JABALPUR ENGINEERING COLLEGE, JABALPUR (MP)
(An Autonomous Institute of Govt. of M.P.)

Affiliated to Rajiv Gandhi Technological University, Bhopal (MP)

Scheme of Study and Examination (w.e.f. July 2010)

BE Third Year **Branch : Electronics & Telecom. Engg** **Sem: Sixth**

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOTAL			
EC- 27A	Digital Communication	3	1	-	10	20	30	70	100	4
EC-29A	Microprocessor & Microcontroller	3	1	-	10	20	30	70	100	4
EC- 33	Antenna Wave Propagation	3	1	-	10	20	30	70	100	4
EC- 35	VLSI Technology	3	1	-	10	20	30	70	100	4
EC -37	Data Communication & Computer Network	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
EC -28L	Digital Communication Lab	-	-	2	20	-	20	30	50	2
EC-30AL	Microprocessor & Microcontroller Lab	-	-	2	20	-	20	30	50	2
EC -36L	VLSI Technology Lab	-	-	2	20	-	20	30	50	2
EC 40L	Minor Project	-	-	2	20	-	20	30	50	2
EC-63L	Professional Activity	-	-	2	50	-	50	-	50	2
EC 64L	Seminar/Group Discussion	-	-	2	50	-	50	-	50	2
	Total	**15**	**5**	**12**	**230**	**100**	**330**	**470**	**800**	**32**

T.A. Teachers Assessment, CT- Class Test, ESE - End Semester Examination, Total Marks 800 Total Periods : 32, Total Credits : 32

COURSE CONTENTS (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	**DIGITAL COMMUNICATION**	EC – 27A	**Min "D"**	**Min "D"**	**5.0**

DIGITAL COMMUNICATION

Unit-I : Pulse Analog Modulation: Pulse Amplitude Modulation (PAM), Spectrum of PAM signal, Pulse Time Modulation, Spectra of PDM and PPM waves, Noise in Pulse Analog Systems, Time Division Multiplexing (TDM), Channel Bandwidth for PAM-TDM Signal.

Unit-II : Pulse Code Modulation: Quantization, Quantization Error, Pulse Code Modulation (PCM), Noise considerations in PCM Systems, Companding, Data Rate and Bandwidth of Multiplexed PCM Signal, Differential PCM (DPCM), Delta Modulation (DM), and Adaptive Delta Modulation (ADM).

Unit-III : Digital Transmission through AWGN Channel: Signal Space Representation, Representation of Digitally modulated signal, Optimum Receiver for Digitally Modulated Signals in AWGN, Correlation type Demodulator, Matched Filter type Demodulator, The Optimum Detector, Performance of the Optimum Receiver for Memoryless Modulation, Optimum Receiver for CPM Signals,

Unit-IV : Digital Transmission through Bandlimited AWGN Channel: Digital Transmission through Bandlimited Channels, Power Spectrum of DigitaJly Modulated Signals, Signal Design for Bandlimited Channels, Channel Equalization, Linear and Non-linear Equalizers, Adaptive Equalizers.

Unit–V : Spread Spectrum Modulation: Introduction to Spread Spectrum modulation, Generation and Characteristics of p-n Sequences, Direct sequence Spread Spectrum System, Processing Gain, Spread Spectrum with Code division Multiple Access (CDMA), Frequency Hopping Spread Spectrum.

References:

1. J. G. Proakis and M. Salehi: Communication Systems Engineering, Prentice Hall, Pearson Education International.
2. Simon Haykins: Communication Systems, 4th Edition, John Wiley.
3. J. G. Proakis: Digital Communications, Mc Graw Hills
4. B. P. Lathi: Modern Analog and Digital Communication System, Oxford University Press
5. Tomasi: Advanced Electronics Communication Systems, 6th Edition, PHI

COURSE CONTENTS (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	Microprocessor and Microcontrollers	EC-29A	Min "D"	Min "D"	5.0

Microprocessor and Microcontrollers

Unit I

Intel 8086 Microprocessor: Introduction to 16-bit microprocessors, 8086 pin functions, Minimum and maximum mode operations. 8086 Architecture, register organization, addressing Modes, 8086 Memory banks and Memory organization, 8086 Instruction set and Assembly language programming.

Unit II

Advanced microprocessors: Salient features of advanced microprocessors. Review of evolution of advanced microprocessors: 186 / 286 / 386 / 486 / Pentium. Super scalar architecture of Pentium. 80286/386 Memory segmentation with descriptor tables, Privilege levels, Changing privilege levels, Paging including address translation, Page level protection, MMU, cache memory, Virtual memory.

Unit III

I/O INTERFACING: Introduction to the interfacing chips 8255. Interfacing keyboards, printers, LEDS with Intel 8086 Microprocessor. Interfacing of 8254 programmable interval timer, 8259A Programmable interrupt controller & 8257 DMA controller with Intel 8086 Microprocessor.

Unit IV

Memory Interfacing: Interfacing of RAM and ROM with Intel 8086 Microprocessor.

Serial communication interface: RS 232C standards, Interfacing of USART chip 8251 with Intel 8086 Microprocessor.

Unit V

Microcontroller: Introduction to micro controller 8051, its architecture, Register set, operational features, pin description, I/O configuration, interrupts, addressing modes, an overview of 8051 instruction set.

Books

1. B.B. Brey (PHI), "The Intel Microprocessors, Architecture, Programming and Interfacing".
2. A Triebel & Avtar Singh (PHI), "The 8088 & 8086 Microprocessor".
3. D. Hall (Mc-Graw Hill), "Advanced Microprocessor and Interfacing".
4. A. Pal (TME), "Microprocessors Principles & Applications".
5. A.P. Mathur (TMA), "Introduction to Microprocessors". Intel Corporation Microprocessors Data manuals.
6. Microprocessor Training Inc., "Microprocessor Fundamentals & Applications (Handson)".

COURSE CONTENTS (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	ANTENNA WAVE PROPAGATION	EC - 33	Min "D"	Min "D"	5.0

ANTENNA AND WAVE PROPAGATION

Unit I : Introduction to antenna: antenna terminology, radiation, retarded potential, radiation field from current element, radiation resistance of short dipole and half wave dipole antenna, network theorems applied to antenna, self and mutual impedance of antenna, effect of earth on vertical pattern and image antenna.

Unit II : Antenna arrays: of point sources, two element array, end fire and broad side arrays, uniform linear arrays of n-elements, linear arrays with non-uniform amplitude distribution (binomial distribution and Chebyshev optimum distribution), arrays of two-driven half wavelength elements (broad side and end fire case), principle of pattern multiplication.

Unit III :Types of antennas: Babinet's principles and complementary antenna, horn antenna, parabolic reflector antenna, slot antenna,log periodic antenna, loop antenna, helical antenna, biconical antenna, folded dipole antenna, Yagi-Uda antenna, lens antenna, turnstile antenna. Long wire antenna: resonant and travelling wave antennas for different wave lengths, V-antenna, rhombic antenna, beverage antenna, microstrip antenna.

Unit IV : Antenna array synthesis: introduction, continuous sources, methods-Schelknoff polynomial method, Fourier transform method, Woodward- Lawson method, Taylor's method, Laplace transform method, Dolph- Chebychev method, triangular, cosine and cosine squared amplitude distribution, line source, phase distribution, continuous aperture sources.

Unit V : Propagation of radio wave: structure of troposphere, stratosphere and ionosphere, modes of propagation, ground wave propagation, duct propagation. Sky wave propagation: Mechanism of Radio Wave Bending by Ionosphere, critical angle and critical frequency, virtual height, skip distance and LUF, MUF. Single hop and multiple hop transmission, influence of earths magnetic field on radio wave propagation, Fading Space Wave Propagation: LOS, effective earth's radius, field strength of space or tropospheric propagation.

References:

1. J. D. Krauss: Antennas;for all applications, TMH.
2. R. E. Collin, Antennas and Wave Propagation, Wiley India Pvt. Ltd.
3. C. A. Balanis: Antenna Theory Analysis and Design, Wiley India Pvt. Ltd.
4. Jordan and Balmain: Electromagnetic Fields and Radiating System, PHI.
5. A. R. Harish and M. Sachidananda: Antennas and wave propagation, Oxford University Press.
6. K. D. Prasad: Antennas and Wave Propagation, Satya Prakashan.
7. B. L. Smith: Mordern Anteenas, 2nd Edition, Springer, Macmillan India Ltd.

COURSE CONTENTS (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	VLSI TECHNOLOGY	EC - 35	Min "D"	Min "D"	5.0

VLSI TECHNOLOGY

Unit - I

Introduction to cmos circuits, circuits & system representation Behavioral representation, structural representation. Physical representation MOS transistor theory. NMOS and PMOS enhancement transistor. Threshold voltage body effect. Mos device design equation. Basic DC equation. Second order effect, MOS models.

Unit - II

The complementary cmos inverter – DC character, Static load MOS inverters. The differential inverter Tristate inverter. Bipolar devices, diodes, transistors, BICMOS inverters.

Unit - III

Review of silicon semiconductor technology and basic CMOS technology-n- well and p-well process. Interconnect and circuit Twin-tub process layout design rules and latch-up, latch-up triggering and prevention.

Unit - IV

Circuit characterization and performance estimation resistance and capacitance estimation, Switching characteristics, CMOS gate transistor sizing, power dissipation. Basic physical design of simple logic gates. CMOS logic structure.

Unit - V

CMOS design methods. Design strategies. Programmable logic, programmable logic structure, reprogrammable gate arrays. Exiling programmable gate array. Algotonix, concurrent logic, sea of gate and gate array design VHDL as a tool.

Reference Books:

1. Neil, H.E. Wesdte, Kamran Eshraghian, Principles of CMOS VLSI design, Pearson Education.
2. Wyne wolf, Modern VLSI design-system on silicon, Prentics Hall of india
3. Phillip E. Allen and Douglas R holding, CMOS analog Circuit Design, 2nd edition, Oxford University press.

COURSE CONTENTS (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	**DATA COMMUNICATION AND COMPUTER NETWORK**	EC - 37	**Min "D"**	**Min "D"**	**5.0**

DATA COMMUNICATION AND COMPUTER NETWORK

Unit – I

Introduction to Data Communication and Networks: Data Communication, Networks – Physical structures; different topologies, Categories of Networks: LAN, MAN, WAN, Interconnection of networks, The Internet, Protocols and Standards, Standards Organizations. Network Models, Layered tasks, The OSI model, different layers in OSI model. TCP/IP protocol suite ; different layers, addressing, - physical, logical, port and specific addresses, Analog and digital, digital signals-Bit Length, Digital Signal as a Composite Analog Signal, Transmission of Digital Signals, Data Rate Limits-Noiseless Channel, Noisy Channel.

Unit – II

Physical Layer : Digital-to-Digital Conversion-Line Coding, Line Coding Scheme, Block Coding, Scrambling. Multiplexing – Frequency Division, Wavelength Division, Synchronous Time Division, Statistical Time Division Multiplexing. Circuit-Switched Networks – Three Phases, Efficiency, Delay. Datagram Networks - Routing Table, Efficiency, Delay, Datagram Networks in the Internet. Virtual Circuit Networks - Addressing, Three Phases, Efficiency, Delay, Circuit Switched Technology in WANs. Structure of Circuit and Packet switches, Dial-up Modems, Digital Subscriber Line - ADSL, ADSL Lite, HDSL, SDSL, VDSL, Cable TV for Data Transfer- Bandwidth, Sharing, CM and CMTS, Data Transmission Schemes.

Unit – III

Data Link Layer: Introduction - Types of Errors, Redundancy, Detection Vs Correction, Forward Error Correction Vs Retransmission, Modular Arithmetic. Block Coding - Error Detection, Error Correction, Hamming Distance, Minimum Hamming Distance. Linear Block Codes, Cyclic Codes - Cyclic Redundancy Check, Hardware Implementation, Polynomials, Cyclic Code Analysis, Advantages. Checksum, Framing - Fixed and Variable-Size. Flow and Error Control, Protocols, Noiseless Channels – Simplest and Stop-and-Wait Protocols. Noisy Channels - Stop-and-Wait Automatic Repeat Request, Go-Back-N Automatic Repeat Request, Selective Repeat Automatic Repeat Request.

Unit - IV

Medium Access: Random Access- ALOHA, Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMA/CD), Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA). Controlled Access-Reservation, Polling, Token Passing. Channelization- Frequency-Division Multiple Access (FDMA), Time- Division Multiple Access (TDMA), Code-Division Multiple Access (CDMA). IEEE Standards, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet, IEEE 802.11- Architecture, MAC Sub layer, Addressing Mechanism, Physical Layer. Bluetooth- Architecture, Radio Layer, Baseband Layer, L2CAP.

Unit V

Connecting LANs: Connecting Devices- Passive Hubs, Repeaters, Active Hubs, Bridges, Two-Layer Switches, Three-Layer Switches, Gateway. Backbone Networks-Bus, Star, Connecting Remote LANs. Virtual LANs -Membership, Configuration, Communication between Switches, Network layer – logical addressing - .IPv4Addresses- Address Space, Notation, Classful Addressing, Classless Addressing, Network Address Translation (NAT). IPv6 Addresses - Structure and Address Space. Internetworking - Need for Network Layer, Internet as a Datagram Network, Internet as a Connectionless Network. IPv4- Datagram, Fragmentation, Checksum, Options. IPv6 - Advantages, Packet Format, Extension Headers. Transition from IPv4 to IPv6. Address Mapping- Logical to Physical Address, Physical to Logical Address, Routing – Delivery forwarding techniques and processes, routing table,, Unicast routing protocols – Optimization, inter domain, intra domain, distance vector, link state and path vector routing, Multicast routing protocol - Unicast, multicast and broadcast, applications, multicast routing and routing protocols.

References:

1. B. A. Forouzan and Sophia Chung Fegan: Data Communications and Networking, 4th Ed, TMH.
2. W. Tomasi: Introduction to Data Communications and Networking, Pearson Education.
3. A. S. Tanenbaum: Computer Networks, Pearson Education.
4. W. Stalling: Data and Computer Communication, Pearson Education.
5. P. C. Gupta: Data Communications and Computer Networks, PHI.
6. A. Elahi and M. Elahi: Data Network and Internet-Communications Technology, Cengage Learning.
7. Duck: Data Communication and Networking, Pearson Education

COURSE CONTENTS (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	**DIGITALCOMMUNICATION LAB**	EC 28L	**Min "D"**	**Min "D"**	**5.0**

DIGITAL COMMUNICATION LAB

(Suggested Exercise)

List of Experiments (Expandable):

Simulation of different modulation techniques using Scilab (Freeware-Downloadable from www.Scilab.org) **/Matlab/Any Similar Software. Plotting of signal constellation diagrams and signals (modulated/ unmodulated). Calculation of Bit error rates BER and comparison of various modulation techniques.**

1. Study of Sampling Process and Signal Reconstruction and Aliasing.
2. Study of PAM, PPM and PDM.
3. Study of PCM Transmitter and Receiver.
4. Time Division Multiplexing (TDM) and De-multiplexing.
5. Study of ASK, PSK and FSK Transmitter and Receiver.

COURSE CONTENTS (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	**Microprocessor and Microcontrollers Lab**	EC-30AL	**Min "D"**	**Min "D"**	**5.0**

Microprocessor and Microcontrollers Lab

(Suggested Exercise)

List of Experiments (Expandable):

1. Byte multiplication.
2. Word multiplication
3. Packed bcd from ascii
4. Bcd multiplication
5. Bcd division
6. Bcd subtraction
7. Signed byte to word
8. Scan string for character
9. If then else implimentation
10. Bcd to hex (register parameter).

COURSE CONTENTS (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	**VLSI TECHNOLOGY LAB**	EC - 36L	**Min "D"**	**Min "D"**	**5.0**

VLSI TECHNOLOGY LAB

(Suggested Exercise)

List of Experiments

1. Design of MOS Generator Using any Electronic Design Automation (EDA)- eg. Microwind / Cadence /Sylvaco / Tanner silicon HiPer / Xilinx ISE 9i or any similar software

2. DC MOSFET Curves using EDA.
3. Design of CMOS Logic Gates using EDA.
4. Draw the following CMOS circuits using 0.12 μm and 65 ntechnology and simulate for transfer characteristics along with 2D and 3D view from 450 angles. Compare power consumption and rise/fall delays
in both technologies:
a. CMOS Inverter with 0.1pF and 0.1fF capacitance loads, in both cases with equal rise and fall times.Plot output eye diagram also.

b. CMOS NAND and NOR gates with 0.01pF load and equal rise and fall times. Comment on area requirement of both gates.
5. To design Current Mirror using CMOS 0.18 micron Technology.
6. Design a basic differential amplifier circuit using current mirror logic. Show gain of amplifier and comment on bandwidth.
7. Design the Schmitt trigger circuit with UTP= 4.5 V and LTP = 2.0 V. Plot transfer curve analysis (with hysteresis effect) VO versus VI.
8. Design a 2-bit parallel adder from schematic and its CMOS layout. List global delay of all nodes. Identify the critical path and comment on its optimization.

COURSE CONTENTS (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
B.E.	**MINOR PROJECT**	EC - 40L	**Min "D"**	**Min "D"**	**5.0**

The exercises in this component shall be designed to demonstrate the basic principles outlined in different units of the theory paper. After completing the exercises the student should have developed a good grasp of the practical utilities of the theory content.

(Suggested Exercise)

Developing research/practical ability and finding solution of any application oriented problem. Project problems may be implemented in any hardware or software or solutions.

There will be a term work presentation/ Seminar . A group students will work in form of batches which may be approved by head of the department.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**PROFESSIONAL ACTIVITY**	EC- 63L	Min "D"	Min "D"	5.0

PROFESSIONAL ACTIVITY
(Suggested Exercise)

- Student shall visit a nearby Industry and shall prepare a technical report suggesting some improvement in operation.
- Student shall Design and fabricate a new laboratory equipment. He shall prepare a design report.
- Student shall improve an existing lab equipment and prepare chart or lab manual .
- Student shall publish a review paper in some Indian Journal.
- Student shall make a report on an Industry employing latest technology/ Innovation.
- Student shall prepare a working model of a machine part.
- Student shall make a software/ comp. program for the Institute to enhance efficiency in its working.
- Student shall prepare a detailed project report to start a small-medium enterprise.
- A group of student shall register with the Industry cell and submit a report on work done there about Institute-Industry linkage.
- Experimental work on a new set of equipments.
- Seminar Presentation with a report submitted to the supervisor.

Note : The list of activities can be modified as per requirements of the department.

A hand written report of about 30 pages duly signed by the student and the concerned teacher should be submitted.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Course	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
BE	**Seminar/Group Discussion**	EC - 64L	Min "D"	Min "D"	5.0

Objectives of Group Discussion & Seminar is to improve the Mass Communication and Convincing/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.