GONDWANA UNIVERSITY,GADCHIROLI

FACULTY OF ENGINEERING AND TECHNOLOGY

CONSLIDATED STATEMENT OF VARIOUS PARAMETERS IN TEACHING & EXAMINATION SCHEME OF B.E. (ELECTRONICS AND COMMUNICATION ENGINEERING / ELECTRONICS AND TELECOMMUNICATION ENGINEERING)- CBCS

SR.NO.	SEMESTER	NO. OF THEORY SUBJECTS	NO OF LABS/PRACT	TEACHING HOURS(TH) (L+T)	TEACHING HOURS (PRACT)	TOTAL CREDIT	MAX. THEORY MARKS	MAX.PRACT MARKS	MAX. MARKS TOTAL
1	I								
2	II								
3	III	5	3	19	6	22	500	150	650
4	IV	5	4	19	8	24	500	200	700
5	V	5	4	19	8	24	500	200	700
6	VI	5	4	20	8	24	500	200	700
7	VII	5	4	20	9	24	500	200	700
8	VIII	5	2	20	8	24	500	200	700
		30	**20**	**117**	**46**	**142**	**3000**	**1150**	**4150**

Subject wise Board of Studies Affiliation

Board of Studies	**Subject Codes**
APPLIED SCIENCES & HUMANITIES	3BEET01, 4BEET01, 4BEET09
ELECTRICAL ENGINEERING	3BEET05, 5BEET03, 6BEET01
COMPUTER SCIENCE/IT ENGG	4BEET08, 8BEET05
ETC ENGINEERING	Rest all ,except above enlisted
EN/ETC/ECE COMMOMN	7BEEN01/7BEET04,7BEEN05(iv)/7BEET05(ii),7BEEN06/7BEET07, 7BEEN08/7BEET09. 8BEEN01/8BEET01,8BEEN05/8BEET05,8BEEN07/8BEET06, 8BEEN08/8BEET07.

Appendix A
Four Year Degree Course in
Engineering and Technology
Course and Examination Scheme with Choice Based Credit System
Third Semester B.E. (Electronics and Communication Engineering/ Electronics and Telecommunication Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours Per Week			Number of Credits	THEORY						PRACTICAL			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
3BEET01	Applied Mathematics-III	4	0	0	4	3	80	10	10	100	40	--	--	--	--
3BEET02	Digital Electronics	3	1	0	3	3	80	10	10	100	40	--	--	--	--
3BEET03	Electronic Devices & Circuits	3	1	0	3	3	80	10	10	100	40	--	--	--	--
3BEET04	Electronic Measurements & Instrumentation	3	1	0	3	3	80	10	10	100	40	--	--	--	--
3BEET05	Network Theory	3	0	0	3	3	80	10	10	100	40	--	--	--	--
Laboratories															
3BEET06	Digital Electronics	0	0	2	2	--	--	--	--	--	--	25	25	50	25
3BEET07	Electronic Devices & Circuits	0	0	2	2	--	--	--	--	--	--	25	25	50	25
3BEET08	Electronic Measurements & Instrumentation	0	0	2	2	--	--	--	--	--	--	25	25	50	25
Total		**16**	**3**	**6**						**500**				**150**	
Semester Total		**25**			**22**										**650**

Appendix A
Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Choice Based Credit System
Fourth Semester B.E. (Electronics and Communication Engineering/ Electronics and Telecommunication Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours Per Week			Number of Credits	THEORY						PRACTICAL			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
4BEET01	Applied Mathematics-IV	4	0	0	4	3	80	10	10	100	40	--	--	--	--
4BEET02	Analog Circuits	3	1	0	3	3	80	10	10	100	40	--	--	--	--
4BEET03	Electromagnetic Fields	3	1	0	3	3	80	10	10	100	40	--	--	--	--
4BEET04	Electronic Engineering Materials and Components	3	0	0	3	3	80	10	10	100	40	--	--	--	--
4BEET05	Microprocessor and interfacing	3	1	0	3	3	80	10	10	100	40	--	--	--	--
Laboratories															
4BEET06	Analog circuits	0	0	2	2	--	--	--	--	--	--	25	25	50	25
4BEET07	Microprocessor and interfacing	0	0	2	2	--	--	--	--	--	--	25	25	50	25
4BEET08	Object oriented language Lab	0	0	2	2	--	--	--	--	--	--	25	25	50	25
4BEET09	**Personal proficiency**	0	0	2	2							50		50	25
Total		**16**	**3**	**8**						**500**				**200**	
Semester Total		**27**			**24**										**700**

Appendix A
Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Choice Based Credit System
Fifth Semester B.E. (Electronics and Communication Engineering/ Electronics and Telecommunication Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours Per Week			Number of Credits	THEORY						PRACTICAL			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
5BEET01	Linear Electronic Circuits	3	1	0	3	3	80	10	10	100	40	--	--	--	--
5BEET02	Microcontroller and its applications	4	1	0	3	3	80	10	10	100	40	--	--	--	--
5BEET03	Power Electronics	3	0	0	3	3	80	10	10	100	40	--	--	--	--
5BEET04	Signals & Systems	3	1	0	3	3	80	10	10	100	40	--	--	--	--
5BEET05	**Program Elective - I**	3	0	0	4	3	80	10	10	100	40	--	--	--	--
Laboratories															
5BEET06	Linear Electronic Circuits	0	0	2	2	--	--	--	--	--	--	25	25	50	25
5BEET07	Microcontroller and its applications	0	0	2	2	--	--	--	--	--	--	25	25	50	25
5BEET08	Signals and Systems	0	0	2	2							25	25	50	25
5BEET09	**Minor Project &Seminar**	0	0	2	2							50		50	25
Total		**16**	**3**	**8**						**500**				**200**	
Semester Total		**27**			**24**										**700**

Program Elective - I 1. Information Theory and Coding, 2. Speech and Audio Processing, 3. Introduction to MEMS

Appendix A
Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Choice Based Credit System
Sixth Semester B.E. (Electronics and Communication Engineering/ Electronics and Telecommunication Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours Per Week			Number of Credits	THEORY						PRACTICAL			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
6BEET01	Control System	3	1	0	3	3	80	10	10	100	40	--	--	--	--
6BEET02	Digital Signal Processing	3	1	0	3	3	80	10	10	100	40	--	--	--	--
6BEET03	Fields & Radiating Systems	3	1	0	3	3	80	10	10	100	40	--	--	--	--
6BEET04	Principals of Communication	3	1	0	3	3	80	10	10	100	40	--	--	--	--
6BEET05	**Program Elective - II**	4	0	0	4	3	80	10	10	100	40	--	--	--	--
Laboratories															
6BEET06	Control System	0	0	2	2	--	--	--	--	--	--	25	25	50	25
6BEET07	Digital Signal Processing	0	0	2	2	--	--	--	--	--	--	25	25	50	25
6BEET08	Principals of Communication	0	0	2	2	--	--	--	--	--	--	25	25	50	25
6BEET09	**Industrial Training Internship**	0	0	2	2							50		50	25
Total		**16**	**4**	**8**						**500**				**200**	
Semester Total		**28**			**24**										**700**

Program Elective - II 1. CMOS Design, 2. Scientific computing, 3. Nano electronics

Appendix A
Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Choice Based Credit System
Seventh Semester B.E. (Electronics and Communication Engineering/ Electronics and Telecommunication Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours Per Week			Number of Credits	THEORY						PRACTICAL			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
7BEET01	Digital Communication	3	1	0	3	3	80	10	10	100	40	--	--	--	--
7BEET02	Modern TV Engineering	3	1	0	3	3	80	10	10	100	40	--	--	--	--
7BEET03	Opto Electronics devices and Communication	3	1	0	3	3	80	10	10	100	40	--	--	--	--
7BEET04 /7BEEN 01	UHF & Microwaves	3	1	0	3	3	80	10	10	100	40	--	--	--	--
7BEET05 7BEET05 (iv)/7BE EN05(iv)	**Core Elective-I** i) Mobile Communication and network ii) Wireless Sensor Network iii) Mixed Signal Design iv) Modern Computer Architecture and Organization v) Adaptive signal processing	3	1	0	3	3	80	10	10	100	40	--	--	--	--
Laboratories															
7BEET06	Digital Communication	0	0	2	2	--	--	--	--	--	--	25	25	50	25
7BEET07 /7BEEN0 6	UHF & Microwaves	0	0	2	2	--	--	--	--	--	--	25	25	50	25
7BEET08	Opto Electronics devices and Communication	0	0	2	2	--	--	--	--	--	--	25	25	50	25
7BEET09	Major Project Phase –I	0	0	3	3	--	--	--	--	--	--	50	--	50	25

/7BEEN08															
Total		**15**	**5**	**9**						**500**				**200**	
Semester Total		**29**			**24**										**700**

Appendix A

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Choice Based Credit System
Eighth Semester B.E. (Electronics and Communication Engineering/ Electronics and Telecommunication Engineering)

Subject Code	Subject	Teaching Scheme				Examination Scheme									
		Hours Per Week			Number of Credits	THEORY						PRACTICAL			
		L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
								MSE	IE						
8BEET01 /8BEEN01	Digital System Design	3	1	0	3	3	80	10	10	100	40	--	--	--	--
8BEET02	Satellite communication	3	1	0	3	3	80	10	10	100	40	--	--	--	--
8BEET03	Wireless Communication	3	1	0	3	3	80	10	10	100	40	--	--	--	--
8BEET04	**Core Elective-II** i) Digital Image and Video processing ii) High speed electronics iii) Wavelets iv) Error correcting Code v) Embedded Systems	3	1	0	3	3	80	10	10	100	40	--	--	--	--
8BEET05 /8BEEN05	**Open Elective** Computer Network	3	1	0	4	3	80	10	10	100	40	--	--	--	--
Laboratories															

8BEET06 /8BEEN0 7	Digital System Design	0	0	2	2	--	--	--	--	--	--	25	25	50	25
8BEET07 /8BEEN0 8	Major Project Phase –II	0	0	6	6	--	--	--	--	--	--	75	75	150	75
Total		**15**	**5**	**8**						**500**				**200**	
Semester Total		**28**			**24**										**700**

AUDIT HEADS

The students shall be required to qualify in minimum 10 (TEN) Audit Heads from the available list. The Students shall be at the liberty to acquire assigned FIVE (05) non-academic Credits by the time s/he appears for the first ESE of VI semester of the Program. The Colleges shall send list of Ten Audit Heads qualified (Q) by the student and their single composite Grade Point (G) by that time. The Audit Heads shall be considered only if undertaken during the tenure of this program, during its first three years. For qualifying, the student has to secure minimum Grade Point of '5' in TEN different Audit Heads.

The Audit Course Credits shall not be counted for calculation of GPA.

The Audit Heads Grade Point shall be shown in the Grade Sheet of VI semester B.E. in all the programs. If the composite Grade Points (G) is not sent from the college side till the above prescribed time, then such student shall be shown 'F'(Fail) in the Grade Sheet of VI semester. The College shall send consolidated list of all the students in the Program and their 'Composite Grade Point' in respect of Audit Heads qualified by them in the prescribed format 'Form-AHCI', appended with this direction as Appendix –B

The following Audit Heads shall be available to the students :

A	National Social Service(NSS)	**H**	National Cadet Corps(NCC)	**O**	Blood Donation
B	Paper Presentation	**I**	Quiz Competition	**P**	Debate Competition
C	Computer/Software/ Campus Recruitment courses (3-5 days)	**J**	Office Bearer in Departmental or higher Students Body/Professional Society (College level)	**Q**	Soft skills Development Course (3-5 days)
D	Hardware/Software Competition participation	**K**	Volunteer in minimum inter collegiate activities	**R**	Sports Team Participation
E	YOGA/Meditation Training Certificate (Minimum Three Days)	**L**	Cultural Activity Competition, National , State, District level Essay Competition.	**S**	Certificate of Noteworthy participation in National event like SWACHCHHA BHARAT ABHIYAAN, TREE PLANTATION
F	Certificate of service to the Home for the Aged/Orphans/Different ly enabled (1-3 days)	**M**	Membership of any registered Non-Government Organization(NGO)	**T**	Plant/Industrial Visit
G	Certificate of Appreciation by local Civic/District /State/ National level	**N**	Certificate of Noteworthy participation in Environment	**U**	Participation in 3 to 5 days youth Seminars on Social, Environmental,

	Government Authority/Organizations		Day/AKSHAY URJA Day or such other programs of national importance/Environmental day, Science day, Engineers Day, Teachers day etc.		Wellbeing, Consciousness Programs.

The Audit Heads may be appended/revised/changed from time to time and shall be notified by the University.

APPENDIX-B
FORM - AHCI

GONDWANA UNIVERSITY, GADCHIROLI
FACULTY OF SCIENCE & TECHNOLOGY
COMPOSITE GRADE SHEET FOR AUDIT HEADS

NAME OF THE COLLEGE: _____

NAME OF THE STUDENT	PRN NUMBER	SEMESTER	BRANCH

AUDIT HEAD CODE	TITLE OF THE AUDIT HEAD	GRADE POINT SCORED (OUT OF 10)	COMPOSITE AUDIT GRADE POINT (CAGP) AVERAGE
A	National Social Service (NSS)		
B	Paper Presentation		
C	Computer/Software/ Campus Recruitment courses (3-5 days)		
D	Hardware / Software Competition participation		
E	YOGA/MEDITATION Training Certificate (Minimum 3 DAYS)		
F	Certificate of Service to the Home for the Aged / Orphans/Differently Enabled.		
G	Certificate of Appreciation by local Civic/ District/ State/ National level Government Authority / Organizations		
H	National Cadet Corps (NCC)		
I	Quiz Competition		
J	Office Bearer in Students Body / Professional Society (College level)		
K	Volunteer in minimum inter collegiate activities		
L	Cultural Activity Competition, National, State, District level **Essay Competition.**		
M	Membership of any registered Non-Government Organization (NGO)		
N	Certificate of Noteworthy participation in Environment Day/ AKSHAY URJA Day or such other programs of national importance/ Environmental day, Science day, Engineers Day, Teachers day etc.		
O	Blood Donation		
P	Debate Competition		
Q	Soft Skills Development Course (3-5 days)		
R	Sports Team Participation		
S	Certificate of Noteworthy participation in National Day event like SWACHCHHA BHARAT ABHIYAAN/TREE PLOANTATION		
T	Plant/ Industrial Visit		
U	Participation in 3 to 5 days youth Seminars/Conferences/Workshops on Social, Environmental, Wellbeing, Consciousness Programs.		

CODES (IN ALPHABETIC ORDER) OF AUDIT HEADS QUALIFIED BY THE STUDENT									

DIRECTOR,

PHYSICL EDUCATION/ **HEAD OF THE DEPARTMENT** **PRINCIPAL**

VII SEMESTER B.E.

ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET01

Title of the Course : **Digital Communication**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
3	1	0	4	3	3	10	10	80	100

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Explain the building blocks of digital communication system
2. Compare advantages/disadvantages of digital communication to analog communication.
3. Understand the generation and detection of different type's baseband and bandpass modulation techniques.
4. Analyze and compare the performance of different types baseband and bandpass digital communication technique in terms of bit rate, error probability and spectral efficiency.
5. Identify various types of error introduced in the processes viz. sampling, quantizing, and describe Inter Symbol Interference (ISI).

Unit	Contents	Hours
1	**Digital Communication System Basics**	
	Basic building blocks of Digital communications, analog versus digital communication, Advantages disadvantages of digital communications.	8
2	**Digital Baseband Transmission**	
	Pulse code modulation, Signal to quantization ratio, non uniform quantization companding, BW calculations.	8
3	**Transmission of Analog Samples & Signal Detection in Noise**	
	Delta Modulation, Adaptive delta modulation, DPCM, ADCM, ADPCM, Matched Filter Receiver, Derivation of Its Impulse Response and Peak Pulse Signal to Noise Ratio. Correlator receiver, Decision Threshold and Error Probability For, Unipolar (ON-OFF) Signaling, ISI, Nyquist Criterion For Zero ISI & Raised Cosine Spectrum	10
4	**Digital Modulation Technique**	
	Gram-Schmidt Orthogonalization Procedure, Types of Digital Modulation, Wave forms for Amplitude, Frequency and Phase Shift Keying, Method of Generation and Detection of Coherent & Non-Coherent Binary ASK, FSK & PSK Differential Phase Shift Keying, Quadrature Modulation Techniques QPSK, Probability of Error and Comparison of Various Digital Modulation Techniques.	10
5	**Digital Multiplexing**	
	Fundamentals of Time Division Multiplexing, Electronic Commutator, Bit, Byte Interleaving T1 Carrier System, Synchronization and Signaling of T1, TDM, PCM Hierarchy, T1 to T4 PCM TDM System (DS1 to DS4 Signals)	9

	Total	45

Text Books:

1. Simon Haykin: ―Digital Communication, John Wiley / 4th Ed.
2. Bernard SKLAR: ―Digital communication, Pearson education.
3. Lathi, B. P.:―Modern Digital & Analog Communication Systems, Oxford University Press.
4. Prokis J. J.: ―Digital Communications, McGraw Hill
5. Wayne Tomasi: Electronic Communication systems, Pearson Education, 5th edition

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET02

Title of the Course : **Modern TV Engineering**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
3	1	0	4	3	3	10	10	80	100

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Illustrate the fundamental concepts of television transmitter and receiver systems.
2. Demonstrate the knowledge of different colour television systems used worldwide and its compatibility.
3. Explain the working principles of latest digital TV and HDTV.
4. Classify and compare advanced TV technology, MAC signals and DTH technology
5. Show the knowledge of digital video principles and their standards

Unit	Contents	Hours
1	**Fundamentals of television**	
	Television basics: Factors of TV systems, Composite video signal, Signal transmission and channel bandwidth, Colour TV systems, Colour fundamentals, Mixing of colours, Colour Perception, Chromaticity diagram.	9
2	**TV standards**	
	NTSC, PAL, SECAM systems, colour TV transmitter, high level, low level transmitters, colour TV receivers, remote control, antennas for transmission, TV alignment and TV pattern generation.	9
3	**Digital TV**	
	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 ITU-Standards(H.). Digital TV recording techniques.	9
4	**Satellite and cable television**	
	Geostationary satellites, Satellite communication systems, Cable signal sources, Cable signal processing and distribution, Cable signal converters.	9
5	**Advanced TV technologies**	

	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),LCD TV System, Plasma TV Systems & LED technologies.	9
	Total	**45**

Text Books:

1. Television and video Engineering, A. M. Dhake, TMH Publication.
2. Video Simplified, 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. R.R. Gulathi, “Modern television practice ”.New age international

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET03

Title of the Course : **Opto Electronics devices and Communication**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
3	1	0	4	3	3	10	10	80	100

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Recognize and classify the structures of optical fiber and types.
2. Discuss the channel impairments like losses and dispersion.
3. classify the optical sources and discuss their principle.
4. classify the optical detectors and discuss their principle.
5. Discuss the basic applications of optical amplifiers like Erbium Doped fiber Amplifier (EDFA).Look into the widely used network like SONET/SDH

Units	Contents	Hours
1	**Introduction to optical Fibers:** Introduction to Step Index and Graded Index Fibers. Multimode Fibers, Propagation in Fibers Ray Mode, Numerical Aperture and Multipath Dispersion, Electromagnetic Wave Equation in SI and GI Fibers.	9
2	**Signal Degradation**: Manufacture of Fibers, Fiber Joints, Splices and Connectors. Attenuation, Material Dispersion, Waveguide Dispersion, Pulse Broadening, Mode Coupling.	9
3	**Optical Sources and Coupling:** Direct and Indirect Band Gap Materials, LED Structures , Light Source Materials, Quantum Efficiency and LED Power, Laser Diodes, Modes and Threshold Conditions, Rate Equations, External Quantum Efficiency, Resonant Frequencies and Temperature effects, Introduction to Quantum Laser, Fiber Amplifiers, Power Launching and Coupling, Lencing Schemes.	9
4	**Optical Receivers:** Pin and APD Diodes, Photo-Detectors, Noise SNR Detector Response Time, Avalanche Multiplication Noise, Comparison of Photo Detectors , Fundamental Receiver Operation , Preamplifiers, Receiver Configuration , Probability of Error Quantum Limit.	9
5	**Digital Transmission System**: Point to Point Links, WDM, Data Buses, Star and T-Coupler, NRZ, RZ and Block Codes. Measurement in Optical Fibers, Attenuation, Dispersion, Refractive Index Profile,Basic Concepts of SONET/SDH Network.	9

	Total	45

Text Books:

1. Optical Fiber Communication –G. Keiser McGraw Hill Publication

Reference books:

1. Optical Communication Principles and Practice – J. senior, Prentice Hall of India
2. Optical Communication System – J. Gower Prentice Hall of India

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET04/7BEEN01

Title of the Course : **UHF & Microwaves**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
3	1	0	4	3	3	10	10	80	100

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Recognize the limitations of existing conventional tubes and solid state devices at microwave frequencies.
2. Study the performance of specialized microwave tubes such as klystron, reflex klystron, magnetron and Travelling wave tube.
3. Analyze microwave circuits using scattering parameters.
4. Understand the operation of passive waveguide components.
5. Test microwave components and circuits with standard microwave bench

Units	Contents	Hours
1	**Microwave tubes :** Causes of Failure of Conventional Tubes at Microwave Frequencies, Velocity Modulation and Electronic Efficiency In Single Cavity and Two Cavity Klystron.	10
2	**Microwave tubes:** Slow Wave Structure, Traveling Wave Tube and Backward Wave oscillator, Electron Motion In Parallel Plane Magnetron and Cylindrical Magnetron	09
3	**Introduction to S –Matrix:** Scattering Matrices and their Properties, Scattering Matrices of E plane Tee, H Plane Tee, Magic Tee, Directional Coupler and Transmission Lines.	09
4	**Microwave Passive Device**: Phase Shifter, Attenuator, Tees, Directional Coupler, Circulator, Isolators, Gyrators, Transmission Line Resonant Circuits.	09
5	**Microwave Measurement And Solid State Devices:** Low, Medium and High Power Measurement, Measurement of VSWR, Measurement of Impedance, Attenuation Measurement, Q Factor Measurement. GaAs Oscillator, PIN Diode, Parametric Amplifier, Maser, Microstrip Lines.	08
	Total	45

Text Books:

1. Foundations of microwave engineering: R.E. Collins. McGraw Hill
2. Microwave Device and Circuits: Samuel Y. Lio Prentice Hall of India

Reference books:

1. Radio Engg. Terman McGraw hill
2. Microwave Principles-Reich Wiley Eastern
3. Microwave engineering: R. Chatterjee, Prentice Hall of India
4. Microwave Engineering, Kulkarni, New Age International

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET05

Title of the Course : **Mobile Communication and Network**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand cellular concepts like frequency reuse, hand-off and Interference.
2. Analyze Multiuser Systems Concepts..
3. know fundamentals of WLAN.

Unit	Contents	Hours
I	**The cellular concept**	10
	Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference , Power Control for Reducing interference, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring	
II	**Mobile Radio Propagation**	9
	Free space propagation model, Two-ray ground reflection model, Distance power loss, Macro-cell propagation model, Micro-cell propagation model, Shadowing model, Multipath effects in mobile communication, Models for multipath reception	
III	**Equalization, diversity and channel coding**	9
	Fundamentals of equalization, Adaptive equalizers, Linear and nonlinear equalization, Algorithms for adaptive equalization, Diversity techniques, Fundamentals of channel coding, Overview of error detection and correction codes	
IV	**Multiple access techniques**	9
	Introduction to multiple access, Frequency division multiple access (FDMA), Time division multiple access (TDMA), Spread spectrum multiple access, Space division multiple access (SDMA),Code division multiple access (CDMA) ,Packet radio, Orthogonal frequency division multiple access (OFDM)	
V	**Wireless LAN**	8
	Introduction, Infrared radio transmission infrastructure and adhoc networks, detailed study of IEEE 802.11, HIPER LAN, Bluetooth, Wireless ATM	

Reference Books

1) William C. Y. Lee, “Mobile Cellular Telecommunications: Analog and Digital Systems”, Tata McGraw Hill Publication, 2nd Edition, 1995.

2) Dr. KamiloFeher, “Wireless and Digital Communications”, PHI Publication, 1st Edition, 1995

Text Books

1) Theodore S. Rappaport,“Wireless Communications: Principles and Practice”, Pearson / PHI Publication, 2nd Edition, 2002

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET05/7BEEN05(iv)

Title of the Course : **Wireless Sensor Network**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand and explain common wireless sensor node architectures
2. Explain the concepts of network architecture andMAC layer protocol for WSN
3. Demonstrate knowledge of routing protocols developed for WSN
4. Understand the Sensor management ,sensor network middleware

Units	Contents	Hours
1	Introduction and Overview of Wireless Sensor Networks, Commercial and Scientific Applications of Wireless Sensor Networks, Basic Wireless Sensor Technology, Sensor Taxonomy, wireless network environment, wireless network trends.	09
2	Sensors Network Protocols, Data dissemination and gathering, Routing Challenges and design issues in wireless sensor network, Routing strategies in WSN.	09
3	Radio technology primer, Available wireless technologies, Wireless Sensors Networks Protocols, Physical Layer, Fundamentals of Medium Access Control Protocols for Wireless Sensor Networks, MAC protocols for WSN, Case Study, IEEE 802.15 4LR WPAN, Standard case study.	09
4	Protocols, Transport Control Protocols for Wireless Sensors Networks, Traditional transport control protocol, transport protocol design issues, examples of existing transport control protocol, performance of TCP.	09
5	Middleware for Sensor Networks, WSN middleware principles, Middleware architecture, existing middleware.	09
	Total	45

Text Books:

1. Morgan Kaufmann F. Zhao and L. Guibas, 'Wireless Sensor Networks', a Francisco, 2004.
2. C. S. Raghavendra, Krishna M. Sivalingam, Taieb F. Znati, 'Wireless sensor networks', Edition: 2,
   Published by Springer, 2004 ISBN 1402078838, 9781402078835

Reference Books:

1. "Wireless Sensor Networks: Technology, Protocols, and Applications", KazemSohraby, Daniel Minoli, TaiebZnati, WIeyInterscience Publication, 2007
2. "Computer Networks" ,Andrew Tanenbaum, 4th ed., Pearson Education,2007

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET05

Title of the Course : **Mixed Signal Design**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the practical situations where mixed signal analysis is required.
2. Analyze and handle the inter-conversions between signals.
3. Design systems involving mixed signals

Unit	Contents	Hours
I		
	Analog and discrete-time signal processing, introduction to sampling theory;Analog continuous-time filters: passive and active filters; Basics of analog discrete-time filters and Z-transform	10
II		
	Switched-capacitor filters- Non-idealities in switched-capacitor filters; Switched-capacitor filterarchitectures; Switched-capacitor filter applications	9
III		
	Basics of data converters; Successive approximation ADCs, Dual slope ADCs,Flash ADCs, Pipeline ADCs, Hybrid ADC structures, High-resolution ADCs, DACs	9
IV		
	Mixed-signal layout, Interconnects and data transmission; Voltage-mode signalling and data transmission; Current-mode signalling and data transmission	9
V		
	Introduction to frequency synthesizers and synchronization; Basics of PLL,Analog PLLs; Digital PLLs; DLLs.	8

Text/Reference Books:

1. R. Jacob Baker, CMOS mixed-signal circuit design, Wiley India, IEEE press, reprint 2008.
2. BehzadRazavi , Design of analog CMOS integrated circuits, McGraw-Hill, 2003.
3. R. Jacob Baker, CMOS circuit design, layout and simulation, Revised second edition, IEEE press, 2008.
4. Rudy V. dePlassche, CMOS Integrated ADCs and DACs, Springer, Indian edition, 2005.

5. Arthur B. Williams, Electronic Filter Design Handbook, McGraw-Hill, 1981.
6. R. Schauman, Design of analog filters by, Prentice-Hall 1990 (or newer additions).
7. M. Burns et al., An introduction to mixed-signal IC test and measurement by, Oxford university press, first Indian edition, 2008.

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET05

Title of the Course : **Modern Computer Architecture and Organization**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the Concept of Parallel Processing and its applications
2. Interpret performance of different pipelined processors
3. Discuss memory organization and mapping techniques

Unit	Contents	Hours
I		
	Instruction execution fundamentals, Von-Neumann architecture, concept of memory and addressing. Performance measurement of computer hardware- MIPS, IPC, CPI, benchmarks. speed-up& Amdahl's Law. Instruction set principles, classification of instructions, addressing modes, instruction set encoding, MIPS instruction set, RISC vs CISC architectures	8
II		
	Concept of instruction pipelining, RISC instruction set, RISC 5 stage pipeline, pipeline hazards, operand forwarding, branch prediction techniques, basic MIPS pipeline, MIPS pipeline for handling multi-cycle operations, Design issues with multi-cycle pipeline, pipeline scheduling, Compiler techniques to exploit ILP, loop unrolling	9
III		
	Advanced branch prediction schemes, dynamic scheduling, Tomasulo's approach, hardware base speculation, VLIW approach for multi-issue, Multi threading - fined grained and coarse grained, super scalar and super pipelining, hyper threading. Vector architectures, organizations and performance tuning. GPU architecture and internal organization, Elementary concepts in CUDA programming	10
IV		
	Introduction to memory hierarchy, locality of reference, cache memory fundamentals, cache performance parameters. Block level issues -mapping, identification, cache replacement techniques, write strategy, types of misses- compulsory, capacity, conflict misses. Basic cache optimizations technique, Advanced cache optimizations technique	10

V		
	Introduction to TCMP, NoC, topology, routing, flow control, virtual channels, input buffered router micro-architecture. Input and output selection strategies, allocators and arbiter algorithms for crossbar switch	8

Text/Reference Books:

1. Computer Architecture - A Quantitative Approach,5th edition, John L. Hennessy, David A. Patterson.
2. Computer Systems Design and Architecture, 2nd Edition, Vincent P. Heuring
3. Computer Organization and Architecture, 6th Edition, William Stallings
4. Advanced Computer Architectures-A Design Space Approach, Dezsosima, Terence Fountain, Peter Kacsuk.

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET05

Title of the Course : **Adaptive signal processing**

Title of the Course : **ADAPTIVE SIGNAL PROCESSING**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Course Outcomes

1. To review the basic concepts related to vector space and Eigen analysis
2. To review the basic concepts of stochastic signals and statistics of stationary signal
3. To implement Wiener filter using different LMS algorithms
4. To introduce RLS algorithm
5. To design adaptive filters for different applications

Unit	Contents	Hours
I		
	General concept of adaptive filtering and estimation, applications and motivation, Review of probability, random variables and stationary random processes, Correlation structures, properties of correlation matrices. Vectors, Matrices and Eigen Analysis, Application to adaptive signal processing.	10
II		
	Optimal FIR (Wiener) filter, Method of steepest descent, extension to complex valued The LMS algorithm (real, complex), convergence analysis, weight error correlation matrix, excess mean square error and mis-adjustment. Variants of the LMS algorithm: the sign LMS family, normalized LMS algorithm, block LMS and FFT based realization, frequency domain adaptive filters, Sub-band adaptive filtering.	9
III		
	Signal space concepts - introduction to finite dimensional vector space theory, subspace, basis, dimension, linear operators, rank and nullity, inner product space, orthogonality, Gram-Schmidt orthogonalization, concepts of orthogonal projection, orthogonal decomposition of vector spaces.	9
IV		
	Vector space of random variables, correlation as inner product, forward and backward projections, Stochastic lattice filters, recursive updating of forward and backward prediction errors, relationship with AR modeling, joint process estimator, gradient adaptive lattice.	9

V		
	Introduction to recursive least squares (RLS), vector space formulation of RL Sestimation, pseudo-inverse of a matrix, time updating of inner products, development of RLS lattice filters, RLS transversal adaptive filters. Advanced topics: affine projection and subspace based adaptive filters, partial update algorithms, QR decomposition and systolic array.	8

TEXT BOOKS:

1. S. Haykin, Adaptive filter theory, Prentice Hall, 1986.
2. C.Widrow and S.D. Stearns, Adaptive signal processing, Prentice Hall, 1984.

REFERENCE BOOKS:

1. M. J. Larrimore, C. R. Johnson and J. R. Treichler Theory and Design of Adaptive Filters publisher

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET06

Title of the Course : **Digital Communication Lab**

Course Scheme					**Evaluation Scheme(Laboratory)**		
Lecture	Tutorial	Practical	Periods/ week	Credits	TW	POE	Total
0	0	2	2	2	25	25	50

Minimum 8 experiments from list below or experiment based on syllabus.

List of suggested experiments

1. Comparisons of frequency response of second order and fourth order Butterworth low pass filter
2. Pulse code modulation and demodulation
3. Delta modulation and demodulation
4. Adaptive Delta modulation and demodulation
5. Phase shift keying
6. Amplitude shift keying
7. Quadrature phase shift keying
8. Frequency shift keying

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET07

Title of the Course : **Opto Electronics devices and CommunicationLab**

Course Scheme					**Evaluation Scheme(Laboratory)**		
Lecture	Tutorial	Practical	Periods/ week	Credits	TW	POE	Total
0	0	2	2	2	25	25	50

Minimum 8 experiments based on the syllabus of 7BEET03.

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET08

Title of the Course : **UHF & Microwaves Lab**

Course Scheme					**Evaluation Scheme(Laboratory)**		
Lecture	Tutorial	Practical	Periods/ week	Credits	TW	POE	Total
0	0	2	2	2	25	25	50

Minimum 8 experiments from list below or experiment based on syllabus.

List of suggested experiments

1. To study propagation of microwaves.
2. Study of primary antennas.
3. Measurement of microwaves power
4. Measurement of frequency and wavelength
5. Measurement of VSWR.
6. Measurement of Impedance.
7. To study characteristics of E-plane and H-plane tee.
8. To study the characteristics of magic tee.
9. Study of Directional Couplers.
10. Study of ferrite devices
11. Find the Reflection loss within a wave guide.
12. To study the characteristics of Reflex Klystron.

SEVENTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 7BEET09

Title of the Course : **Major Project Phase –I**

Course Scheme					**Evaluation Scheme(Laboratory)**		
Lecture	Tutorial	Practical	Periods/ week	Credits	TW	POE	Total
0	0	3	3	3	50	00	50

- The Major Project Phase–I - It includes seminar work, literature survey and minimal implementation of the project including software and Hardware, which is to be carried out in the institution/industry/research laboratory.
- The duration of project work should be a minimum of two semesters: Major Project Phase –I & II.
- Each student has to present a seminar, on any technical topic related to any subject not covered in the syllabus or preferably based on the project.
- The presentation time is of minimum 10 minutes followed by a 5 minutes session for discussion/question and answers.
- The seminar topic selected by the student must be approved by the project committee of the department at the beginning of the semester; the duplicity of the topics must be avoided.
- Each student/project group has to demonstrate the minimal implementation of the project work and should submit individual seminar report on the day of seminar to the department along with the project progress report.
- The seminar presentation & submission of the report will carry 50% weightage and demonstration and submission of project progress report will carry 50% weightage for final evaluation. The evaluation is to be carried out by department project committee including guide.

VIII SEMESTER B.E.

ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICS AND TELECOMMUNICATION ENGINEERING

EIGHTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code :8BEET01

Title of the Course : **Digital System Design**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
3	1	0	4	3	3	10	10	80	100

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Know the IEEE Standard 1076 Hardware Description Language (VHDL).
2. Use of VHDL to specify Arithmetic, Combinational and Storage element.
3. Design and model synchronous sequential circuit independently or in a team.
4. Analyze and Synthesize asynchronous sequential circuit.
5. Demonstrate knowledge of operation of programmable logic

Unit	Contents	Hours
1	**Introduction to VHDL** Design Concepts, Digital Hardware, Design Process, Introduction to CAD tools, Design Entry, Synthesis, Functional Simulation, introduction to VHDL, Representation of Digital Signals in VHDLand Introduction to VHDL code.	9
2	**VHDL for Combinational circuits** Assignment Statements, Selected Signal Assignment, Conditional Signal Assignment, Generate Statements, Concurrent and Sequential Assignment Statements, Process Statements, Case Statements, Design of Full adder, four bit adder Multiplexers, decoders, encoders, Code converters , Flip-flops, Registers, Counters.	9
3	**Synchronous Sequential circuits** Basic Design Steps, State diagram, State table, State assignment, Choice of flip-flops, Design of Moore and Mealy circuits using VHDL.	9
4	**Asynchronous Sequential circuits** Primitive flow table, Transition table, State reduction, Concept of Races, Critical races, Hazards, Design of Asynchronous circuits.	9
5	**Programmable Logic Devices** Programmable logic array, Programmable array logic. Architecture of Complex Programmable logic devices (CPLD), Field programmable gate array(FPGA).	9
	Total	45

Text Books:

1. Fundamentals of Digital logic with VHDL design-Stephen Brown, ZvoncoVranesic TMH

Reference Books:

1. Circuit Design with VHDL-Volnei A. Pedroni-Prentice Hall Publications.
2. Principles of Digital Systems Design using VHDL- Charles Roth Lizzy John-Cengage Learning
3. Digital System Design with VHDL-Mark Zwolinski_Pearson Education.
4. Introductory VHDL from Simulation to Synthesis -SudhakarYalamanchilli -Pearson Education
5. VHDL Primer - J. Bhasker -B. S. Publications.

EIGHTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code :8BEET02

Title of the Course : **Satellite communication**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
3	1	0	4	3	3	10	10	80	100

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Define orbital mechanics and launching methodologies.
2. Demonstrate satellite subsystems & access techniques.
3. Estimate link power budget for satellites
4. Design antennas to provide Uplink and Down link Frequency.
5. Explain GPS system

Units	Contents	Hours
1	**Orbital Mechanism:** Kepler's three Laws of planetary motion, motion locating the satellite in the orbit and with respect to the earth, , orbital elements, calculation of Geo-stationary orbits radius, leo, elliptical orbit, Link Angle Determination, Limits of visibility, Sub satellite point,Launching Procedures -launch vehicles and propulsion.	09
2	**Space Segment And Satellite Link Design:** Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis and Design, link budget, C/N calculations,, system noise, inter modulation, Propagation Characteristics and Frequency considerations-,System reliability and design lifetime.	09
3	**Satellite Access:** Modulation and Multiplexing: Voice, Data, Video, and Analog – digital transmission systems, Digital video Broadcasts, multiple accesses: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication.	09
4	**Earth Segment**: Earth Station Technology-- Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, Test methods, Measurements on G/T, C/No, EIRP, Antenna Gain.	09
5	**Satellite Navigation And GPS**: Orbital considerations of GPS satellites, Radio and Satellite Navigation, GPS time, GPS receivers, C/A code, satellite signal acquisition, GPS navigation, GPS signal levels, telemetry accuracy, GPS return operation.	09

	Total	45

Text Books:

1. Satellite Communication by T. Pratt Wiley India edition.
2. Satellite Communication system by William L Pritchard Pearson education.
3. Satellite Communication system by M Richeria Macmillan

EIGHTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code : 8BEET03

Title of the Course : **Wireless Communication**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
3	1	0	4	3	3	10	10	80	100

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Analyze different modulation techniques for wireless communication.
2. Demonstrate knowledge of frequency reuse, frequency hopping, radio Wave Propagation, diversity concepts, channel and speech coding in wireless communication.
3. Compare CDMA and GSM architecture with their standards
4. Formulate the elementary problems of GSM network to evaluate various parameters of KPI (key performance index) like TCR,CDR,HOSR,Traffic,etc.
5. Illustrate the knowledge of link budget calculation and protocols involved in Wireless communication

Unit	Contents	Hours
1	**Services And Technical Challenges**	
	Types of Services, Requirements for the services, Multipath propagation, Spectrum Limitations, Noise and Interference limited systems, Principles of Cellular networks, Multiple Access Schemes.	9
2	**Wireless Propagation Channels**	
	Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio, Channel Classification, Link calculations, Narrowband and Wideband models.	9
3	**Wireless Transceivers**	
	Structure of a wireless communication link, Modulation and demodulation – Quadrature Phase Shift Keying, Differential Quadrature Phase Shift Keying, Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels.	9
4	**Signal Processing In Wireless Systems**	
	Principle of Diversity, Macro diversity, Signal Combining Techniques, Transmit diversity, Equalizers- Linear and Decision Feedback equalizers, Review of Channel coding and Speech coding techniques.	9
5	**Advanced Transceiver Schemes**	

	Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, Orthogonal Frequency Division Multiplexing – Principle, Cyclic Prefix, Transceiver implementation, Second Generation(GSM, IS–95) and Third Generation Wireless Networks and Standards	9
	Total	45

Text Books:

1. Andreas. F. Molisch, "Wireless Communications", John Wiley – India, 2006.
2. Simon Haykin& Michael Moher, "Modern Wireless Communications", Pearson Education, 2007.
3. Rappaport T. S., "Wireless communications", Pearson Education, 2003.

Reference Books:

1. Gordon L. Stuber, "Principles of Mobile Communication", Springer International Ltd., 2001.
2. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007

EIGHTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code :8BEET04

Title of the Course : **Digital Image and Video Processing**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Mathematically represent the various types of images and analyse them.
2. Process these images for the enhancement of certain properties or for optimized use of the resources.
3. Develop algorithms for image compression and coding

Unit	Contents	Hours
I	**DIGITAL IMAGE FUNDAMENTALS**	
	Digital Image Fundamentals-Elements of visual perception, image sensing andacquisition, image sampling and quantization, basic relationships between pixels – neighbourhood, adjacency, connectivity, distance measures.	6
II	**IMAGE ENHANCEMENT AND FILTERING**	
	Image Enhancements and Filtering-Gray level transformations, histogram equalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain sharpening filters – first and second derivative two-dimensional DFT and its inverse, frequency domain filters – low-pass and high-pass.	10
III	**COLOR IMAGE PROCESSING**	
	Color Image Processing-Color models–RGB, YUV, HSI; Color transformations– formulation, color complements, color slicing, tone and color corrections; Color image smoothing and sharpening; Color Segmentation. Image Segmentation- Detection of discontinuities, edge linking and boundary detection, thresholding – global and adaptive, region-based segmentation.	10
IV	**IMAGE DATA COMPRESSION**	
	Image Compression-Redundancy–inter-pixel and psycho-visual; Lossless compression –predictive, entropy; Lossy compression- predictive and transform coding; Discrete Cosine Transform; Still image compression standards – JPEG and JPEG-2000.	10
V	**FUNDAMENTALS OF VIDEO PROCESSING**	
	Fundamentals of Video Coding- Inter-frame redundancy, motion estimation techniques – full search, fast search strategies, forward and backward motion prediction, frame classification – I, P and B; Video sequence hierarchy –	9

	Group of pictures, frames, slices, macro-blocks and blocks; Elements of a video encoder and decoder; Video coding standards – MPEG and H.26X. Video Segmentation- Temporal segmentation–shot boundary detection, hard-cutsand soft-cuts; spatial segmentation – motion-based; Video object detection and tracking.	

TEXT BOOKS:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, PearsonEducation 3rd edition 2008
2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India2ndedition 2004

REFERENCE BOOKS:

1. Murat Tekalp, Digital Video Processing" Prentice Hall, 2nd edition 2015

EIGHTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code :8BEET04

Title of the Course : **High speed electronics**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand significance and the areas of application of high-speed electronics circuits.
2. Understand the properties of various components used in high speed electronics.
3. Design High-speed electronic system using appropriate components.

Unit	Contents	Hours
I		
	Transmission line theory (basics) crosstalk and non-ideal effects; signal integrity: impact of packages, vias, traces, connectors; non-ideal return current paths, high frequency power delivery, methodologies for design of high speed buses; radiated emissions and minimizing system noise	10
II		
	Noise Analysis: Sources, Noise Figure, Gain compression, Harmonic distortion, Intermodulation, Cross-modulation, Dynamic range	9
III		
	Devices: Passive and active, Lumped passive devices (models), Active (models, low vs. high frequency)	9
IV		
	RF Amplifier Design, Stability, Low Noise Amplifiers, Broadband Amplifiers (and Distributed) Power Amplifiers, Class A, B, AB and C, D E Integrated circuit realizations, Cross-over distortion Efficiency RF power output stages	9
V		
	Mixers –UpconversionDownconversion, Conversion gain and spurious response. Oscillator Principles. PLL Transceiver architectures Printed Circuit Board Anatomy, CAD tools for PCB design, Standard fabrication, Microvia Boards. Board Assembly: Surface Mount Technology, Through Hole Technology, Process Control and Design challenges	8

Text/Reference Books:

1. Stephen H. Hall, Garrett W. Hall, James A. McCall “High-Speed Digital System Design: A Handbook of Interconnect Theory and Design Practices”, August 2000, Wiley-IEEE Press
2. Thomas H. Lee, “The Design of CMOS Radio-Frequency Integrated Circuits”, CambridgeUniversity Press, 2004, ISBN 0521835399.
3. BehzadRazavi, “RF Microelectronics”, Prentice-Hall 1998, ISBN 0-13-887571-5.
4. Guillermo Gonzalez, “Microwave Transistor Amplifiers”, 2nd Edition, Prentice Hall.
5. Kai Chang, “RF and Microwave Wireless systems”, Wiley.
6. R.G. Kaduskar and V.B.Baru, Electronic Product design, Wiley India, 2011

EIGHTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code :8BEET04

Title of the Course : **Wavelets**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1) Learn and understand basic linear algebra
2) Understand the need of time frequency resolution
3) Understand the basics of Discrete Wavelet transform and various wavelets available
4) Learn the signal analysis using multi-resolution analysis
5) Study the applications of Wavelets in compression, enhancement, noise removal etc

Unit	Contents	Hours
I	**Fundamentals of Linear Algebra**	8
	Vector spaces, Orthogonality, Ortho-normality, Projection, Functions and function spaces. Orthogonal basis functions. Fourier series orthogonality of complex exponential bases, mathematical preliminaries for continuous and discrete Fourier transformer. Limitations of Fourier domain signal processing, towards wavelet signal processing, signal representation with continuous and discrete Short Time Fourier Transform	
II	**Introduction to Wavelet**	8
	Concept of time-frequency resolution, Resolution problem associated with STFT, Heisenberg's uncertainty principle and time frequency tiling, why wavelet transform? The origin of wavelets, Properties of Wavelet Transform, Wavelet and other wavelet like transformer, different communities and family of wavelets, different families of wavelets within wavelet communities, Continuous and discrete wavelet transform	
III	**Discrete Wavelet Transform**	9
	Haar scaling function and function spaces, translation and scaling of φ(t), function spaces V0 Finer Haar Scaling Functions, concept of nested vectopr spaces, Haar wavelet function, scaled and translated Haar wavelet functions, orthogonality of φ (t) and γ (t). Normalization of Haar bases at different scales, daubechies wavelets, plotting of Daubechies wavelets. 1-D and 2-D decomposition (analysis) of signals using Wavelet	
IV	**Multi-resolution Analysis**	9

	Signal decomposition and its relation with filter banks, frequencies response, signal reconstruction course to fine scale, upsampling and filtering, QMF conditions, concepts of multi-Resolution analysis and multi-rate signal processing, Perfect matching filters, Vanishing moments of wavelet function and filter properties, introduction to wavelet lifting	
V	**Wavelet Transform in Data Compression**	10
	Transform coding, image compression using DWT, Embedded tree image coding, comparison of JPEG and JPEG 2000, Audio masking, MPEG Coding for audio, Wavelet based audio coding, video coding using Multi-resolution technique (introduction). Applications of Wavelet Transform Waveletdenoising, speckle removal, Edge detection and object isolation Image fusion, wavelet watermark, image enhancement. Communication application scaling functions as signaling pulses, Discrete Wavelet Multitone modulation	

Text Books:

1. K.P Soman, K I Ramchandran, N G Resmi, ―Insights into Wavelets from theory to Practice‖, Third edition, PHI publication.

2. Raghuveer M Rao, Ajit S. Bopardikar, ―Wavelet Transforms, Introduction to Theory and Applications‖, Seventh Indian Reprint 2005, Pearson Education.

Reference Books:

1. Jaideva C. Goswami, Andrew K. Chan, ―Fundamentals of Wavelets‖, Wiley Student Edition
2. V. M. Gadre, A. S. Abhyankar, ―Multiresolution and Multirate Signal Processing, Introduction, Principles and Applications‖, MGH Publication

EIGHTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code :8BEET04

Title of the Course : **Error correcting Code**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Understand the error sources
2. Understand error control coding applied in digital communication
3. Develop an ability to compare and contrast the strengths and weaknesses of various error correcting Codes for a given applications.

Unit	Contents	Hours
I	Linear block codes: Systematic linear codes and optimum decoding for the binary symmetric channel; Generator and Parity Check matrices, Syndrome decoding on symmetric channels.	8
II	Introduction to TCM, TCM encoding, decoding.Introduction to BCH Code, BCH encoding and decoding. Reed Solomon(RS) Code, Justeen codes, MDS codes RSA Algorithm, RSA encryption and decryption.	10
III	Hamming codes; Weight enumerators and the McWilliams identities; Perfect codes, Introduction to finite fields and finite rings; factorization of (X^n-1) over a finite field; Cyclic Codes.	9
IV	Berlekamp's decoding algorithm, Massey's minimum shift register synthesis technique and its relation to Berlekamp's algorithm. A fast Berlekamp - Massey algorithm.	9
V	Convolution codes; Wozencraft's sequential decoding algorithm, Fann's algorithm and other sequential decoding algorithms; Viterbi decoding algorithm	9

Text/Reference Books:

1. F.J. McWilliams and N.J.A. Slone, The theory of error correcting codes, 1977.
2. R.E. Balahut, Theory and practice of error control codes, Addison Wesley, 1983.
3. Bose Ranjan,"Information Theory,Coding and Crypography,"TaTa McGraw-Hill,1st,ED,2006

EIGHTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code :8BEET04

Title of the Course : **Embedded Systems**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
3	**1**	**0**	**4**	**3**	**3**	**10**	**10**	**80**	**100**

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Suggest design approach using advanced controllers to real-life situations
2. Understand Real time systems concepts.
3. To know the hardware – software co design issues and testing methodology for embedded system

Unit	Contents	Hours
I	**Introduction to Embedded Systems**: The concept of embedded systems design, design challenges,Architecture, Design Process, Design Metrics ,Classification and Characteristics of Embedded System, technological aspects of embedded systems, introduction to ARM LPC2138	9
II	**Processor and Memory Organization**: optimization of various parameters of embedded system, structural unit in a processor, processor selection for an embedded system, memory devices, memory selection for an embedded system, allocation of memory to program segments and blocks and memory map of a system.	9
III	**Programming Concept and Embedded Programming in C and C++:**Software Programming in assembly language and in high level language'C',C program elements header,sourse files, preprocessor directives, macros, functions, datatypes, data structures,modifiers,statements,loop,pointers,queues and stacks, lists and ordered lists, Embedded programming in C++	9
IV	**RTOS Concepts:** basic model of a real time system, characteristics of real time systems, architecture of the kernel, task and task scheduler, interrupt service routines, semaphores, mutex, mailboxes, RMA, priority inheritance protocol ,highest locked protocol ,priority ceiling protocol. Priority inversion problem.	9
V	**µCOS II and case studies of embedded systems:** Features of µCOS II. Kernel structure.Inter-process communication and synchronization of processes, tasks and threads,exemplary embedded systems.	9

Text/Reference Books:

1Raj Kamal, "Embedded Systems – Architecture, Programming and Design" 2nd edition,McGraw Hill.
2. Jean J.Labrosse, "Micro C OS II, The Real-Time Kernel", 2 ndedition, CMP Books
3. DR.K.V.K.K. Prasad - Embedded / real time system, Dreamtech.
4. RajibMall,Real Time Systems,Pearson Education

EIGHTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code :8BEET05

Title of the Course : **Computer Network**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
3	1	0	4	4	3	10	10	80	100

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Explain different layers of OSI and TCP/IP model.
2. Apply techniques of error detection and correction to detect and correct error bit during data communication.
3. Illustrate various wireless systems and IEEE 802 standards.
4. Identify the protocols used in Network and Transport layer.
5. Make use of security and ethical issues in computer networking

Units	Contents	Hours
1	**Introduction:** Protocol hierarchies, connection oriented & connectionless services, service primitives, relationship of services to protocols, OSI reference model, TCP/IP model, connection oriented networks: X .25, frame relay & ATM.	9
2	**Physical Layer & Data Link Layer:** Guided transmission media, wireless transmission media, data link design issues: framing, flow control, error detection and correction, HDLC.	9
3	**Medium Access Control Sublayer:** Multiple access protocols such as aloha, CSMA, CSMA/CD, collision free protocols, limited contention protocol, wavelength division multiple access protocol, Ethernet, IEEE 802.11, IEEE 802.16, IEEE 802.18	9
4	**Network Layer And Transport Layer:** Virtual circuit and datagram network, network layer design issues, routing algorithms : hierarchical routing, flooding, least cost routing, distance vector routing, congestion control &QoS, IP protocol & IP addressing, ARP, RARP, elements of transport protocol, TCP & UDP.	9
5	**Application Layer & Network Security:** Domain name system, electronic mail, world wide web, multimedia, cryptography, symmetric key algorithm, public key algorithm, digital signature, communication security, mail security, web security, social issues.	9
	Total	**45**

Text Books:

1. Computer Networks – Andrew Tanenbaum, Pearson Education.
2. Data & Computer Communication - William Stalling, Pearson Education.

Reference Books:

1. TCP / IP Protocol Suite – Forouzan, Tata McGraw Hill.
2. Computer networking with internet protocols & Technology – William Stalling, Pearson Education.
3. Element of Network Protocol Design – M. G. Gouda, Wiley Interscience Publication.
4. Telecommunication Networks Protocols Modeling & Analysis – M. Schwartz, Pearson Education

EIGHTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code :8BEET06

Title of the Course : **Digital System Design Lab**

Course Scheme					**Evaluation Scheme(Laboratory)**		
Lecture	Tutorial	Practical	Periods/ week	Credits	TW	POE	Total
0	0	2	2	2	25	25	50

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Use EDA tool for synthesis of digital circuits using VHDL.
2. Simulate VHDL models of digital circuits using CAD tool.
3. Analyze the subsystems/ modules using CAD tool.
4. Implement a simple digital circuit on FPGA based system and target the design to an FPGA Board

It includes at least 8 programs based on the theory syllabus of Digital System Design where students will write VHDL programs, compile them, perform functional simulation and download onto CPLD or FPGA.

List of suggested programs

1. Implementation of full adder.
2. Implementation of four bit adder.
3. Implementation of 4 to 1 Multiplexer.
4. Implementation of 16 to 1 multiplexer.
5. Implementation of 2 to 4 Decoder.
6. Implementation of 4 to 16 Decoder.
7. Implementation of Encoder.
8. Implementation of Priority encoder.
9. Implementation of Flip-flop.
10. Implementation of Counters.
11. Implementation of Registers.
12. Implementation of Moore circuits.
13. Implementation of Mealy circuits**.**

EIGHTH SEMESTER B.E. ELECTRONICS AND COMMUNICATION ENGINEERING/ ELECTRONICSAND TELECOMMUNICATION ENGINEERING

Course Code :8BEET07

Title of the Course : **Major Project Phase –II**

Course Scheme					**Evaluation Scheme(Laboratory)**		
Lecture	Tutorial	Practical	Periods/ week	Credits	TW	POE	Total
0	0	6	6	6	75	75	150

- The Major Project work Phase-II is to be conducted in continuation of the project work Phase-I which is to be carried out in the institution/industry/research laboratory.
- The duration of project work should be a minimum of two semesters (Project Phase –I & II).
- There will be a mid-semester evaluation of the project work done after about two months. An interim project report is to be submitted to the department during the mid-semester evaluation. The mid-semester evaluation will be done by the department project committee/project guide; this will carry weightage in final evaluation.
- Each student / project group has to submit to the department a project report in the prescribed format after completion of the project work. The final evaluation and viva-voce will be conducted by the project committee/Guide on the stipulated date at the end of the semester.
- Each student / project group has to make a demonstration on the work carried out, before the project committee for project evaluation. The end semester evaluation will be done by the project committee including the guide