process of CMOS technology and its layout design rules
2. To study the concepts of CMOS inverters and their sizing methods
3. To understand basic circuit concepts and designing Arithmetic Building Blocks.
4. To have an overview of Low power VLSI.
5. To know the concepts of power estimation and delay calculations in CMOS circuits.

COURSE OUTCOMES:

1. Understand and calculate device and circuit parameters of MOSFET.
2. Draw the Stick diagram and Layout diagrams for nMOS/CMOS circuits.
3. Design basic logic functions with different logic styles and compare various logic design styles on their performance metrics.
4. Study the importance of low power design and basic techniques for low power design.
5. Impart the research skills and encourage continuous learning in the area of microelectronics and VLSI design.

Mapping COs with POs & PSOs:

CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	-	2	3	-	-	-	-	-	-	-	-	-	-	1	-
CO3	1	1	3	-	-	-	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	3	2	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	-	2	3	-	-	2

UNIT-I INTRODUCTION

Introduction to ic technology – mos, pmos, nmos, cmos technologies oxidation, lithography, diffusion, ion implantation, metallization, encapsulation, integrated resistors and capacitors, types of packages sets significance.

UNIT-II BASIC ELECTRICAL PROPERTIES

Basic electrical properties of mos circuits: enhancement mode transistor action, idsvds relationships, mos transistor threshold voltage, gm, gds; pass transistor, inverter with ntype mosfet load, enhancement load nmos, depletion load nmos, cmos inverter analysis and design, bicmos inverters.

UNIT-III VLSI CIRCUIT DESIGN PROCESSES

Mos layers, stick diagrams, design rules and layout: lambda based cmos design rules for wires, contacts and transistors. Layout diagrams for nmos and cmos inverters and gates.

UNIT-IV BASIC CIRCUIT CONCEPTS

Sheet resistance rs and its concept to mos, area capacitances of layers, standard unit of capacitance cg, area capacitance calculations, the delay unit, inverter delays, estimation of cmos inverter delay, wiring capacitances, choice of layers.

UNIT-V DESIGNING ARITHMETIC BUILDING BLOCKS

Design of adders: static, dynamic, manchester carry chain, carry bypass adder, csa, carry look ahead adder ,linear csla, square root csla. Multiplier: definition, partial product generation, partial product accumulation, final addition, 4x4 array multiplier,4x4 carry save multiplier, multiplier summary. Brief elementary introduction to fpgas, cplds

UNIT-VI INTRODCTION TO LOW POWER VLSI

Introduction, overview of power consumption,sources of power dissipation, static power dissipation, active power dissipation, low power design through voltage scaling, estimation and optimization of switching activity.

TEXT BOOKS:

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, EshraghianDougles and A. Pucknell, PHI, 2005 Edition.
2. CMOS digital integrated circuits analysis and design by SungMo Kand and Yusuf Leblebici, Tata McGraw Hill, 3rd edition.

REFERENCE BOOKS:

1. Introduction to VLSI Circuits and Systems John .P. Uyemura, JohnWiley, 2003
2. Modern VLSI Design Wayne Wolf, Pearson Education, 3rd Edition, 1997.
3. VLSI Technology – S.M. SZE, 2nd Edition, TMH, 2003.
4. Principles of CMOS VLSI Design Weste and Eshraghian, Pearson Education, 1999.
5. Digital Integrated Circuits – A design perspective, John M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, Pearson Education, 2rd Edition.

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/117106092

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(A0427157) DIGITAL IMAGE PROCESSING

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. To learn the digital image fundamentals.
2. To learn the sampling and reconstruction procedures.
3. To learn the various transforms used in image Processing.
4. To learn the various concepts of image enhancement, reconstruction and image compression.

COURSE OUTCOMES:

1. Understand the basics of image processing, concepts of Image transforms.
2. Choose appropriate technique for image enhancement both in spatial and frequency domains and understand basics of color image Processing.
3. dentify causes for image degradation and apply restoration techniques.
4. Understand the concepts of different Image segmentation techniques.
5. Choose the appropriate image compression techniques for their application.

Mapping COs with POs & PSOs:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	-	-	-	2	-	2	-
CO2	2	3	-	-	-	-	-	-	-	-	-	1	1	1	-
CO3	2	3	-	-	-	-	-	-	-	-	-	1	-	-	1
CO4	2	3	-	-	-	-	-	-	-	-	-	2	2	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	3	-	-	2

UNIT-I DIGITAL IMAGE FUNDAMENTALS

Definition of an image, digital image, and digital image processing, applications of digital image processing(brief note), fundamental steps in digital image processing, components of an image processing system, a simple image formation model, basic concepts in image sampling and quantization, representing digital images, spatial and graylevel resolution(brief note), some basic relationships between pixels, imaging geometry: some basic transformations translation, rotation, concatenation and inverse transformations

UNIT-II IMAGE TRANSFORMS

Introduction to the 2d fourier transform, 2d discrete fourier transform, some properties of 2d fft, other separable image transforms: walsh transform, hadamard transform, discrete cosine transform, haar transform, hotelling transform.

UNIT-III IMAGE ENHANCEMENT IN SPATIAL DOMAIN

Background, some basic gray level transformations: image negatives, log transformations, powerlaw transformations, piecewiselinear transformation functions: contrast stretching, graylevel slicing, bitplane slicing, definition of histogram, histogram processing: histogram equalization(brief note), histogram matching(specification), local enhancement, enhancement using arithmetic/logic operations: image subtraction, and image averaging(brief note), basics of spatial filtering: smoothing and sharpening filters(brief note). Image enhancement in the frequency domain: filtering in the frequency domain, smoothing filtersideal, butterworth, and gaussian lowpass filters, sharpening filters ideal, butterworth, and gaussian highpass filters

UNIT-IV IMAGE RESTORATION

A model of the image degradation/restoration process, noise models, restoration in the presence of noise only spatial filtering: mean filters, orderstatistics filters, and adaptive filters, periodic noise reduction by frequency domain filtering: bandreject, bandpass, and notch filters, linear, positioninvariant degradations, estimating the degradation function, inverse filtering, wiener filtering.

UNIT-V IMAGE SEGMENTATION

Introduction, detection of discontinuities: point detection, line detection, edge detection; edge linking and boundary detection: local processing, global processing hough transform, and graph theoretic technique; thresholding: foundation, role of illumination, global thresholding, adaptive thresholding; region based segmentation: basic formulation, region growing, region splitting and merging.

UNIT-VI IMAGE COMPRESSION

Fundamentals: coding redundancy, interpixel redundancy, psychovisual redundancy, fidelity criteria, image compression models, source encoder and decoder, elements of information theory: measuring information; error free compression: variable length coding, huffman coding, arithmetic coding, lzw coding, bit plane coding, run length coding, lossless predictive coding; lossy compression: lossy predictive coding, and transform coding.

TEXT BOOKS:

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education,2nd Education, 2002.
2. Digital image processing by S.Jayaraman, S.Esakkirajan & T.Veera Kumar, Tata McGraw Hill, 2010.

REFERENCE BOOKS:

1. Fundamentals of Digital Image processing – A.K.Jain , PHI.

2. Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA, 2004.
3. Digital Image Processing – William K. Pratt, John Wilely, 3rd Edition, 2004.
4. Fundamentals of Electronic Image Processing – Weeks Jr., SPIC/IEEE Series, PHI.

e-Resources and Digital Material:

1. https://onlinecourses.nptel.ac.in/noc19_ee55/preview

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(A0428157) SATELLITE COMMUNICATIONS

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. To introduce the basic principles of Satellite Communication systems, orbital mechanics, launchers.
2. To know the different subsystems of satellites.
3. To introduce the basic concepts and designing of Satellite links.
4. To introduce the basic concepts of earth station transceiver.
5. To know the basics of direct broadcast satellite television
6. To know the basic concepts of various multiple access techniques and GPS systems.

COURSE OUTCOMES:

1. To introduce the basic principles of satellite communication system, orbital mechanics and launchers.
2. To understand the concepts of satellite subsystems and designing of satellite uplink and downlinks.
3. To analyze the concepts of various multiple access techniques.
4. To introduce the basic concepts of earth station transmitter and receiver.
5. To know the concepts of global positioning system and its operation.

Mapping COs with POs & PSOs:

CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	-	1	-	-	-	-	-	-	-	-	-	2	-
CO2	-	-	3	-	-	-	-	-	-	2	1	-	2	-	-
CO3	-	2	-	1	-	-	-	-	-	3	-	-	2	-	2
CO4	-	-	-	-	3	1	-	-	-	2	-	-	-	1	-
CO5	-	-	-	-	-	-	1	-	-	3	-	2	-	-	1

UNIT-I INTRODUCTION

Background, a brief history of satellite communications, satellite communications in 2000, overview of satellite communications orbital mechanics and launchers: orbital mechanics developing the equations of the orbit, kepler's three laws of planetary motion, describing the orbit of a satellite, locating the satellite in the orbit, locating the satellite with respect to the earth, orbit elements. Look angle determination the sub satellite point, elevation angle calculation, azimuth angle calculation, specialization to geostationary satellites. Orbital perturbations longitudinal and inclination changes. Orbit determination, launches and launch vehicles expandable launch vehicles, placing satellites into geostationary orbit. Orbital effects in communication systems performance.

UNIT-II SATELLITE SUBSYSTEMS

Attitude and orbit control system, telemetry, tracking, command and monitoring, power systems, communication subsystems description of the communications systems, transponders, satellite antennas basic antenna types and relationships, satellite antennas in practice equipment reliability and space qualification redundancy.

UNIT-III SATELLITE LINK DESIGN

Introduction, basic transmission theory, system noise temperature and gain to temperature (g/t) ratio noise temperature, calculation of system noise temperature, noise figure and noise temperature/t ratio for earth stations. Design of down linkbudgets, link budget example. Up link design, design of satellite links for specified carrier to noise (c/n)combining c/n and c/i values in satellite links, overall (c/n) with uplink and downlink attenuation, uplink and downlink attenuation in rain, uplink attenuation and (c/n)up, down link attenuation and (c/n)dn, system design for specific performance, satellite communication link design procedure.

UNIT-IV MULTIPLE ACCESSES

Introduction, frequency division multiple access (fdma): intermediation, calculation of c/n with inter modulation. Time division multiple access (tdma): bits, symbols, and channels, frame structure. Reference burst and preamble, unique word, guard times, synchronization in tdma networks, transmitter power in tdma networks, satellite switched tdma, onboard processing baseband processing transponders, satellite switched tdma with onboard processing. Demand access multiple access (dama), code division multiple access (cdma), spread spectrum transmission and reception.

UNIT-V DIRECT BROADCAST SATELLITE TELIVISION AND RADIO

C band and ku band home satellite tv, digital dbs tv,dbs tv system design ,dbs tv link budget, error control in digital dbs tv, master control station and uplink, installation of dbs tv antennas, satellite radio broadcasting, orbit considerations, coverage and frequency considerations.

UNIT-VI SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM

:introduction, radio and satellite navigation, gps position location principles position location in gps,gps time. Gps receivers and codes the c/a code. Satellite signal acquisition, gps navigation message, gps signal levels, timing accuracy, gps receiver operation.

TEXT BOOKS:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE Wiley Publications, 2nd Edition, 2006.
2. Satellite Communications – Dennis Roddy, McGraw Hill, 3rd Edition, 2001.

REFERENCE BOOKS:

1. Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication –Dr.D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite communications Robert M.Gagliardi, CBS publications, first edition 1987.

e-Resources and Digital Material:

1. https://archive.nptel.ac.in/courses/117/105/117105131/

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(A0509157) COMPUTER NETWORKS

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. An understanding of the overriding principles of computer networking, including protocol design, protocol layering, algorithm design, and performance evaluation.
2. An understanding of computer networking theory, including principles embodied in the protocols designed for the application layer, transport layer, network layer, and link layer of a networking stack.
3. An understanding of specific implemented protocols covering the application layer, transport layer, network layer, and link layer of the Internet (TCP/IP) stack
4. An understanding of security issues

COURSE OUTCOMES:

1. Understand the basis and structure of an abstract layered protocol models like OSI reference model and TCPIP reference model
2. Analyse and compare a number of data link, network, and transport layer protocols
3. Analyse various related technical, administrative and social aspects of specific computer network protocols
4. Analyse the features and operations of various application layer protocols such as Http, DNS, and SMTP and Have a basic knowledge of the use of cryptography and network security

Mapping COs with POs & PSOs:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	-	-	-	1	-
CO2	1	2	3	-	-	-	-	-	-	-	-	-	2	-	2
CO3	2	-	-	-	-	3	2	-	-	-	-	-	2	-	1
CO4	-	-	-	-	-	-	-	-	-	-	2	3	-	2	-

UNIT-I Introduction

:network hardware, network software, references models. The physical layer: guided transmission media, communication satellites, the public switched telephone network the local loop: modern adsl, and wireless, trunks and multiplexing, switching.

UNIT-II The Data Link Layer
Data link layer design issues, elementary data link protocols, and sliding window protocols.

UNIT-III The Medium Access Control Sub layer
Multiple access protocols, ethernet ethernet cabling, manchester encoding, the ethernet mac sub layer protocol. The binary exponential back off algorithm, ethernet performance, switched ethernet, fast ethernet. Wireless lans the 802. 11 protocol stack, the 802. 11 physical layer, the 802. 11 mac sub layer protocol, the 802. 11 frame structure.

UNIT-IV The Network Layer
:network layer design issues, routing algorithms (shortest path, flooding, distance vector, link state and hierarchical routing, broad cast routing, multicast routing), congestion control algorithms, internetworking, ipv4 addresses.

UNIT-V The Transport Layer
The transport service, elements of transport protocols, the internet transport protocols: udp, the internet transport protocols: tcp,

UNIT-VI The Application Layer
Dns the domain name system, electronic mail, the world wide web.

TEXT BOOKS:

1. Computer Networks, Andrew S. Tanenbaum, Fouth Edition, Pearson Education.
2. TCP/IP Protocol suite Fourth Edition Behrouz A.Forouzan

REFERENCE BOOKS:

1. Computer Communications and Networking Technologies, Michael A. Gallo, William M. Hancock, Cengage Learning.
2. Computer Networks, Bhushan Trivedi, Oxford.
3. Computer Networks: Principles, Technologies and Protocols for Network Design, Natalia Olifer, Victor Olifer, Wiley India.
4. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill.
5. Understanding Communications and Networks, Third Edition, W.A.Shay, Cengage Learning.
6. Computer and Communication Networks, Nader F. Mir, Pearson Education

e-Resources and Digital Material:

1. https://archive.nptel.ac.in/courses/106/105/106105183/

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(A0484157) MICROWAVE AND OPTICAL COMMUNICATIONS LAB

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. To verify the characteristics of various microwave components using microwave test bench.
2. Initiate an expose the newcomers to exciting area of optical communication

COURSE OUTCOMES:

1. The foundation education in Microwave and optical communications and make the student to analyze the operation of each device.
2. Study and analysis of microwave equipments and optical components
3. Ability to design and conduct experiments, analyze and interpret data
4. Demonstrate the skill to use modern engineering tools and equipment to analyze problems

Mapping COs with POs & PSOs:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	3	1	2	-	-	-	-	-	-	-	-	-	3	1	-
CO2	1	2	2	-	-	-	-	-	-	-	-	-	2	-	1
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	2	-
CO4	2	2	2	-	-	-	-	-	-	-	-	-	-	-	2

Minimum 8 Experiments to be conducted:

Part – A (Any 4 Experiments):

1) Reflex Klystron Characteristics.
2) Gunn Diode Characteristics.
3) Attenuation Measurement.
4) Directional Coupler Characteristics.
5) Impedance Measurement.
6) Waveguide parameters measurement.

7) Scattering parameters of Directional Coupler.

8) Scattering parameters of Magic Tee.

Part – B (Any 4 Experiments):

1) Characterization of LED.
2) Characterization of Laser Diode.
3) Intensity modulation of Laser output through an optical fiber.
4) Measurement of Data rate for Digital Optical link.
5) Measurement of NA.
6) Measurement of losses for Analog Optical link.
7) Radiation Pattern Measurement of Antennas (at least two antennas).

TEXT BOOKS:

1. Optical Fiber Communications – Gerd Keiser, Mc GrawHill International edition, 4th Edition, 2008.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

REFERENCE BOOKS:

1. Fiber Optic Communications – D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

e-Resources and Digital Material:

1. https://www.iitk.ac.in/mimt_lab/vlab/index.php

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

IV B.Tech. I Sem.

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(A0485157) DSP & IMAGE PROCESSING LAB

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. To design real time DSP systems and real world applications.
2. To implement DSP algorithms using both fixed and floating point processors.
3. To generate the basis function of different transforms.
4. To perform Image processing techniques.

COURSE OUTCOMES:

1. Able to analyze the systems using DFT.
2. Understand circular convolution, and how circular convolution can be achieved via the DFT.
3. Alter the sampling rate of signal using decimation and interpolation.
4. Able to design digital FIR filters using window method and IIR filters by prototype method analog filters then transform to digital filters.
5. Able to perform various image processing operations such as enhancement, compression, edge detection, restoration

Mapping COs with POs & PSOs:

CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	-	2	-	-	-	-	-	-	1	-	-	1
CO2	2	2	1	-	2	-	-	-	-	1	-	-	1	-	-
CO3	1	2	3	-	2	-	-	-	-	-	-	-	-	-	-
CO4	2	1	2	-	2	-	-	-	-	-	-	-	2	-	-
CO5	3	2	1	-	2	1	-	-	-	-	-	2	-	-	2

I. **DSP LAB (Any 5 of the following):**

1) Simulation of discrete time systems.

2) Verification of DTFT properties.

3) Stability test.

4) Effect of sampling in frequency and time domain.

5) Design of analog filters.

6) Realization of IIR and FIR transfer functions.

7) Design of IIR & FIR filters.

8) Design of tunable digital filters.

9) Multirate signal processing techniques: Decimation and interpolation.

II. **Image Processing LAB (Any 5 of the following)**:

1) Verification of image scaling properties.

2) To generate the basis function of different transforms.

3) Image enhancement using special domain and frequency domain techniques.

4) Image restoration using inverse and weiner filtering.

5) Edge detection using various operators.

6) Image compression techniques.

TEXT BOOKS:

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education,2nd Education, 2002.
2. Digital image processing by S.Jayaraman, S.Esakkirajan & T.Veera Kumar, Tata McGraw Hill, 2010.

REFERENCE BOOKS:

1. Fundamentals of Digital Image processing – A.K.Jain , PHI.
2. Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA, 2004.
3. Digital Image Processing – William K. Pratt, John Wilely, 3rd Edition, 2004.
4. Fundamentals of Electronic Image Processing – Weeks Jr., SPIC/IEEE Series, PHI.
5. Digital Image Processing with Matlab, Elsevier

e-Resources and Digital Material:

1. http://vlabs.iitkgp.ernet.in/dsp/

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1	2	0	1

(A0138157) MOCK INTERVIEWS & GROUP DISCUSSIONS

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**
Course Enrichment Relevance	**Professional Ethics**

COURSE OBJECTIVES:

1. To make the students aware of the GD session in selection process
2. To learn the art of presentation and organising meetings
3. To learn about the benefits of team work at the work place
4. To learn the process of interviews an also extempore sessions
5. To motivate the students with the help of popular motivational stories

COURSE OUTCOMES:

1. The students can develop good leadership skills, communication skills, good interpersonal skill, analytical and lateral thinking.
2. To apply the principles of a good presentation and develop the art of presenting effectively
3. To become a good team player by learning about the advantages of team building
4. The student would be able to perform well in interviews and extempore sessions
5. The student also learns the importance of developing self motivation by being influenced by successful stories.

Mapping COs with POs & PSOs:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	2	2	3	-	3	2	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	3	-	1	-
CO3	-	-	-	-	-	-	-	2	3	3	2	-	-	-	3
CO4	-	-	-	-	-	2	-	-	-	3	-	-	-	-	-
CO5	-	-	-	-	-	-	-	2	2	3	-	3	-	-	2

UNIT-I GROUP DISCUSSION

Introduction types of gdd topics do's and don't's in gdgd tips difference between gd and debate mock gd's and debate role play in a group discussion

UNIT-II PRESENTATION SKILLS

Presentation evaluation just a minute speeches creating a power point presentation body language conclusions planning a meeting analyzing a meeting analyzing agendas round table discussions small group presentation shaking hands logging silences talent search to speak or not to speakrelationships.

UNIT-III TEAM WORK SKILLS

Dimensions of team building components of team building purpose of teams building blocks for team types of team team leader skills.

UNIT-IV INTERVIEW SKILLS

: introduction – concept – types of interviews – characteristics of interviewer – characteristics of interviewee – recruitment interview – appraisal interview – research interview.

UNIT-V Extempore

Introduction to extempore common extempore topics – swot analysis

UNIT-VI Motivational Themes

How to win friends and influence people by dale carnegie, the gogiver: a little story about a powerful business idea by bob burg and john david mann, how to talk to anyone – 92 little tricks for big success in relationship by leil lowndes.

TEXT BOOKS:

1. The GoGiver: A little story about a powerful Business idea by Bob Burg and John David Mann
2. How to talk to anyone – 92 little tricks for big success in relationship by Leil Lowndes

REFERENCE BOOKS:

1. How to win Friends and influence people by Dale Carnegie.
2. The GoGiver: A little story about a powerful Business idea by Bob Burg and John David Mann
3. How to talk to anyone – 92 little tricks for big success in relationship by Leil Lowndes

e-Resources and Digital Material:

1. https://archive.nptel.ac.in/IndustryAssociate/Soft_Skills_Training.html

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(A0429157) DIGITAL TV TECHNOLOGY

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. To study the basic principles and development of the TV systems
2. To study the analysis and synthesis of TV pictures, receiver picture tubes and Television tubes
3. To study the principles of monochrome television transmitter and receiver systems
4. To study the various colour TV systems with greater emphasis PAL systems
5. To study the advance topics in TV systems
6. To learn protected skills for working with digital TV technology

COURSE OUTCOMES:

1. Analyze and understand Colour T.V System
2. Understand fundamental techniques of Different T.V. standards
3. Understand Advanced T.V. Technology.
4. Understand different video recording, display and its consumer application.

Mapping COs with POs & PSOs:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	1	1	-	-	-	1	-	-	-	-	-	-	1	2	-
CO3	-	-	2	-	-	1	1	-	-	-	-	-	-	1	3
CO4	-	-	2	-	-	-	1	-	-	-	-	-	1	-	2

UNIT-I FUNDAMENTALS OF TELEVISION AND DISPLAY

Television basics: factors of tv systems, composite video signal, signal transmission and channel bandwidth etc.. , color tv systems, color fundamentals, mixing of colors, color perception, chromaticity diagram.

UNIT-II TV STANDARDS

Ntsc, pal, secam systems, color tv transmitter, high level, low level transmitters, color tv receivers, remote control, antennas for transmission. Tv alignment and fault finding with wobbuloscope and tv pattern generation, field strength meter

UNIT-III Introduction to Digital TV

Principle of digital tv, digital tv signals and parameters, digital tv transmitters, mac signals, advanced mac signal transmission, digital tv receivers, basic principles of digital video compression techniques, mpeg1, mpeg2, mpeg4, video compression itustandards(h.). Digital tv recording techniques.

UNIT-IV HDTV standards and systems

Hdtv transmitter and receiver/encoder, digital tv satellite systems, video on demand, cctv, catv, direct to home tv, set top box with recording facility, conditional access system (cas), 3d tv systems, digital broadcasting, case study (cricket match, marathon, football match).

UNIT-V VIDEO RECORDERS

Ip audio and video, iptv systems, mobile tv, video transmission in 3g mobile system, ipod(mpeg4 video player), digital video recorders, personal video recorders, wifi audio /video transmitter and receivers. Video projectors, hd video projectors, video intercom systems/ video door phones.

UNIT-VI CONSUMER APPLICATIONS

Color tv digital cameras, camcoders, handycams, and digicams. Display devices: led, lcd, tft, plasma, hdtv, cd/ dvd player, mp3 player, blue ray dvd players, mpeg, and mp3.

TEXT BOOKS:

1. Television and video Engineering, A. M. Dhake, TMH Publication.
2. Video Demisified, Kelth jack, Penram International Publication.
3. Audio Video Systems, R.G. Gupta, Technical Education.

REFERENCE BOOKS:

1. S. P. Bali, “Color TV Theory and Practice”.
2. Bernard Grobb, Charles E, “Basic TV and Video Sytems”
3. Gulathi, “Monochrome & Color TV”.

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/109102156

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(A0430157) SPREAD SPECTRUM COMMUNICATIONS

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. To understand the general concepts of spread spectrum
2. To generate spread spectrum signals.
3. To study various applications of spread spectrum.
4. To learn the working operation of CDMA systems.

COURSE OUTCOMES:

1. Demonstrate knowledge in various types of spread spectrum and code division multiple access digital cellular systems and generation and detection of spread spectrum signals.
2. Analyse problems in direct sequence and avoidance type spread spectrum systems.
3. Design and develop spread spectrum communication systems.
4. Choose proper multiple accessing methods depending on channel model.

Mapping COs with POs & PSOs:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	2	2	-	-	-	-	-	-	2	-
CO2	2	-	-	-	2	2	1	-	-	-	-	2	2	-	-
CO3	2	-	-	-	2	2	1	-	-	-	-	-	-	-	2
CO4	1	-	-	-	2	-	2	-	-	-	-	-	1	2	1

UNIT-I FUNDAMENTALS OF SPREAD SPECTRUM

General concepts, direct sequence (ds)), pseudo noise (pn), frequency hopping, time hopping, comparison of modulation methods, hybrid spread spectrum systems, chirp spread spectrum, base band modulation techniques.

UNIT-II ANALYSIS OF DIRECT SEQUENCE SPREAD SPECTRUM SYSTEMS

Properties of pn sequences, classes of periodic sequences, properties of m sequences, partial correlation, pn signal from pn sequences, partial correlation of pn signals, the pn signal, dispreading the pn signal, interference rejection, output signal to noise ratio, antijam characteristics, interception, energy bandwidth efficiency.

UNIT-III ANALYSIS OF AVOIDANCETYPE SPREAD SPECTRUM SYSTEMS

The frequency hopped signal, interference rejection in a frequency hopping receiver, the time hopped signal. Generation of spread spectrum signals: shift register sequence generators, discrete frequency synthesizers, saw device pn generators, charge coupled devices, digital tapped delay lines.

UNIT-IV DETECTION OF SPREAD SPECTRUM SIGNALSTRACKING

Coherent direct sequence receiver, other method of carrier tracking, delay lock loop analysis, taudither loop, coherent carrier tracking, non coherent frequency hop receiver. Detection of spread spectrum signalsacquisition: acquisition of spread spectrum signals, acquisition cell by cell searching, reduction of acquisition time, acquisition with matched filters, matched filters for pn sequences, matched filters for frequency hopped signals, matched filters with acquisition aiding waveform.

UNIT-V APPLICATION OF SPREAD SPECTRUM TO COMMUNICATIONS

General capabilities of spread spectrum, multiple access considerations, energy and bandwidth efficiency in multi access, selective calling and identification, antijam considerations, error correction coding, intercept consideration (ai), miscellaneous considerations, examples of spread spectrum system.

UNIT-VI CODE DIVISION MULTIPLE ACCESS DIGITAL CELLULAR SYSTEMS

Introduction, cellular radio concept, cdma digital cellular systems, specific examples of cdma digital cellular systems.

TEXT BOOKS:

1. George.R.Cooper and Clare D.McGillem, Modern Communications and Spread Spectrum, McGraw Hill.
2. Roger L.Peterson, Rodger E.Ziemer & David E.Ziemer & David E.Both, Introduction to spread spectrum communications, Prentice hall, 1995.

REFERENCE BOOKS:

1. Dr.Kamilo Feher, Wireless Digital Communications: Modulation & Spread Spectrum Applications, PHI, 1999.
2. Upena Datal, Wireless Communication, Oxford Higher Education, 2009.
3. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2005.

e-Resources and Digital Material:

1. https://onlinecourses.nptel.ac.in/noc20_ee34/preview#:~:text=A%20spread%20spectrum%20communication%20system,to%20non%2Dspread%20signals%2C%20inherent

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(A0431157) DSP PROCESSORS ARCHITECTURES AND APPLICATIONS

Course Composition	**Professional Core course (PC)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. To understand the concept of DSP Architecture & comparison of this with that of microprocessors.
2. To understand addressing modes, instruction sets , pipelining and application programs in TMS320C54XX processor
3. To understand the architectural issues of programmable DSP devices and their relationship to the algorithmic requirements, architectures of commercially popular programmable devices and the use of such devices for software development and system design
4. To highlight the suitability of programmable DSP devices for various application areas and motivate to design systems around these devices.

COURSE OUTCOMES:

1. To become familiar with fundamentals of DSP processors and architectures.
2. To become familiar with computational accuracy in DSP implementations.
3. To understand architectures of programmable DSP devices and processors
4. Students can able to implement basic DSP algorithms.
5. To understand interfacing and applications of programmable DSP devices.

Mapping COs with POs & PSOs:

CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	-	1	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	1	-	-	-	-	-	-	3	2	-	-	-	1
CO3	-	3	-	1	-	-	-	-	-	2	-	-	2	-	2
CO4	-	-	-	-	3	2	-	-	-	1	-	-	-	2	-
CO5	-	-	-	-	-	-	2	-	-	3	-	1	-	-	2

UNIT-I ARCHITECTURE OF DSP PROCESSOR (TMS320C5X)

Introduction, bus structure, central arithmetic logic unit(calu),auxiliary register alu (arau),index register(indx),auxiliary register compare register(arcr),block move address register(bmar)block repeat registers(rptc,brcr, pasr,paer), parallel logic unit(plu),memory mapped registers, program controller, some flags in the status registers

UNIT-II COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS

:number formats for signals and coefficients in dsp systems, dynamic range and precision, sources of error in dsp implementations, a/d conversion errors, dsp computational errors, d/a conversion errors, compensating filter.

UNIT-III ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES

Basic architectural features, dsp computational building blocks, bus architecture and memory, data addressing capabilities, address generation unit, programmability and program execution, speed issues, features for external interfacing.

UNIT-IV PROGRAMMABLE DIGITAL SIGNAL PROCESSORS

Commercial digital signal processing devices, data addressing modes of tms320c54xx dsps, data addressing modes of tms320c54xx processors, memory space of tms320c54xx processors, program control, tms320c54xx instructions and programming, onchip peripherals, interrupts of tms320c54xx processors, pipeline operation of tms320c54xx processors.

UNIT-V IMPLEMENTATIONS OF BASIC DSP ALGORITHMS

:the quotation, fir filters, iir filters, interpolation filters, decimation filters, implementation of fft algorithms: an fft algorithm for dft computation, a butterfly computation, overflow and scaling, bit reversed index generation, an 8point fft implementation on the tms320c54xx, computation of the signal spectrum.

UNIT-VI INTERFACING &APPLICATIONS OF PROGRAMMABLE DSP DEVICES

:dsp based biotelemetry receiver, a speech processing system, an image processing system, memory interfacing, synchronous serial interface, mcbsp, a codec interface circuit.

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. Digital Signal Processors, Architecture, Programming and Applications – B. Venkata Ramani and M. Bhaskar, TMH, 2004.

REFERENCE BOOKS:

1. Digital Signal Processing – Jonathan Stein, John Wiley, 2005.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000.

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/108106149

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(A0432157) RADIO FREQUENCY IDENTIFICATION

Course Composition	**Professional Elective (PE)**
Course Category	**Employability**
Developmental Needs	**Global**

COURSE OBJECTIVES:

1. Introduce and define radiofrequency identification or RFID.
2. Identify the advantages and disadvantages of radiofrequency identification.
3. Demonstrate the difference between radiofrequency identification and barcodes.

COURSE OUTCOMES:

1. Students understand the technology and features of RFID.
2. Students know the history and operation of RFID.
3. To understand global privacy policy.
4. Students aware of regulations of RFID.
5. Students able to apply RFID technology for different areas.

Mapping COs with POs & PSOs:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO1	PSO2	PSO3
CO1	3	2	-	1	-	-	-	-	-	-	-	-	-	-	1
CO2	-	-	2	-	-	-	-	-	-	3	1	-	2	-	-
CO3	-	2	-	1	-	-	-	-	-	3	-	-	-	-	2
CO4	-	-	-	-	3	2	-	-	-	1	-	-	-	-	-
CO5	-	-	-	-	-	-	1	-	-	3	-	2	-	2	1

UNIT-I UNDERSTANDING RFID TECHNOLOGY

Introduction, rfid technology, the elements of an rfid system, coupling, range, and penetration, rfid applications, veri chip and mark of the beast.

UNIT-II A HISTORY OF THE EPC

Introduction, the distributed intelligent systems center, meanwhile, at procter & gamble, “low cost” rfid protocols, “low cost” manufacturing, the software and the network, privacy, harnessing the juggernaut, the six auto id labs, the evolution of the industry, the creation of epc global.

UNIT-III RFID AND GLOBAL PRIVACY POLICY

Introduction, definitions of privacy, definitions of personal information, history of current privacy paradigm, mapping the rfid discovery process, functions and responsibilities for chips, readers, and owners, privacy as a fundamental human right, constitutional rights.

UNIT-IV PRIVACY OF RFID

Introduction, understanding rfid's privacy threats. Rfid and the united states regulatory landscape.

UNIT-V REGULATION OF RFID

Introduction, current state of rfid policy, individuals, business, government, miscellaneous, integrity and security of the system, government access, health impact, labor impact

UNIT-VI APPLICATIONS

Rfid payments at exxonmobil, exxon mobil corporation, transforming the battlefield with rfid, logistics and the military, rfid in the pharmacy, cvs and auto id, project jump start, rfid in the store.

TEXT BOOKS:

1. Simson Garfinkel and Beth Rosenberg, "RFID Applications, Security, and privacy", Pearson Education
2. Steven Shepard, "Radio Frequency Identification", First edition, McGrawHill Professional.

REFERENCE BOOKS:

1. Radio Frequency and ELF Electromagnmetic Energies by R.Thimothy Hitchcock,Robert M.Patternson

e-Resources and Digital Material:

1. https://nptel.ac.in/courses/117102012