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)

B.E. Third Year Branch : Electronics & Telecommunication Engineering Sem : Fifth

Course Code	Subject	Periods			EVALUATION SCHEME					Credits
					SESSIONAL EXAM			ESE	SUB TOTAL	
		L	T	P	TA	CT	TOTAL			
EC-17	Analog Communication	3	1	-	10	20	30	70	100	4
EC-22	Analog Integrated Circuits	3	1	-	10	20	30	70	100	4
EC-23	Digital Signal Processing	3	1	-	10	20	30	70	100	4
EC-31	Microwave Engineering	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-18L	Analog Communication Lab	-	-	2	20	-	20	30	50	2
EC-24L	Digital Signal Processing Lab	-	-	2	20	-	20	30	50	2
EC-25L	Analog Integrated Circuits Lab	-	-	2	20	-	20	30	50	2
EC-32L	Microwave Engineering Lab	-	-	2	20	-	20	30	50	2
EC-26L	Industrial Training - I	-	-	2	50	-	50	-	50	2
EC-61L	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 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	ANALOG COMMUNICATION	EC-17	Min "D"	Min "D"	5.0

ANALOG COMMUNICATION

Unit 1 Amplitude Modulation System

Representation of band pass signals, Frequency Translation, A Method of Frequency Translation, Recovery of Baseband Signal, Amplitude Modulation, Maximum Allowable Modulation, Spectrum of an Amplitude Modulated Signal, Generation and Detection of AM waves. Suppressed Carrier Systems (DSB-SC), Single Sideband Modulation, Vestigial Sideband Modulation, Comparison of various AM Systems, Frequency Division Multiplexing, AM Transmitter and AM Radio Broadcasting.

Unit 2 Angle Modulation System

Angle modulation, Phase & Frequency Modulation, Relation between Phase & Frequency Modulation, Phase & Frequency Deviation, Spectrum of an FM Signal, Features of Bessel Coefficient, Narrowband FM, Wideband FM, Bandwidth of FM Signal, Effect of Modulation Index on Bandwidth, Phasor Diagram of FM signal, FM Generation and Detection, FM Radio Broadcasting.

Unit 3 Random Variables

Random Variables, CDF, PDF, relation between CDF & PDF, Average Value of Random Variables, Variance of Random Variable, Tchebycheff's Inequality, Guassian Probability Density, Error Function, Rayleigh Probability Density, Correlation between Random Variables, Central Limit Theorem, Autocorrelation.

Unit 4 Random Processes

Description of Statistical Average, Stationary, Random Processes and Linear System, Power Spectrum of Stochastic Processes, Transmission over LTI System, Gaussian processes , White processes, Bandlimited Processes and Sampling, Bandpass Processes.

Unit 5 Effect of Noise on Analog Communication Systems

Effect of noise on a Baseband Signal, DSB-SC AM, SSB AM, and Conventional System, The PLL, Effect of Additive Noise on Phase Estimation, Threshold effect in Angle Modulation, Pre-Emphasis and De-Emphasis Filtering, Comparison of Analog Modulation System, Characterization of Thermal Noise Sources, Effective Noise Temperature and Noise Figure, Transmission Losses, Repeaters for Signal Transmission.

Reference Books:

1. H.Taub & D.L.Schilling: Principles of Communication System; TMH
2 Simon Haykins- Communication System; John Wiley
3 B P Lathi- Modern Digital and Analog Communication, Oxford University.
4 J.Prokis and Salehi- Communication Engineering System, Prentice Hall.
5 Hwie. P. Hsu- Schaum's Outline of Analog and Digital Communication

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	
B.E/PTDC	**ANALOG INTEGRATED CIRCUITS**	EC-22	Min "D"	Min "D"	5.0

ANALOG INTEGRATED CIRCUITS

UNIT- I Integrated Circuit Fabrication:
Introduction, Classification, IC Chip Size and Circuit Complexity, Fundamentals of Monolithic IC Technology, Basic Planar Processes, Fabrication of a Typical Circuit, Active and Passive Components of ICs, Fabrication of FET ,Thin & Thick Film Technology

UNIT -II Operational Amplifier:
Ideal Operational amplifier, Operational Amplifier Internal Circuit, FET Operational Amplifier, Operational amplifier DC Characteristics : Input bias Current, Input offset Current, Input offset Voltage, Thermal Drift, Operational amplifier AC Characteristics : Frequency Response, Stability of an OP-AMP, Frequency Compensation (External & Internal), Slew Rate.

UNIT- III Basic Operational Amplifier Applications:
Instrumentation amplifier, AC amplifier, Voltage to current and current to Voltage Converter, Op-amp circuits using diodes, Sample and hold circuits ,Log & antilog amplifier Multiplier & Divider, Differentiator, Integrator, Electronic Analog Computation, Operational Transconductance Amplifier(OTA).

UNIT- IV
Comparator: Regenerative Comparator (Schmitt Trigger), Square Wave generator (Astable Multivibrator), Monstable Multivibrator, Triangular Wave Generator, Basic Principle of Sine Wave Oscillators,
Voltage Regulator: Series OP-AMP Regulator, IC Voltage Regulators, 723 General Purpose Regulators, Switching Regulator,
Active Filters: RC Active filters, Transformation, State variable filter, Switched capacitor filters, Active filters using OTA's.

UNIT -V
IC 555 Timers: Description of Functional Diagram, Monostable Operation, Astable Operation, Schmitt Trigger,
Phased- Locked Loops: Basic Principles, Phase Detector /Comparator, Voltage Controlled Oscillator (VCO), Low Pass Filter, Monolithic Phase- Locked Loop, PLL Applications.
D-A & A-D Converters: Basic DAC Techniques, A-D Converters.

REFERENCES:

1. Millman and Halkias : Integrated Electronics, TMH
2. Gayakwad: OP-AMP and Linear Integrated Circuits, Pearson Education
3. D. Roy Choudhury and Shail B. Jain: Linear Integrated Circuits, New Age
4. Boylestad and Nashelsky: Electronic Devices and Circuit Theory, PHI
5. Sedra and Smith : Microelectronics, Oxford Press
6. Graham Bell : Electronics Devices and Circuits, PHI
7. Donald A Neamen: Electronic Circuits Analysis and Design, TMH
8. S. Rama Reddy: Electronic Devices and Circuits, Alpha Science International Limited

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	**DIGITAL SIGNAL PROCESSING**	EC-23	Min "D"	Min "D"	5.0

DIGITAL SIGNAL PROCESSING

Unit – I

Discrete-Time Signals and Systems : Review of Discrete-Time Sequences and Systems, Linear constant coefficient difference equations, Derivation of transfer function of LTI systems, Frequency Domain Representation of discrete time signals & systems, Signal flow Graph representation of digital network, matrix representation, introduction to Two dimensional sequences and systems.

Unit - II

The z-Transform Applications: The review of Direct z-transform and Inverse- Z transform ,Mapping of S-domain to Z-domain, System Stability in Z-domain, Rational z-transforms, chirp – Z transform, Two dimensional Z-transform. Design of LTI systems using Z-transform.

Unit - III

Frequency Analysis of Discrete Time Signals: Discrete Fourier series (DFS),Comparision of the DFS and Discrete Fourier Transform (DFT), Properties of DFT , Circular Convolution , Two dimensional DFT ,FFT algorithms, Radix-2 FFT Algorithm, Goertzel's Algorithm, Decimation in time, Decimation in frequency algorithm, Decomposition for 'N' composite number.

Unit – IV

Basic filter structures –Recursive and non -recursive networks, System connectivity, Basic structures of IIR and FIR filters, Determining of system response, Impulse response and transfer function of filters, Determining impulse response using Recursion formula ,finite word -length effects in digital filters.

Unit - V

Digital filters Design Techniques: Design of IIR and FIR digital filters, Impulse invariant and bilinear transformation, windowing techniques- rectangular and other windows, Application of MATLAB for design of digital filters, Concept of Adaptive filtering and applications.

Books:

1. A.V. Oppenheim and R. W. Schafer: Digital Signal Processing, Prentice Hall.
2. . L.R. Rabiner and B. Gold: Theory and Application of Digital Signal Processing, Prentice Hall
3. John. G. Proakis and Monolakis: Digital Signal Processing, Pearson Education
4. Salivahanan and Vallavraj: Digital Signal Processing, Mc Graw Hill.
5. S. K. Mitra: Digital Signal Processing- A Computer based Approach, Mc Graw Hill.
6. Schilling and Harris: Fundamentals of DSP using MATLAB, Cengage Learning.

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

Introduction to 8 bit microprossor, 8085 microprossor, architecture and instruction set, 8085 assembly language programming.

Unit - IV

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

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	
B.E/PTDC	**ANALOG COMMUNICATION LAB**	EC-18L	Min "D"	Min "D"	5.0

ANALOG COMMUNICATION LAB

(Suggested Exercise)

List of Experiments :

1) Study of AM, DSB – SC & SSB.
2) Study of AM Transmitter.
3) Study of AM receiver.
4) Study of FM Generation by Armstrong Method.
5) Study of FM Generation by Reactance Modulator.
6) Study of Superhetrodyne receiver.
7) Study of Sampling Theorem and Reconstruction of Bandlimited signal.

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	**DIGITAL SIGNAL PROCESSING LAB**	EC-24L	Min "D"	Min "D"	5.0

DIGITAL SIGNAL PROCESSING LAB
(Suggested Exercise)

List of experiments:
The following practical should be performed using Matlab/ any DSP software –

1. Generation, analysis and plots of discrete-time signals.
2. Implementation of operations on sequences (addition, multiplication, scaling, shifting, folding etc).
3. Implementation of Linear time-invariant (LTI) systems and testing them for stability and causality.
4. Computation and plots of z-transforms, verification of properties of z-transforms.
5. Computation and plot of DFT of sequences, verification of properties of DFT.
6. Computation and plots of linear/circular convolution of two sequences.
7. Computation of radix-2 FFT- Decimation in time and Decimation in frequency.
8. Implementation of IIR and FIR filter structures (direct, cascade, parallel etc).
9. Design of windowing techniques of FIR Filter.

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.	**ANALOG INTIGRATED CIRCUITS LAB**	EC-25L	Min "D"	Min "D"	5.0

ANALOG INTIGRATED CIRCUITS LAB

(Suggested Exercise)

List of experiments (Expandable) :

1. Design and Performance of IC Voltage Regulator.
2. Wave from of Mono sable, Bi stable
3. Design and Performance Evaluation of FET amplifiers.
4. Application of Integral & Differential amplifier
5. To Design and Construct a shunt and series Regulator and find line and load regulation
6. Study of switching regulator
7. Study of General purpose regulator
8. Study of Schmitt trigger
9. Study and characteristics of Op-AMP
10. Design and assembling of Op-AMP based ckts.

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	**INDUSTRIAL TRAINING - I**	EC-26L	Min "D"	Min "D"	5.0

INDUSTRIAL TRAINING - I

The student shall go to an Industry at the end of Fourth Semester during summer and shall prepare a report on the Practical Training undergone there. He has to present the report in Fifth semester and assessment will be done by committee of two members (Headed by H.O.D. 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	**SEMINAR/GROUP DISCUSSION**	EC-61L	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.