Syllabus
for
Final Year

B. Tech. Electronics and Telecommunication Engineering
Four Year (Eight Semesters) Course
w.e.f. (July 2009)

Department of Electronics and Telecommunication Engineering
Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
Lonere-402103, Dist-Raigad (MS)

Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY
LONERE-402103 (MS)
Syllabus for Final Year Electronics and Telecommunication Engineering
(Effective from year June 2009)

B. Tech. Final Year (Electronics and Telecommunication Engineering)											
Sr No.	**Semester**	**Name of the subject**	Weekly Load			**Credit**	**Theory**	**Test (test1 + test 2)**	**Practical/Oral**	**Term Work**	**TOTAL**
			L	**T**	**P**						
1	**Semester VII**	Biomedical Electronics	03	-	02	08	50	50	25	25	150
2		Computer Organization &System Software	03	-	02	08	50	50	-	25	125
3		Fiber Optics Communication	03	-	02	08	50	50	25	25	150
4		Microwave and Radar Engineering	03	-	02	08	50	50	25	25	150
5		Elective – I*	03	-	-	06	50	50	-	25	125
6		Project-I	-	-	06	06	-	-	-	50	50
		Total of Part I	15	-	14	44	250	250	75	175	750
7	**Semester VIII**	Digital Image Processing	03	-	02	08	50	50	25	25	150
8		Satellite Communication	03	-	02	08	50	50	-	50	150
9		Computer Networks	03	-	-	06	50	50	50	25	175
10		Embedded Systems Design	03	-	02	08	50	50	25	25	150
11		Elective – II**	03	-	-	06	50	50	-	25	125
12		Project-II	--	--	10	10	-	-	100	100	200
		Total of Part II	15	-	16	46	250	250	200	250	900

Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Department of Electronics and Telecommunication Engineering

w.e.f. (July 2009)

Semester VII

Sr. No.	Subject Code	Name of the subject	*Teaching Scheme*			
			Hrs/week			**Credits**
			L	**T**	**P**	
01	BET4101	Biomedical Electronics	03	-	-	06
02	BET4102	Computer Organization &System Software	03	-	-	06
03	BET4103	Fiber Optics Communication	03	-	-	06
04	BET4104	Microwave and Radar Engineering	03	-	-	06
05	BET4105	Elective – I*	03	-	-	06
06	BET4106	Biomedical Electronics Lab	-	-	02	02
07	BET4107	Computer Organization &System Software Lab	-	-	02	02
08	BET4108	Fiber Optics Communication Lab	-	-	02	02
09	BET4109	Microwave and Radar Engineering Lab	-	-	02	02
11	BET4110	Project-I	-	-	06	06
		Total	29			44

Semester VIII

Sr. No.	Subject Code	Name of the subject	*Teaching Scheme*			
			Hrs/week			**Credits**
			L	**T**	**P**	
01	BET4201	Digital Image Processing	03	-	-	06
02	BET4202	Satellite Communication	03	-	-	06
03	BET4203	Computer Networks	03	-	-	06
04	BET4204	Embedded Systems Design	03	-	-	06
05	BET4205	Elective – II**	03	-	-	06
06	BET4206	Digital Image Processing Lab	-	-	02	02
07	BET4207	Computer Communication Networks Lab	-	-	02	02
08	BET4208	Embedded Systems Design Lab	-	-	02	02
09	BET4209	Project-II	-	-	10	10
		Total	31			46

***Elective- I [BET4105]**

A] Artificial Intelligence

B] Electromagnetic Interference & Compatibility

C] Television Engineering

****Elective – II [BET4205]**

A] Telematics

B] Robotics

C] Mobile Communication

SEMESTER – VII

BET4101: BIOMEDICAL ELECTRONICS

Weekly Teaching Hours	TH : 03	PR : 02	TUT: 00	
Examination Hours	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 25
Credits	TH : 06	PR : 02	TUT : 00	Total = 08

UNIT I
Introduction to Electrophysiology and Cell Structure
Bioelectric signals: EEG, ECG, EMG, EOG, Muscle cell and nerve cell actions, resting potentials

UNIT II
Central Nervous and Cardio-Vascular System
Receptors, Motor systems, Neural and neuromuscular measurements, Evoked response of EEG, Structure of Heart, Rhythmicity, Pacemaker cells, ECG theory, Electrocardiograph, Measurement of blood pressure and blood flow, ECG electrodes, Life saving devices: Pacemaker, Defibrillators.

UNIT III
Bio-signal Amplifiers and Signal Processing
Electrodes and transducers for biomedical applications, Basic requirements of op-Amp circuits and instrumentation amplifiers in biomedical applications, ECG data acquisition and biomedical signal processing.

UNIT IV
Intensive Care Instrumentation and Patient Safety
Bedside and central station monitoring systems, Introduction to bio-medical telemetry, Surgical Diathermy, Physiological effects of electricity, Macroshock and Microshock hazards, Basic approaches to protection against shock.

UNIT V
Imaging and Display System
X-ray machine, CT-scanners, Ultrasound scanner, Nuclear methods, Recorders and displays: Inkjet, Thermal array, Fiber optic face plate CRT, Non fade CRO

UNIT VI
Clinical Laboratory Equipment
Calorimeter, Spectro- photometers, Auto analyzers, Blood cell counter, Blood gas analyzers.

Texts / References

1. Leslie Cromwell, Fred Weibell and Erich A Pfeiffer, “Biomedical Instrumentation and Measurement”, PHI.
2. R. S. Khandpur, “Handbook of Biomedical Instrumentation”, Tata McGraw Hill
3. Jacobson and Webster, “Medicine and Clinical Engineering”, PHI
4. Carr and Brown, “Introduction to Biomedical Equipment Design”, John Wiley

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BET4102: COMPUTER ORGANIZATION & SYSTEM SOFTWARE

Weekly Teaching Hours	TH : 03	PR : 02	TUT: 00	
Examination Hours	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 00
Credits	TH : 06	PR : 02	TUT : 00	Total = 08

UNIT I
Processor Design
Processor organization, Information representation, Number formats, Instruction types, Fixed-point arithmetic: Addition, Subtraction, Multiplication and Division, ALU design: Basic ALU organization, Floating-point arithmetic, and Arithmetic processor.

UNIT II
Control Unit Design
Instruction sequencing, Instruction interpretation, hardwired control unit design, Microprogrammed control unit design.

UNIT III
Memory Organization, Memory Technology and Classifications
Memory technology, Virtual memory concept, Segments, Pages and Files, Cache, Interleaved, Video, Dual Port memory.

UNIT IV
Input/Output Organization and Data Transfer Methods
Programmed I/O, DMA control and Interrupt based I/O, Serial transmission, Synchronization, Bus arbitration techniques, Bus architectures: ISA, EISA, VESA, PCI and SCSI.

UNIT V
Parallel Processing and Assembly Level Programming Concepts
Basic concepts, Performance considerations, Assembly level programming, Concepts of one pass and two pass assemblers, Macros.

UNIT VI
Loaders and Linkers and Operating Systems
Relocating and Linking Loaders, Fundamentals of operating systems: MS-DOS, Windows and Linux, Case study of IBM PC or compatible.

Texts / References:

1. Donovan, “System Programming”, TMH
2. Hayes, “Computer Architecture and Organization”, McGraw-Hill.
3. Moris Mano, “Computer system Architecture”, PHI.
4. William Gear, “Computer Organization and Programming”, TMH.
5. Dhamdhere,” Introduction to System Software”, TMH.

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BET4103: FIBER OPTICS COMMUNICATION

Weekly Teaching Hours	TH : 03	PR : 02	TUT: 00	
Examination Hours	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 25
Credits	TH : 06	PR : 02	TUT : 00	Total : 08

UNIT I

Optical Communication Fundamentals

Introduction, ray theory of transmission, EM mode theory for optical propagation, cylindrical fiber, single mode fibers, transmission characteristics of optical fibers.

UNIT II

Optical Sources

LED: Introduction, structure & characteristics.

LASER**:** Basic concepts, optical emission from semiconductors, the semiconductor injection laser, Injection laser characteristics.

UNIT III

Optical Detectors

Introduction, optical detection principles, absorption, quantum efficiency, responsivity, long wave cutoff, semiconductor photodiode with & without internal gain, mid-infrared photodiodes, phototransistors, photoconductive detectors. Optical receiver**:** Noise, receiver noise, receiver structures.

UNIT IV

Optical fiber Connection & Measurements

Optical fiber connection: Fiber alignment and joint loss, fiber splices, fiber connectors, fiber couplers.

Optical fiber measurements**:** attenuation measurement, dispersion measurement, NA measurement, OTDR, cutoff wavelength measurement.

UNIT V

Introduction to Optical Networks

Optical networks, the optical layer, transparency & all optical networks, transmission basics.Optical amplifiers, multiplexers & filters.

UNIT VI

Optical Network Elements

Client layer element: SONET/SDH, ATM.

WDM network element**:** Optical line terminals, optical line amplifiers, optical add/drop multiplexers, optical cross connects.

Texts/References:

1. Jhon senior, " Optical Fiber Communications-Principles & Practices", 2nd Edition, PHI-2001.
2. Ramaswami & sivarajan, "Optical Networks- A practical perspective", 2nd edition,Elsevier-2006.
3. Gred Keiser, "Optical Fiber Communication"3rd Edition, Tata McGraw Hill-2006.

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BET4104: MICROWAVE ENGINEERING

Weekly Teaching Hours	TH : 03	PR : 02	TUT: 00	
Examination Hours	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 25
Credits	TH : 06	PR : 02	TUT : 00	Total = 08

UNIT I
Review of Electromagnetic Field Theory
An overview of Maxwell's equations, Interaction between electrons and fields, Electromagnetic plane waves, Microwave frequencies and Microwave devices.

UNIT II
Microwave Transmission Lines
Line equations and solutions, Reflection and transmission coefficients, Standing waves and standing wave ratio, Line impedance and admittance, Smith chart and impedance matching, Microwave coaxial connectors.

UNIT III
Waveguides, Microwave Components and Devices
Rectangular and circular waveguides, TE and TM mode wave, Power transmission in waveguide, power losses in wave-guide, Excitation of modes in waveguides, Characteristics of standard wave guides. Microwave cavities, Microwave hybrid circuits, Directional couplers, Circulators, Isolators. Klystrons, Reflex Klystrons and TWTs.

UNIT IV
Microwave Crossed Field Tubes
Magnetrons, Forward wave crossed field amplifier (FWCFA), M-carcinotron oscillators, High power Gyrotrons.

UNIT V
Microwave Solid State Devices and Integrated Circuits
Microwave transistors, Microwave tunnel diodes, Microwave FETs, Gunn effect diodes, LSA diodes, InP diodes, CdTe diodes, Avalanche transit time devices, Pin diodes, Laser processes, Ruby laser, Pocket cell laser modulators. Materials, Fabrications, Hybrid microwave I.C.

UNIT VI
Microwave Enclosures, Hazards and Microwave Measurements and Computations
ElectromagneticCompatibility, Plane wave propagation in shielded rooms and in anechoic chambers, Microwave hazards. Unit of measurements for free space attenuation, Conversion of transmitting and receiving power to electric field intensity, Conversion of receiving voltage to electric field intensity.

Texts / References:

1. Lieo, "Microwave Devices and Circuits"; PHI
2. Peter A.Rizzi, "Fundamentals of Microwave Engineering", Prentice Hall of India

3. R.E. Collin, “Foundation for Microwave Engineering”, McGraw Hill International
4. Sisodia and Raghuvanshi, “Microwave Circuits and Passive Devices”, Wiley Eastern
5. B.E. Keiser, “Principles of Electromagnetic Compatibility”, Artech

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ELECTIVE-I-[BET4105 A]: ARTIFICIAL INTELLIGENCE

Weekly Teaching Hours	TH : 03	PR : 00	TUT: 00	
Examination Hours	TH : 03	PR : 00		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 00
Credits	TH : 06	PR : 00	TUT : 00	Total = 06

UNIT I
Introduction
Intelligent Agents – Agents and environments - Good behavior – The nature of environments – structure of agents - Problem Solving - problem solving agents – example problems – searching for solutions – uniformed search strategies - avoiding repeated states – searching with partial information.

UNIT II
Searching Techniques
Informed search and exploration – Informed search strategies – heuristic function – local search algorithms and optimistic problems – local search in continuous spaces – online search agents and unknown environments - Constraint satisfaction problems (CSP) – Backtracking search and Local search for CSP – Structure of problems - Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision – games that include an element of chance.

UNIT III
Knowledge Representation
First order logic – representation revisited – Syntax and semantics for first order logic – Using first order logic – Knowledge engineering in first order logic - Inference in First order logic – prepositional versus first order logic – unification and lifting – forward chaining – backward chaining - Resolution - Knowledge representation - Ontological Engineering - Categories and objects – Actions - Simulation and events - Mental events and mental objects

UNIT IV
Learning
Learning from observations - forms of learning - Inductive learning - Learning decision trees - Ensemble learning - Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information – Inductive logic programming - Statistical learning methods - Learning with complete data - Learning with hidden variable - EM algorithm.

UNIT V
Instance Based Learning
Neural networks - Reinforcement learning – Passive reinforcement learning - Active reinforcement learning - Generalization in reinforcement learning.

UNIT VI
Applications
Communication – Communication as action – Formal grammar for a fragment of English – Syntactic analysis – Augmented grammars – Semantic interpretation – Ambiguity and disambiguation – Discourse understanding – Grammar induction - Probabilistic language processing - Probabilistic language models – Information retrieval – Information Extraction – Machine translation.

Text Book/ References:

1. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, 2nd Edition, PHI- 2004.

2. Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd., 2000.
3. Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill, 2003.
4. George F. Luger, “Artificial Intelligence-Structures And Strategies For Complex Problem Solving”, PHI, 2002.

ELECTIVE-I-[BET4105 B]: ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

Weekly Teaching Hours	TH : 03	PR : 02	TUT: 00	
Examination Hours	TH : 03	PR : 00		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 00
Credits	TH : 06	PR : 00	TUT : 00	Total = 06

UNIT I
Introduction to EMI / EMC
Electromagnetic interference and Electromagnetic Compatibility (EMI / EMC) Standards, Introduction to E, H, Near and far field radiators, Receptors and antennas, Different types of EMI sources and possible remedies.

UNIT II
Measurement techniques in EMI
Open area test sites, Radiated interference measurements, Conducted interference measurements, Interference immunity.

UNIT III
EMI reduction techniques
Grounding, Shielding, Bonding, and EMI filters.

UNIT IV
EMI Analysis and EMC Regulations
EMI Modelling, EMI analysis using Spice, **EMC Regulations**: FCC, VDE, MIL-STD-461, Voltage/LISN measurement method, Current /capacitor measurement method, Comparison of some of the RF conducted emission standards.

UNIT V
Probabilistic and Statistical Physical Model
Introduction to Probability considerations, Statistical Physical Models of EMI / EMC. EMC of terrestrial radio communication systems.

UNIT VI
Computer Based Modeling and Simulation
Computer Based Modeling and Simulation of EMI Models and Signal Integrity.

Texts / References:

1. V. Prasad Kodali, “Engineering Electromagnetic Compatibility, Principles and Measurement Technologies”, IEEE Press-2002.
2. Devid A. Weston, “Electromagnetic Compatibility, Principles and Applications”, Marcol Dekker, Inc New York.
3. Jeffrey P. Mills, “EMI Reduction in Electronic Systems”, PTR PH New Jersey 2001.

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ELECTIVE-I-[BET4105 C]: TELEVISION ENGINEERING

Weekly Teaching Hours	TH : 03	PR : 00	TUT: 00	
Examination Hours	TH : 03	PR : 00		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 00
Credits	TH : 06	PR : 00	TUT : 00	Total = 06

UNIT I

TV Transmission and Reception

Signal brightness perception, Flicker, Scanning, Vertical resolution, Kell factor, Horizontal resolution and video bandwidth, Interlaced scanning and composite video signal, Video modulation, Vestigial sideband reception, TV channels, CCIR standards, TV broadcast transmission, Design principles of TV transmitters, IF modulation, Power output stages, Block diagram of TV transmitters, Visual exciter, Aural exciter, Diplexer, TV transmitting station, Microwave relay system, TV via satellite, TV signal reception, Ghost interference, Booster and distribution amplifiers.

UNIT II

TV Receivers

Block schematic, Functional requirement and specifications for monochrome TV receivers, Receiver circuit, RF tuner, AFT synthesized tuning, AGC keyed, AGC circuits, Video IF amplifier, Integrated subsystem, Video detection, Video output circuit, Sound section, Monochrome picture tube.

UNIT III

Colour Fundamentals

Block schematic functional requirements and specifications for color TV receivers, Colour fundamentals and mixing, Chromaticity diagram, Colour picture tube, Colour TV camera, Purity and convergence, Degaussing, Gray scale tracing, Colour TV receiver using IC's, Chroma processing IC, Colour TV signals and system, Composite colour video signal, Colour transmission, NTSC, SECAM and PAL system, Studio equipment organization and control, Technical facilities in TV studios, Production facilities, Control room equipment, Telecine, CCD Telecine, TV recording systems, Helical scan recording, Automatic scan tracing , Time base correctors, Services like Teletext, Data organization, Teletext decoder, Videotext, Alphanumeric display, CRT interfaces, Character generation, Video graphic terminal and CRT controllers.

UNIT IV

TV Cameras

Camera pickup tubes, Vidicon, Saticon, Newicon, CCD image sensor, Video processing of picture signal.

UNIT V

Deflection circuits, Alignment and Servicing

Drive requirement, Horizontal deflection circuits, Energy recovery system, Linearity corrections, Generation of EHT voltage and transistor line output circuits, Sync separator, Horizontal AFC, Vertical deflection, Drive circuits, Power supply circuits, SMPS, Remote control, Testing and alignment of TV receivers, Test charts, Troubleshooting of TV receivers.

UNIT VI

Advanced TV System

CCTV design features, Colour detector, Camera signal processing, Video monitors, VCR system,
Camcorders. Merits of digital TV technology, Digital video coding standards, Digital video hardware, Digital transmission, and reception, TV receiver, Digital signal processing of audio and video signals, Codecs, Digital audio and video signals, Multiplexed analog component (MAC) signals, D2-MAC/ Packet signal, HDTV.

Texts / References:

1. R.R. Gulati, "Monochrome and Color Television", New Age International Pvt Ltd.

2. A.M. Dhake, "Television and Video Engineering", TMH

3. Benson, "Video Handbook", Mc Graw –Hill.

4. M. Burrel, "Television Engineering Pocket Book", Newnes.

5. Bernard Grobe, “Basic Television and Video Systems”, Mc Graw-Hill

BET 4110: PROJECT-I

Weekly Teaching Hours	TH : 00	PR : 06	TUT: 00	
Marking Scheme	TH :00	TEST : 00	TW : 50	PR/OR : 00
Credits	TH : 00	PR : 06	TUT : 00	Total = 06

Following activities are expected during Project Phase-I

1. Selection of broad area of the project work.
2. The students must carry out the literature survey of the Project Work.
3. Finalization of project topic.
4. Periodic presentations based on the work done during the semester.

It is broadly expected that the students must complete the theoretical part /through understanding of the project work at the end of the PROJECT-I.

Every student has to present his/her work before the examiners in an open defense examination at the end of semester.

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SEMESTER – VIII

BET4201: DIGITAL IMAGE PROCESSING

Weekly Teaching Hours	TH : 03	PR : 02	TUT: 00	
Examination Hours	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 25
Credits	TH : 06	PR : 02	TUT : 00	Total = 08

UNIT I
Digital Image Fundamentals
Background, Digital image representation, Fundamental steps in image processing, Elements of digital image processing systems, Elements of visual perception, A simple image model, Sampling and quantization, Basic relationships between pixels, Imaging geometry, Photographic film.

UNIT II
Image Transforms and Enhancement
Introduction to the fourier transform, Discrete fourier transform, Properties of the two dimensional FT, Fast fourier transform, Other separable image transforms, Hotelling transform, Enhancement by point processing, Spatial filtering, Enhancement in the frequency domain, Generation of spatial masks from frequency domain specifications, Colour image processing.

UNIT III
Image Restoration
Degradation model, Diagonalization of circulant and block-circulant matrices, Algebraic approach to restoration, Inverse filtering, Least mean square (Wiener) filter, Constrained least squares restoration, Interactive restoration, Restoration in the spatial domain, Geometric transformation.

UNIT IV
Image Compression and Segmentation
Fundamentals, Image compression models, Elements of information theory, Error-free compression, Lossy compression, Image compression standards, Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region-oriented segmentation, Use of motion in segmentation.

UNIT V
Representation and Description
Representation schemes, Boundary descriptors, Regional descriptors, Morphology, Relational descriptors.
Recognition and Interpretation: Elements of image analysis, Patterns and pattern classes, Decision theoretic methods, Structural methods, Interpretation.

UNIT VI
Morphology

Dilation, erosion, opening, closing, hit or miss transform, some basic morphological algorithms, extension to gray scale images.

Element of image analysis, pattern & pattern classes.

Texts / References:

1. Rafael C. Gonzalez and Woods, “Digital Image Processing”, Addison Wesley, 1998.
2. A. K. Jain, “Digital Image Processing”, PHI, New Delhi, 1997.
3. Pratt W.K., “Digital Image Processing”, 2nd Edition, John Wiley, New York, 2001.
4. Edward R. Dougherty, “Random Processes for Image and Signal Processing”, PHI-2001.

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BET4202: SATELLITE COMMUNICATION

Weekly Teaching Hours	TH : 03	PR : 00	TUT: 00	
Examination Hours	TH : 03	PR : 00		
Marking Scheme	TH :50	TEST : 50	TW : 50	PR/OR : 00
Credits	TH : 06	PR : 00	TUT : 00	Total = 06

UNIT I

Satellite Systems

Introduction, Basic block schematic of satellite systems**,** Communication satellite systems, Orbiting satellites, Satellite frequency bands, Satellite multiple access format, Satellite launch vehicle and space shuttle.

UNIT II

Satellite Channel

Electromagnetic field propagation, Earth station, Power flow and polarization, Satellite antennas, Gain pattern, Common antenna types and parabolic dish, Atmospheric losses, Noise, Satellite link analysis, Spot beams and multiple beams.

UNIT III

Satellite Transponders

Basic model, Satellite front-end block diagrams, Satellite signal processing, Transponder limiting, Non- linear satellite amplifiers.

UNIT IV

Satellite Access Techniques

FDMA system, Non linear amplification with multiple FDMA carriers, Channelisation, am-pm conversion with FDMA satellite switched FDMA, Basic TDMA system, Preamble design, Satellite effects on TDMA performance, Network synchronization, SSTDMA**,** Direct sequence CDMA systems, Performance of DSCDMA satellite system, Frequency hopped CDMA, Anti jam advantages of spectral spreading, Code acquisition and tracking.

UNIT V

Phase Coherency in Satellite Systems

Carrier phase noise spectra and phase stability, Frequency generators, Multipliers and synthesizers, Phase errors, Phase coherency, Pilot tone frequency corrections, Satellite return link phase coherency.

UNIT VI

Introduction to Digital Satellite and Mobile Satellite Communication

Texts / References:

1. Robert Gagliardi , “Satellite Communication” , CBS Publication
2. Ha, “Digital Satellite Communication”, Mc Graw- Hill
3. Timothy Pratt and Charles Bostian, “Satellite Communications”, John Wiley and Sons.

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BET4203: COMPUTER NETWORKS

Weekly Teaching Hours	TH : 03	PR : 02	TUT: 00	
Examination Hours	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 50
Credits	TH : 06	PR : 02	TUT : 00	Total = 08

UNIT I

Physical Layer

Data communications, type of networks, protocol & standards, the OSI model, TCP/IP suite, Addressing shames, data & signals, transmission impairments, transmission media, data rate limits, digital to digital conversion, transmission modes, switching techniques.

UNIT II

Data Link Layer

Error detection & correction block coding, cyclic codes, checksum, data link layer design issues, protocols for noiseless & noisy channels, random access, controlled access.

Connecting Devices: passive hubs, repeaters, active hubs, bridges, routers, two/three layer switches and gateways.

UNIT III

Network Layer

Concept of datagram & VC,ICMP, IGMP, Delivery, Forwarding, Unicast & Multicast Routing Protocols.

UNIT IV

Transport Layer

Process to Process Delivery, UDP, TCP, Data Traffic, Congestion Control, QoS, Techniques to improve QoS, Integrated Services.

UNIT V

Application Layer

Name Space, DNS, Distribution Of Name Space, DNS In Internet, Resolution, TELNET, FTP, E-MAIL.

UNIT VI

Network Security

Introduction, systematic & asystematic key cryptography, security services, digital signature, entity authentication, key management.

Texts / References:

1. B.A.Forouzan, “Data Communication & Networking” Tata McGraw Hill-4th Edition-2008.
2. A. S. Tannenbaum, “Computer Networks”, PHI- 4rd Edition-2006.
3. B.A.Forouzan, “TCP-IP” Tata McGraw Hill-4th Edition-2008
4. W. Stallings, “Local Networks : An Introduction”, Macmillan New York-2003.

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BET4204: EMBEDDED SYSTEM DESIGN

Weekly Teaching Hours	TH : 03	PR : 02	TUT: 00	
Examination Hours	TH : 03	PR : 02		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 25
Credits	TH : 06	PR : 02	TUT : 00	Total = 08

UNIT I

Embedded system design: Introduction

History, Design challenges, Categories and requirements of embedded system , Challenges and issues related to embedded software development, Applications of embedded systems and recent trends in embedded systems Hardware/Software co-design.

UNIT II

Introduction to ARM

ARM processor fundamentals, Introduction to ARM instruction and THUMB instruction set, ARM programming, Introduction to DSP on ARM.

UNIT III

ARM Interrupt and Memory Management

ARM Interrupt handling, Details of ARM MMU, Future of Architecture

UNIT IV

Real Time Operation Concept

Programming concept, Architecture of kernel task, schedule, ISR , Semaphore, Mailbox , message queues, pipes, events, timers.

UNIT V

Commercial RTOS

Overview of commercial RTOS like Vx Works, µCos-II , Introduction to mobile computing.

UNIT VI

Case Studies and applications of Embedded Systems

Case study of chocolate wending machine, Digital Camera, Smart card and embedded systems in automobiles

Text/References:

1.Frank Vahid, “Embedded System Design ”,Prentice Hall-2002.

2.Raj kamal. “Embedded System architecture programming and Design”, 3rd edition, TMH-2006.

3.Andrew N. Sloss , Dominic Symes, Chris Wright , “ ARM System Developer’s Guide, Designing and Optimizing System Software” , Elseveir-2002.

ELECTIVE-II-[BET4205 A]: TELEMATICS

Weekly Teaching Hours	TH : 03	PR : 00	TUT: 00	
Examination Hours	TH : 03	PR : 00		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 00
Credits	TH : 06	PR : 00	TUT : 00	Total : 06

UNIT I
Introduction to Telephone Network
Basic concepts of telephony, Frequency bands, Components of subscriber telephone set,
Manual telephone Exchange and Exchange design parameters.

UNIT II
Concept of Telephone Switching
Rotary dial telephone, Signaling tones, Strowger switching components, Principles of common control, Touch tone dial telephone, Principles of crossbar switching, Crossbar switch configurations, Cross point technology.

UNIT III
Electronic Exchange Systems
Concept of SPC, Centralized SPC, Distributed SPC, Software architecture, Enhanced services offered by SPC, Two-stage network, Three stage network and n-stage network, Time division switching, Space division switching, Time division space switching, Prime division time switching, Time multiplexed time switching, Combination switching, Three-stage combination switching, n-stage combination switching and Trunk operation.

UNIT IV
Traffic Analysis
Network traffic load and parameters, Grade of service and blocking probability, Modeling switching systems, Incoming traffic and service time characterization, Blocking models and loss estimates and Delay systems.

UNIT V
Telephone Networks
Subscriber loop systems, Switching hierarchy and routing, Transmission plan, Transmission systems, Numbering and charging plan. Signaling techniques: In-channel and Common channel signaling.

UNIT VI
Introduction to Modern Telematics
Teleprinter, Telex, Teletext services, CCITT standards, Picture transmission, Fax, E-mail, Video phone, Teleconferencing, Wireless LAN/ mobile linker and Cellular radio system.

Texts / References:

1. Roynayne Pitman, “Introduction to Digital Communication Switching”.
2. Vishvanathan, “Telecommunication and switching Network”, Edward Arnold.
3. Ray Sarch, “Basic Guide to Data Communication”, McGraw Hill.
4. Bellamy, “Digital Telephony”, John Wiley and Sons.

ELECTIVE-II-[BET4205 B]: ROBOTICS

Weekly Teaching Hours	TH : 03	PR : 00	TUT: 00	
Examination Hours	TH : 03	PR : 00		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 00
Credits	TH : 06	PR : 00	TUT : 00	Total = 06

UNIT I

Basic Concepts

Automation and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system, Dynamic stabilization of Robotics.

UNIT II

Power Sources And Sensors

Hydraulic, Pneumatic and electric drivers – Determination HP of motor and gearing ratio, variable speed arrangements, Path Determination - Machinery Vision – Ranging – Laser – Acoustic, Magnetic Fiber Optic and Tactile Sensor

UNIT III

Manipulators

Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators.

UNIT IV

Actuators And Grippers

Pneumatic, Hydraulic Actuators, Stepper Motor Control Circuits, End Effecter, Various types of Grippers, Design consideration.

UNIT V

Differential transformation and manipulators, Jacobians – problems.Dynamics: Lagrange – Euler and Newton – Euler formations – Problems.

UNIT VI

Kinematics

Forward and Inverse Kinematic Problems, Solutions of Inverse Kinematic problems, Multiple Solution, Jacobian Work Envelop – Hill Climbing Techniques.

UNIT VII

Path Planning

Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

Texts / References:

1.Robotics, CSP Rao and V.V. Reddy, Pearson Publications (In press)

2.Robotics and Control / Mittal R K & Nagrath I J / TMH.

3.An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983 London.

4.Robotic Engineering / Richard D. Klafter, Prentice Hall

ELECTIVE-II-[BET4205 C]: MOBILE COMMUNICATION

Weekly Teaching Hours	TH : 03	PR : 00	TUT: 00	
Examination Hours	TH : 03	PR : 00		
Marking Scheme	TH :50	TEST : 50	TW : 25	PR/OR : 00
Credits	TH : 06	PR : 00	TUT : 00	Total = 06

UNIT I

Introduction to Wireless Communication System

Evolution of mobile radio communications, examples of wireless communication systems, comparison,2G & 3G systems, WLL & LMDS.

UNIT II

Wireless Transmission

Frequencies for radio transmission, frequency reuse, channel assignment strategies, Handoff strategies, interference & system capacity, trunking & grade of service, coverage & capacity improvement in cellular system.

UNIT III

Mobile Radio Propagation

LARGE SCALE PATH LOSS: introduction, free space propagation model, three basic propagation model, reflection, two ray model, diffraction, scattering, outdoor & indoor propagation model.

SMALL SCALE FADING & MULTIPATH**:** Small scale multipath propagation, types of small scale fading.

UNIT IV

Modulation Techniques for Mobile Radio

Line coding, pulse shaping techniques, linear modulation techniques, constant envelope modulation, Spread spectrum modulation techniques.

UNIT V

Wireless LANs

Infrared vs radio transmission, infrastructure &adhoc networks, IEEE 802.11, HIPERLAN and Bluetooth.

UNIT VI

Support for Mobility

Mobile IP, Mobile adhoc networks, DHCP, file systems, WAP2.0.

Text Book/References:

1.Mobile communication-J.Schiller,Pearson publication-2nd Edition-2002.

2.Wireless communications-T.S.Rappaport, Pearson publication-2nd Edition2001.

3.Wireless communication & networks-W.Stallings, Pearson publication-3rd Edition-2005.

BET 4209: PROJECT-II

Weekly Teaching Hours	TH : 00	PR : 10	TUT: 00	
Marking Scheme	TH :00	TEST : 00	TW : 100	PR/OR : 100
Credits	TH : 00	PR : 10	TUT : 00	Total :10

Every student will be required to prepare and submit a project report/dissertation based on experimental or modeling and simulation work carried out under the supervision of Project Guide.

A student must report the Guide at least once in a week on a specified day and report the progress of his/her work to the Project Guide.

Every student has to present his/her work before the examiners in an open defense examination.

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