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 (PTDC) **Sem : FIFTH**

Branch : ELECTRONICS & TELECOMMUNICATION ENGINEERING

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
		L	T	P	SESSIONAL EXAM			ESE	SUB TOTAL	
					TA	CT	TOTAL			
EC-27	Digital Communication	3	1	-	10	20	30	70	100	4
EC-31	Microwave Engineering	3	1	-	10	20	30	70	100	4
EC-35	VLSI Technology	3	1	-	10	20	30	70	100	4
EC-57	Computer System Organization	3	1	-	10	20	30	70	100	4
(PRACTICAL/DRAWING/DESIGN)										
EC-28L	Digital Communication Lab	-	-	2	20	-	20	30	50	2
EC- 32L	Microwave Engineering Lab	-	-	2	20	-	20	30	50	2
EC- 36L	VLSI Technology Lab	-	-	2	20	-	20	30	50	2
EC-62L	Professional Activity	-	-	2	50	-	50	-	50	2
	Total	**12**	**4**	**8**	**150**	**80**	**230**	**370**	**600**	**24**

T.A. Teachers Assessment, CT- Class Test, ESE - End Semester Examination, Total Marks 600 Total Periods : 24, Total Credits : 24

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	
PTDC	**DIGITAL COMMUNICATION**	EC-27	Min "D"	Min "D"	5.0

DIGITAL COMMUNICATION

Unit-I

Random Processes : Random variables:- Cumulative distribution function, Probability density function, Mean, Variance and standard deviations of random variable, Gaussian distribution, Error function, Correlation and autocorrelation, Central-limit theorem, Error probability, Power Spectral density of digital data.

Unit-II

Pulse Modulation : Analog Signals:- Sampling of Signal, Sampling Theorem for Low Pass and Band Pass Signals, Aliasing, Pulse Amplitude Modulation (PAM), Time Division Multiplexing (TDM), Channel Bandwidth for PAM-TDM Signal, Types of Sampling, Instantaneous, Natural and Flat Top (Mathematical and Spectral Analysis), Aperture Effect, Introduction to Pulse Position and Pulse Duration Modulation.

Unit-III

Pulse Code Modulation : Digital Signal:- Quantization, Quantization Error, Pulse Code Modulation (PCM), Signal-to-Noise Ratio in PCM, Companding, Data Rate and Bandwidth of Multiplexed PCM Signal, Inter-symbol Interference, Differential PCM (DPCM), Delta Modulation (DM), and Adaptive Delta Modulation (ADM), Comparison of various system in terms of Bandwidth and Signal-to-Noise Ratio.

Unit-IV

Digital Modulation Techniques :- Analysis, Generation and Detection (Block Diagram), Spectrum and Bandwidth of Amplitude Shift Keying (ASK), Binary Phase Shift Keying (BPSK), Differential Phase Shift Keying (DPSK), Offset and Non-offset Quadrature Phase Shift Keying (QPSK), M-ary PSK, Binary Frequency Shift Keying (BFSK), M-ary FSK, Minimum Shift Keying, Quadrature Amplitude Modulation (QAM), Comparison of digital modulation techniques on the basis of probability of error, Matched Filter.

Unit–V

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

References:

1. Taub and Schilling: Principles of Communication System, TMH
2. Simon Haykins: Communication Systems, 4th Edition, John Wiley.
3. Singh and Sapre: Communication System, TMH
4. B.P. Lathi: Modern Analog and Digital Communication System, Oxford University Press
5. Tomasi: Advanced Electronics Communication Systems, 6th Edition, PHI
6. Couch: Digital and Analog Communication, Pearson Education.
7. David Smith : Digital Transmission Systems, Springer- Macmillan India Ltd

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	
B.E/PTDC	**Microwave Engineering**	EC-31	Min "D"	Min "D"	5.0

Microwave Engineering

1 **Introduction to Microwaves and Mathematical model of Microwave Transmission.** . History of Microwaves, Microwave Frequency bands. Applications of Microwaves: Civil and Military,Medical, EMI/ EMC, Concept of Mode ,Characteristics of TEM, TE and TM Modes, Losses associated with microwave transmission, Concept of Impedance in Microwave transmission .

2. **Analysis of RF and Microwave Transmission Lines.** Coaxial Line, Rectangular Waveguide, Circular waveguide, Stripline,Microstrip Line,**Microwave Network Analysis:** Equivalent Voltages and currents for non-TEM lines, Network parameters for microwave Circuits, Scattering Parameters.

3. **Passive and Active microwave Devices**: Microwave Passive components: Directional Coupler, Power Divider, Microwave Passive components: Magic Tee,attenuator, resonator, Microwave Active components: Diodes, Transistors, Microwave Active components: oscillators, mixers.Microwave Semiconductor Devices: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes. Microwave tubes: Klystron, TWT, Magnetron.

4.**Microwave Design Principles.** Impedance transformation, Impedance Matching, Microwave Filter Design, RF and Microwave Amplifier Design, Microwave Power amplifier Design. Low Noise Amplifier Design, Microwave Mixer Design, Microwave Oscillator Design.

5. Microwave Measurements and Modern Trends in Microwaves Engineering . Power, Frequency and impedance measurement atmicrowave frequency.Network Analyser and measurement of scattering
parameters.Spectrum Analyser and measurement of spectrum of a microwave signal. Noise at microwave frequency and measurement of noise figure. Measurement of Microwave antenna parameters. Effect of Microwaves on human body. Medical and Civil applications of microwaves.Electromagnetic interference / Electromagnetic Compatibility (EMI / EMC). Monolithic Microwave IC fabrication. RFMEMS for microwave components. Microwave Imaging.

References:

1. David M. Pozar, "Microwave Engineering", Third Edition, Wiley India.
2. Samuel Y.Lio, "Microwave Devices andCircuits" ,PHI India
2. S. Ramo, J.R.Whinnery and T.V.Duzer, "Fields and Waves in Communication
Electronics", Third Edition, Wiley India.
3. R.E.Collin, "Foundations for Microwave Engineering", Second edition, IEEE Press.

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	
PTDC	**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 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	
B.E/PTDC	**COMPUTER SYSTEM ORGANIZATION**	EC-57	Min "D"	Min "D"	5.0

COMPUTER SYSTEM ORGANIZATION

Unit - I

Von newmann model-CPU, Memory, I/O, System Bus, Memory address register, Memory data register, program Counter, Accumulator, Instruction register, Micro operations, Register Transfer Language, Instruction Fetch, decode and execution, Instruction formats and addressing modes.

Unit - II

Control Unit Organization, Hardwired control Unit, Micro programmed Control Unit, Control Memory, Address Sequencing, Micro instruction formats, Micro program sequencer, Microprogramming

Unit - III

Arithmetic Processor design, Addition and subtraction algorithms, Multiplication algorithm, Division algorithm, Floating point arithmetic, Decimal Arithmetic Unit.

Unit - IV

Input Output Organization, I/O interface, Asynchronous data transfer, Programmed I/O, Interrupt initiated I/O, DMA, I/O processor, Priority Interrupts.

Unit - V

Memory Organization – RAM, ROM, Memory Maps, Memory Hierarchy, Cache Memory – Organization and mapping. Associative memory, Virtual memory, Memory Management Hardware. Introduction to parallel processing, Instruction and Arithmetic Pipeline.

Reference Books:

1. Morris Mano, Computer System Architecture, PHI.
2. William Stalling, Computer Organization and Architecture, PHI.
3. Kain, Advance Computer Architecture a system design approach, Prentice Hall of India , New Delhi.

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	
PTDC	**DIGITAL COMMUNICATION 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 Demultiplexing.
5. Study of ASK, PSK and FSK Transmitter and Receiver.

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	
B.E/PTDC	Microwave Engineering **LAB**	EC-32L	Min "D"	Min "D"	5.0

Microwave Engineering **LAB**

List of Experiments (Expandable):

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	
B.E/PTDC	**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 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	
PTDC	**PROFESSIONAL ACTIVITY**	EC- 62L	Min "D"	Min "D"	5.0

Objective – The aim of professional activity is to impart training in developing capabilities of students in expressing views on technical topics. Students can choose any topics related to electronics & communication branch theoretically or can fabricate practical working models on which lecture could be delivered . Practical working model demonstration in group is also permitted. Model fabrication under the professional activity shall be encouraged. Students who have visited, some technical places can also write & present report on it.