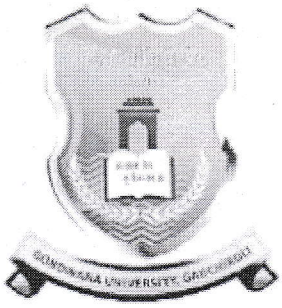
Gondwana University, Gadchiroli



Electronics & Telecommunication Engineering

Model Curriculum

VII/VIII Semesters (AY: 2022-23)

Scheme & Syllabus

Board of Studies in Electronics Engineering

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
First Semester Common to GROUP-B branches of Engineering & Technology

Course Category	Course Code	BoS	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						
BSC	FE201	S&H	Chemistry-I	3	1	0	4	3	80	10	10	100	40	--	--	--	--
BSC	FE102	S&H	Mathematics –I	3	1	0	4	3	80	10	10	100	40	--	--	--	--
ESC	FE203	Computer	Programming for Problem Solving	3	0	0	3	3	80	10	10	100	40	--	--	--	--
HSMC	FE204	S&H	English	2	0	0	2	-	-	40	10	50	20	--	--	--	--
			Laboratory														
BSC	FE205	S&H	Chemistry-I Lab	0	0	3	1	-	-	-	-	-		25	25	50	25
ESC	FE206	Computer	Programming for Problem Solving Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
ESC	FE207	Mechanical	Workshop/ Manufacturing Practices	1	0	4	3	-	-	-	-	-		50	50	100	50
HSMC	FE208	S&H	English	0	0	2	1							50	-	50	25
		Total		**12**	**2**	**11**						**350**				**250**	
		Semester Total		**25**			**19**	**600**									

Dr. S. G. Akojwar
Chairman BOS Electronics.

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Second Semester Common to GROUP-B branches of Engineering & Technology

Course Category	Course Code	BoS	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						
BSC	FE101	S&H	Physics	3	1	0	4	3	80	10	10	100	40	--	--	--	--
BSC	FE202	S&H	Mathematics –II	3	1	0	4	3	80	10	10	100	40	--	--	--	--
ESC	FE103	Electrical	Basic Electrical Engineering	3	0	0	3	3	80	10	10	100	40	--	--	--	--
ESC	FE104	Mechanical	Engineering Graphics & Design	2	0	0	2	4	80	10	10	100	40	--	--	--	--
HSMC	FE105	S&H	Soft Skill	2	0	0	2	-	-	40	10	50	20	--	--	--	--
			Laboratory														
BSC	FE106	S&H	Physics Lab	0	0	3	1	-	-	-	-	-	-	25	25	50	25
ESC	FE107	Electrical	Basic Electrical Engineering Lab	0	0	2	1	-	-	-	-	-	-	25	25	50	25
ESC	FE108	Mechanical	Engineering Graphics & Design Lab	0	0	4	2	-	-	-	-	-	-	25	25	50	25
		Total		**13**	**2**	**9**						**450**				**150**	
		Semester Total		**24**			**19**	**600**									

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Third Semester Electronics & Telecommunication Engineering

Course Category	Course Code	BoS	Course title	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						
BSC/ES C/HSMC	ET301M	Science & Humanities	Mathematics-III	3	1	0	4	3	80	10	10	100	40	--	--	--	--
PCC	ET302M	Electronics	Electronic Devices	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET303M	Electronics	Digital System Design	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET304M	Electronics	Signals and Systems	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET305M	Electrical	Network Theory	3	1	0	4	3	80	10	10	100	40	--	--	--	--
Laboratory																	
PCC	ET306M	Electronics	Electronic Devices Lab	0	0	2	1	-	-	-	-	-	-	25	25	50	25
PCC	ET307M	Electronics	Digital System Design Lab	0	0	2	1	-	-	-	-	-	-	25	25	50	25
PCC	ET308M	Electronics	Signals and Systems Lab	0	0	2	1	-	-	-	-	-	-	25	25	50	25
MC	ET309M	Science & Humanities	Environmental Science	0	0	2	0	Grade A/B/C									
		Total		**15**	**2**	**8**						**500**				**150**	
		Semester Total		**25**			**20**	**650**									

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Fourth Semester Electronics & Telecommunication Engineering

Course Category	Course Code	BoS	Course title	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						
BSC/ES C/HSMC	ET401M	Management	Business Economics	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET402M	Electronics	Probability, random process and numerical method	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET403M	Electronics	Analog and Digital Communication	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET404M	Electronics	Analog Circuits	3	1	0	4	3	80	10	10	100	40	--	--	--	--
PCC	ET405M	Electronics	Microprocessor and Microcontrollers	3	1	0	4	3	80	10	10	100	40	--	--	--	--
Laboratory																	
PCC	ET406M	Electronics	Analog and Digital Communication Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
PCC	ET407M	Electronics	Analog Circuits Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
PCC	ET408M	Electronics	Microprocessor and Microcontrollers Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
		Total		**15**	**2**	**6**						**500**				**150**	
		Semester Total		**23**			**20**	**650**									

Industrial Training /Internship/Case Studies:-It is to be completed during the summer vacation after completion of fourth semester and/or winter vacation after the completion of Fifth semester and its nning and allocation should be done during the fourth/ fifth semester and its marks will be awarded in the sixth semester for subject code ET608M on submission of the certified relevant report at the end of th semester

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Fifth Semester Electronics & Telecommunication Engineering

Course Category	Course Code	BoS	Course title	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						
PEC-1	ET501M	Electronics	Program Elective – 1	3	0	0	3	3	80	10	10	100	40	--	--	--	--
OEC-1	ET502M	Electronics	Open Elective – 1	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET503M	Computer Science	Computer Architecture	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET504M	Computer Science	Data structure & Algorithms	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET505M	Electronics	Digital Signal Processing	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET506M	Electronics	Electromagnetic Waves	3	0	0	3	3	80	10	10	100	40	--	--	--	--
Laboratory																	
PCC	ET507M	Electronics	Digital Signal Processing Lab	0	0	2	1	-	-	-	-	-	-	25	25	50	25
PCC	ET508M	Electronics	Mini Project/Electronic Design workshop	0	0	2	1	-	-	-	-	-	-	25	25	50	25
		Total		**18**	**0**	**4**						**600**				**100**	
		Semester Total		**22**			**20**	**700**									

st of Program Elective – 1
Information Theory and Coding; 2) Power Electronics; 3) Bio-Medical Electronics; 4) Nano electronics;

st of Open Elective – 1
Optimization Techniques; 2) IC Technology; 3) Opto Electronic Devices; 4) Professional Ethics;

Industrial Training /Internship/Case Studies:-It is to be completed during the summer vacation after completion of fourth semester and/or winter vacation after the completion of Fifth semester and its nning and allocation should be done during the fourth/ fifth semester and its marks will be awarded in the sixth semester for subject code ET608M on submission of the certified relevant report at the end of th semester

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Sixth Semester Electronics & Telecommunication Engineering

Course Category	Course Code	BoS	Course title	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						
PEC-2	ET601M	Electronics	Program Elective – 2	3	0	0	3	3	80	10	10	100	40	--	--	--	--
OEC-2	ET602M	Electronics	Open Elective – 2	3	0	0	3	3	80	10	10	100	40	--	--	--	--
HSMC/BSC	ET603M	Management	Management & Accountancy	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET604M	Computer Science	Computer Network	3	0	0	4	3	80	10	10	100	40	--	--	--	--
PCC	ET605M	Electrical	Control Systems	3	0	0	4	3	80	10	10	100	40	--	--	--	--
Laboratory																	
PCC	ET606M	Computer Science	Computer Networks Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
PCC	ET607M	Electronics	Electronic Measurement Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
PCC	ET608M	Electronics	# # Industrial Training /Internship/Case Studies (2 to 4 Weeks)	0	0	2	1	-	-	-	-	-		25	25	50	25
		Total		**15**	**0**	**6**						**500**				**150**	
		Semester Total		**23**			**20**	**650**									

t of Program Elective – 2

Speech and Audio Processing; 2) Introduction to MEMS; 3) CMOS Design; 4) Scientific computing;

t of Open Elective – 2

Software Engineering and Project Management; 2) Wind and Solar Energy Systems; 3) RF Circuit Design; 4) Mechatronic Systems;

Industrial Training /Internship/Case Studies:-It is to be completed during the summer vacation after completion of fourth semester and/or winter vacation after the completion of Fifth semester and its nning and allocation should be done during the fourth/ fifth semester and its marks will be awarded in the sixth semester for subject code ET608M on submission of the certified relevant report at the end of h semester

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Seventh Semester Electronics & Telecommunication Engineering

Course Category	Course Code	BoS	Course title	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						
PCC	ET701M	Electronics	Fiber Optic Communications	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET702M	Computer Science	Advance programming	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET703M	Electronics	Radar and Satellite Communication	3	1*	0	4	3	80	10	10	100	40	--	--	--	--
PEC-3	ET704M	Electronics	Program Elective – 3	3	0	0	3	3	80	10	10	100	40	--	--	--	--
OEC-3	ET705M	Electronics	Open Elective – 3	3	0	0	3	3	80	10	10	100	40	--	--	--	--
Laboratory																	
PCC	ET706M	Electronics	Fiber Optic Communications Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
PCC	ET707M	Electronics	Advance programming Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
ECP-1	ET708M	Electronics	Major Project – 1	0	0	6	3	-	-	-	-	-		50	50	100	50
			Total	**15**	**1**	**10**						**500**				**200**	
		Semester Total		**26**			**21**	**700**									

List of Program Elective – 3
1) Wireless Sensor Networks; 2) Embedded systems; 3) Testing and Verification of VLSI circuits;

List of Open Elective – 3
1) Internet of Things; 2) Robotics and Automation; 3) Information & Cyber security

* Tutorial based on practical assignment

Four Year Degree Course in Engineering and Technology
Course and Examination Scheme with Model AICTE Curriculum
Eighth Semester Electronics & Telecommunication Engineering

Course Category	Course Code	BoS	Course title	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 MSE	Max. Marks Sessional IE	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
PCC	ET801M	Electronics	Mobile Communication and Networks	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET802M	Electronics	Digital Image & Video Processing	3	0	0	3	3	80	10	10	100	40	--	--	--	--
PCC	ET803M	Computer Science	Advance Computer Architecture	3	1*	0	4	3	80	10	10	100	40	--	--	--	--
PEC-4	ET804M	Electronics	Program Elective – 4	3	0	0	3	3	80	10	10	100	40	--	--	--	--
OEC-4	ET805M	Electronics	Open Elective – 4	3	0	0	3	3	80	10	10	100	40	--	--	--	--
Laboratory																	
PCC	ET806M	Electronics	Mobile Communication and Networks Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
PCC	ET807M	Electronics	Digital Image & Video Processing Lab	0	0	2	1	-	-	-	-	-		25	25	50	25
ECP-2	ET808M	Electronics	Major Project – 2 & Dissertation	0	0	6	3	-	-	-	-	-		50	50	100	50
		Total		**15**	**1**	**10**						**500**				**200**	
		Semester Total		**26**			**21**	**700**									

List of Program Elective – 4

1) High Speed Electronics; 2) Advance Digital Signal Processing; 3) Adaptive Signal Processing;

List of Open Elective – 4

1) Introduction of Neural Network and Artificial Intelligence; 2) Introduction of Machine learning; 3) Automotive Electronics;

* Tutorial based on practical assignment

Definition of Credit:

1 Hr. Lecture (L) per week 1 credit
1 Hr. Tutorial (T) per week 1 credit
2 Hours Practical(Lab)/week 1 credit

Range of credits – A credits of 160 is required for a student to be eligible to get Under Graduate degree in Engineering.

Structure of Undergraduate Engineering program :

S.No	Abbreviations	Category	Suggested Breakup of Credits(Total 160)
1	HSMC	Humanities and Social Sciences including Management courses	12*
2	BSC	Basic Science courses	25*
3	ESC	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc	24*
4	PCC	Professional core courses	48*
5	PEC	Professional Elective courses relevant to chosen specialization/branch	18*
6	OEC	Open subjects – Electives from other technical and /or emerging subjects	18*
7	PROJ	Project work, seminar and internship in industry or elsewhere	15*
8	MC	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition]	(non-credit)
Total			160*

*Minor variation is allowed as per need of the respective disciplines.

Abbreviations

L	Lecture	MC	Mandatory courses
T	Tutorial	PROJ	Project
P	Practical	MSE	Mid Semester Examination
BSC	Basic Science Courses	IE	Internal Evaluation
ESC	Engineering Science Course	ESE	End Semester Examination
HSMC	Humanities and Social Sciences including Management courses	TW	Term work
PCC	Professional core courses	POE	Performance & Oral Examination
PEC	Professional Elective courses	BoS	Board of Studies (Board)
OEC	Open Elective courses		

VII SEMESTER B.E.

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SYLLABUS

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

Course Code : ET701M

Title of the Course : Fiber Optic Communications

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

Course Outcomes

At the end of this course students will demonstrate the ability to

1. Understand the principles fiber-optic communication, the components and the bandwidth advantages.
2. Understand the properties of the optical fibers and optical components.
3. Understand operation of lasers, LEDs, and detectors.
4. Analyze system performance of optical communication systems.
5. Design optical networks, identify and rectify optical communication systems faults.

Unit	Topic	Hour
1	Introduction to optical Fibers: Introduction, Block diagram of fiber optic system, Advantages and disadvantages, Ray theory transmission, Total internal reflection, Acceptance angle, Numerical aperture, Skew rays, Optical fiber construction and their types.	9
2	Transmission characteristics of optical fibers: Attenuation, fiber joint losses, fiber connectors, fiber splicing and their types, dispersion, Chromatic dispersion, Intermodal dispersion	9
3	Optical sources: Direct and Indirect Band Gap Materials, Requirement of optical source, Working principle of light-emitting diode, LED power and efficiency, LED structures, , Planar LED, The double-hetero junction LED Surface emitter LEDs, Edge emitter LEDs, LASER	9
4	Optical Receivers: Optical detection principles, Performance and compatibility requirement for detector, Quantum efficiency, Responsivity, Semiconductor photodiode, PIN photodiode, Avalanche photodiode, Receiver noise.	9
5	Optical networks And Optical fiber measurements: Optical networking terminology, Wavelength division multiplexed network, Dense wavelength Division Multiplexed Network. Synchronous Digital Hierarchy (SDH), GPON. Fiber attenuation measurements, Fiber numerical aperture measurements.	9

Text/Reference Books:

1. Optical Fiber Communication –G. Keiser McGraw Hill Publication, 5th Ed.
2. Optical Communication Principles and Practice – J. senior, Prentice Hall of India,3rd Ed.
3. Optical Communication System – J. Gower Prentice Hall of India

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

Course Code : ET702M

Title of the Course : Advance programming

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

Unit	Topic	Hour
1	Basic coding skills, working with data types and variables, working with numeric data, Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module.	9
2	Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods	9
3	Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions	9
4	OOPS Concepts, Classes and objects , Classes in Python, Constructors, Data hiding, Creating Classes, Instance Methods, Special Methods, Class Variables, Inheritance, Polymorphism	9
5	Usage of Numpy for numerical Data, Usage of Pandas for Data Analysis, Matplotlib for Python plotting, Seaborn for Statistical plots. Case Study of any one organization	9

Text Books:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think- python/)
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011

Reference Books:

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press, 2013
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
4. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers,LLC,2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016. 6. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015

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

Course Code : ET703M

Title of the Course : Radar and 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	4	3	80	10	10	100

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Analyze the Radar systems
2. Understand the basics of satellite orbits
3. Analyze the various methods of satellite access
4. Illustrate various satellite applications
5. Understand the basics of satellite Networks

Unit	Topic	Hour
1	Basics of Radar Basic principles and fundamentals of Radar, block diagram of basic Radar, classification, free space Radar range equation, factors influencing maximum range.	9
2	Radar Systems Pulsed Radar system, Modulators, Radar displays, target detection, scanning and tracking, CW Doppler Radar, MTI Radar, radio navigational aids, Radar antennas.	9
3	Satellite Orbits Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo stationary orbits, Look Angle Determination, Limits of visibility, eclipse, Sub satellite point, Launching Procedures, launch vehicles and propulsion. Telemetry, Tracking and command	9
4	Satellite Link Design, Access and Coding Methods Basic link analysis, Interference analysis, Rain induced attenuation and interference, Ionospheric characteristics, Link Design with and without frequency reuse. Modulation and Multiplexing: Voice, Data, Video, Analog / digital transmission system, Digital video Broadcast, multiple access: FDMA, TDMA, CDMA.	9
5	Satellite Applications INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. GPS Position Location Principles, Differential GPS, Direct Broadcast satellites (DBS/DTH).	9

Text Books:

1. Skolnik, "Principles of Radar Engineering" Mc Graw Hill
2. Dennis Roddy, —Satellite Communication, 4th Edition, Mc Graw Hill International, 2006.
3. Timothy Pratt, Charles,W.Bostain, JeremyE.Allnutt,"SatelliteCommunication, 2nd Edition, Wiley Publications, 2002

Reference Books:

1. Wilbur L.Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, —Satellite Communication Systems Engineering, Prentice Hall/Pearson, 2007.
2. N.Agarwal, —Design of Geosynchronous Space Craft, Prentice Hall, 1986.
3. Bruce R. Elbert, —The Satellite Communication Applications, Hand Book, Artech House Bostan London, 1997.
4. Tri T. Ha, —Digital Satellite Communication, II nd edition, 1990.
5. Emanuel Fthenakis, —Manual of Satellite Communications, Mc Graw Hill Book Co., 1984.
6. Robert G. Winch, —Telecommunication Trans Mission Systems, Mc Graw-Hill Book Co., 1983.
7. Brian Ackroyd, —World Satellite Communication and earth station Design, BSP professional Books, 1990.
8. G.B.Bleazard, —Introducing Satellite communications—, NCC Publication, 1985.
9. M.Richharia, —Satellite Communication Systems-Design Principles, Macmillan 2003

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

Course Code : ET704M

Title of the Course : Program Elective – 3

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

ET704M	Wireless Sensor Networks

Course Outcomes:

After completion of the course, the student will be able to:

1. Infer Wireless Sensor Networks for basic applications such as environmental Monitoring.
2. Verify the various WSN protocols and design challenges.
3. Implement various wireless technologies for WSN
4. Establish different Routing protocols for WSN
5. Apply Middleware for WSN and known OS for WSN

Unit	Topic	Hour
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	9
2	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 studies	9
3	Sensors Network Protocols, Data dissemination and gathering, Routing Challenges and design issues in wireless sensor network, Network Scale and Time-Varying Characteristics, Resource Constraint, Sensor Applications, Data Models, Routing strategies in WSN	9
4	Transport Control Protocols for Wireless Sensors Networks, Traditional transport control protocol and transport protocol design issues, Examples of existing transport control protocol, performance of TCP" WSN Protocol design issues & Performance modeling	9
5	Middleware for Sensor Networks, WSN middleware principles, Middleware architecture, existing middleware. Operating System Design Issues, Examples of Operating Systems. TinyOS etc	9

Text Books:

1. "Wireless Sensor Networks: Technology, Protocols, and Applications", KazemSohraby, Daniel, Minol, Taieb Znati, Wiley Interscience Publication, 2007
2. Morgan Kaufinann F. Zhao and L. Guibas, 'Wireless Sensor Networks', a Francisco, 2004.

Reference Books:

1 "Computer Networks" ,Andrew Tanenbaum, 4th ed., Pearson Education,2007
2. C. S. Raghavendra, Krishna M. Sivalingam, Taieb F. Znati,'Wireless sensor networks', Edition: 2, Published by Springer, 2004 ISBN 140207883 8, 978 1402078835.

ET704M	Embedded systems

Course Outcomes:

At the end of this 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	Topic	Hour
1	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
2	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

3	Programming Concept and Embedded Programming in C and C++:Software Programming in assembly language and in high level language "C", C program elements header ,source files, preprocessor directives, macros, functions, data types, data structures, modifiers, statements, loop, pointers, queues and stacks, lists and ordered lists, Embedded programming in C++.	9
4	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
5	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:

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

ET704M	**Testing and Verification of VLSI circuits**

Course Outcomes:

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

1. To realize importance and challenges of VLSI Testing at different abstraction levels.
2. To study and apply various fault models for generation of test vectors.
3. To apply concepts of logic simulation and fault simulation in designing and testing of VLSI circuits
4. To identify the different characteristics of verification, and apply different verification methods
5. To study different Verification techniques using System Verilog and improve different coverage.

Unit	Topic	Hour
1	Importance of Testing, Testing during VLSI Lifecycle, Challenges in VLSI Testing, Levels of Abstraction in VLSI Testing, Historical Review of VLSI Test Technology	8
2	Design and Testability: Introduction, Testability Analysis, Design for Testability Basics, Scan Cell Designs, Scan Architectures, Scan Design Rules, Scan Design Flow, Special purpose Scan Designs, RTL Design for Testability	14
3	Logic and Fault Simulation: Introduction, Simulation Models, Logic Simulation, Fault Simulation	10
4	Verification: Importance of verification, Verification plan, Verification flow, Levels of verification, Verification methods and languages	5
5	Verification Techniques using System Verilog: Linting, Simulation, Verification Intellectual Property, Waveform Viewers, Code Coverage, Functional Coverage, Verification Language Technologies, Assertions, Revision Control, Issue Tracking metrics	8

Text/Reference Books:

1. VLSI Test Principles and Architectures, Wang Wu Wen, Morgan Kaufmann Publishers
2. Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits", M. Bushnell and V. D. Agrawal, Kluwer Academic Publishers, 2000
3. Digital Systems Testing and Testable Design, M. Abramovici, M. A. Breuer and A. D. Friedman, IEEE Press, 1990
4. Introduction to Formal Hardware Verification, T.Kropf, Springer Verlag, 2000
5. System-on-a-Chip Verification- Methodology and Techniques, P. Rashinkar, Paterson and L. Singh, Kluwer Academic Publishers, 2001.
6. Janick Bergeron, Writing Testbenches, Functional Verification of HDL Models, Springer
7. Janick Bergeron, Writing Testbenches using SystemVerilog, Springer

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

Course Code : ET705M

Title of the Course : Open Elective – 3

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

ET705M	Internet of Things

Unit	Topic	Hour
1	Introduction to IoT: Introduction, Definition and characteristics of IoT, IoT Architecture, Physical and Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The identification of Iot, About the Internet in IoT, IoT framework. M2M to IoT: Machine to Machine, Difference between IoT and M2M, Software defined Networks	9
2	Internet Communication: TCP/IP protocol suit, IP addresses, Static IP address assignment, MAC addresses, TCP/UDP ports, Application Layer protocol: HTTP Sensor Networks:	9
3	Definition, Types of sensors, Sensor characteristics, Types of actuators, Examples and working, RFID principles and components, Wireless Sensor networks: History and context, The node, connecting node, Networking nodes, WSN and IoT	9
4	Interoperability in IoT, Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino, Introduction to Python programming, Introduction to Raspberry pi board, Implementation of IoT with Raspberry Pi	9
5	Introduction to SDN, SDN for IoT, Data Handling and Analytics, Cloud Computing, Sensor-Cloud, Fog computing, Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Industrial IoT Case Study: Agriculture, Healthcare, Activity Monitoring	9

Text Books

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Handbook-on Approach, VPT, 2014
2. Waltenegus Dargie, Chistain Poellabauer: Fundamnetals of Wireless Sensor Network: Theory and Practice
3. Francis daCosta, Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, Apress Pub, 2013.

ET705M	Robotics and Automation

Course Outcomes:

After completion of the course, the student will be able to:

1. Enlist the components and structures of robots.
2. Formulate the feed forward, computed torque and PD control strategies for robotic motion.
3. Derive the kinematic and dynamical model of robotie manipulators.
4. Exemplify the usage of feedback linearization techniques for'n' link robots.
5. Apply the concepts of robotics in industrial automations and societal applications

Unit	Topic	Hour
1	Introduction to robotics, History, growth; Robot applications, Laws of Robotics, Components and Structure of Robots, Common Kinematic arrangements, Rotations, Composition of Rotations, Properties, Homogeneous Transformation.	9
2	Kinematic Chains, Denavit-Hartenberg Representation, Derivation of the Jacobian, Examples, Singularities, Inverse Velocity and acceleration	12
3	Euler-Lagrange Equations, Expressions for kinetic and potential energy. Equation of Motions, Common configurations	11
4	Introduction, Actuator dynamics, Set-Point Tracking, Drive Train Dynamics, Trajectory Interpolation/Planning, PD/PID, Feed forward Control and Computed Torque	5
5	The Frobenius theorem, Single-Input Systems, Feedback Linearization for N-Link Robots, Introduction to outer loop design-Lyapunov's Second Method, Introduction to sliding mode control for robotic applications"	8

Text Books:

1. Mark W. Spong & M. Vidyasagar. "Robot Dynamics and Control", Willey India Publisher, 2009
2. Lee, K.S. Fu, R.C. Gonzalez & C.S.G. - Robotics, McGraw Hill

3. Bruno Sicilian (1996) - Modeling and controlling of Robot manipulations, Lorenzo Seivicco, TMH.

Reference Books:

1. Wolfram Stadler (1995) - Analytical robotics and Mechatronics, TMH.
2. Robert J. Schilling (1996) - Fundamentals of Robotics Analysis and control, PHI.

ET705M	**Information & Cyber security**

Unit	Topic	Hour
1	Overview of vulnerability scanning, Open Port / Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit	9
2	Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools, Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping, Kismet	9
3	Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection	9
4	Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, OpenSSL and tunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTCHydra	9
5	Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000	9

Text Books:

1. Mike Shema , Anti-Hacker Tool Kit, Mc Graw Hill
2. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley

References:

1. Achyut S.Godbole Data Communication and Networking,2e, McGraw –Hill Education New Delhi,2011

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

Course Code : ET706M

Title of the Course : Fiber Optic Communications Lab

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
0	0	2	2	1	0	0	25	25	50

Minimum 8 experiments based on the syllabus of ET701M

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

Course Code : ET707M

Title of the Course : Advance programming Lab

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
0	0	2	2	1	0	0	25	25	50

Minimum 8 experiments based on the syllabus of ET702M

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

Course Code : ET708M

Title of the Course : Major Project – I

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
0	0	6	6	3	0	0	50	50	100

Course Outcomes:

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

1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
3. Write comprehensive report on project work

Guidelines:

1. The duration of project work should be a minimum of two semesters: Major Project Phase –I & II
2. 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.
3. 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.
4. 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.

5. 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.
6. 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 TELECOMMUNICATION ENGINEERING

SYLLABUS

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

Course Code : ET801M

Title of the Course : Mobile Communication and Networks

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

Course Outcomes

At the end of this course students will demonstrate the ability to

1. Understand switching techniques for voice and data traffic.
2. Explore the traffic engineering to design networks.
3. Realize importance of cellular concepts and its propagation mechanism.
4. Understand architecture of GSM system.
5. Differentiate 4G LTE and 5G technologies.

Unit	Topic	Hour
1	Switching techniques for Voice and Data Switching techniques for Voice: Manual Switching System, Electronic Switching System and Time Division Switching. Single Stage networks, Gradings, Two stage and Three stage networks. Synchronization, Control of switching systems: Call processing Functions, Common Control, Reliability, Availability and Security. Switching techniques for Data: Circuit switching, Message Switching and packet Switching in perceptive with mobile communication.	9
2	Cellular Concept Introduction to cellular telephone system, Cellular concept: Expansion of mobile system capacity through frequency reuse, Cell geometry, Selection of cluster size, Cell splitting and sectoring, Coverage and capacity in cellular system and Handoff strategies. Small Scale Fading and Multipath: Types of Small scale fading, Small scale multipath propagation, Impulse response model of multipath channel and Small scale multipath measurements.	9
3	GSM Fundamentals Introduction, Architecture of GSM, characteristics of GSM standards, services, Radio transmission parameters in GSM System, Applications.	9
4	GSM Channels and Services Traffic and Logical Channels in GSM, GSM time hierarchy, GSM burst structure, Description of call setup procedure, Handover mechanism in GSM, Security in GSM. Data transmission in GSM: Data Services, SMS, HSCSD, GPRS, EDGE. Multiple Access Techniques-TDMA, CDMA and OFDMA.	9
5	Evolution of Mobile Technologies Evolution of Mobile Generation and its comparison (GSM & CDMA), Overview of LTE: LTE basics, LTE frame structure, LTE Design parameters with Standardization and Architecture of LTE. Overview of 5 G Networks: Comparison of 4G and 5G technology, Opportunities and Requirements in 5G network, Open Wireless Architecture of 5G network and Disruptive technologies for 5G.	9

Text Books:

1. Thiagarajan Vishwanathan, —Telecommunication Switching Systems and Networks; PHI Publications
2. Theodore Rappaport, —Wireless Communications Principles and Practice, Second Edition, Pearson Education

Reference Books

1. Fei Hu, —Opportunities in 5G Networks : A research& development perspective, CRC Press
2. J. E. Flood , —Telecommunications Switching, Traffic and Networks, Pearson Education
3. Krzysztof Wesolowski, —Mobile Communication Systems, Wiley Student Edition
4. John C. Bellamy, —Digital Telephony, Third Edition; Wiley Publications
5. Mischa Schwartz, —Mobile Wireless Communications, Cambridge University Press
6. AdityaJagannatham, Principles of Modern Wireless Communication Systems

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

Course Code : ET802M

Title of the Course : Digital Image & Video Processing

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

Unit	Topic	Hour
1	Digital Image Fundamentals-Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures	9
2	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	9
3	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	9
4	Image Segmentation- Detection of discontinuities, edge linking and boundary detection, thresholding – global and adaptive, region-based segmentation 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	9
5	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 – Group of pictures, frames, slices, macro-blocks and blocks; Elements of a video encoder and decoder; Video coding standards – MPEG and H.26X	9

Suggested books:

1. "R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition 2008
2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2ndedition 2004
3. Murat Tekalp , Digital Video Processing" Prentice Hall, 2nd edition 2015

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

Course Code : ET803M

Title of the Course : Advance Computer Architecture

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	80	10	10	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	Topic	Hour
1	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	9
2	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
3	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	9
4	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	9
5	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	9

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.

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

Course Code : ET804M

Title of the Course : Program Elective – 4

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

ET804M	High Speed Electronics

Course Outcomes:

After completion of the course, the student will be able 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	Topic	Hour
1	The Importance of Interconnect Design; Transmission line structure on PCB or MCM, Wave propagation, Transmission lines parameters, Transmission lines reflections; Mutual inductance/Capacitance, Matrix, Field simulators, Crosstalk induced noise, Crosstalk trends, termination of Transmission line pair, Minimization of crosstalk;	9
2	Transmission line losses, Variation in dielectric dielectric constant, Serpentine traces, Inter symbol interference, Effects of 90° bend, Effects of topology; Vias, Connectors, Chip Packages, Calculating the Effect of a Long Package Stub; Non-ideal current return paths, Local power delivery networks, Simultaneous switching noise (SSO/SSN);	9
3	Types of Models, Basic CMOS Output Buffer, Buffers operation in the saturation region; Common-clock timing, Source synchronous timing, Bus signaling techniques, Timing and signal quality metrics, Design Optimization, Sensitivity analysis, Design guidelines, Design methodology, radiated emissions and minimizing system noise;	9
4	High Frequency Amplifier Design, Noise (Thermal, Shot, Flicker, Popcorn, Classical), Low Noise Amplifiers Design, LNA topology, Optimization, LNA Design;	9
5	Mixers –Up conversion/Down conversion, Types of Mixer; Power Amplifiers, Class A, B, AB, C, D, E and F, Modulation, Characteristic and Design of power amplifier	9

Text 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", Cambridge University Press.
3. BehzadRazavi, "RF Microelectronics", Prentice-Hall 1998.
4. Guillermo Gonzalez, "Microwave Transistor Amplifiers", 2nd Edition, Prentice Hall.

ET804M	Advance Digital Signal Processing

Unit	Topic	Hour
1	Fundamentals of DSP background and review of discrete time random signals. Discrete Fourier Transform: representation, properties and computation of the DFT (FFT), decimation in time and frequency	9
2	Multirate digital signal processing: Fundamentals of Multirate systems, Basic multirate operations, Decimation, interpolation, filter design and implementation of sampling rate conversion, polyphase filter structures, time variant filter, structures, multistage implementation of sampling rate conversion of BP signals, sampling rate conversion by an arbitrary factor, interconnection of building blocks, polyphase representation, multistage implementations	10
3	Wavelet Transform: Introduction to wavelets, wavelets and wavelet expansion systems, discrete wavelet transform, multiresolution formulation of wavelet systems, Haar Wavelet and other wavelet representations, scaling function, wavelet functions, Parseval's theorem	9
4	Construction of Daubechies filters, Lattice Factorization of Filter Banks. Construction by lifting: "next-generation" wavelets, Tree-structured filter banks and Wavelet-Packets	8
5	Wavelet Series: Mallat's algorithm, Continuous Wavelet Transform and Frames, Adapted wavelet and wavelet packet representations, Best Bases algorithms, Arbitrary tilings of the time-	9

	frequency plane based on wavelets, Applications to signal compression, Review of Rate-Distortion, KLT, Optimal Bit Allocation principles, Basics of Quantization Theory	

Text /Reference Books:

1. S. K. Mitra, Digital signal processing: A computational approach, TMH
2. P. P. Vaidyanathan, Multirate filters and Filter banks, PH International, Englewood Cliffs
3. Rabiner and Schafer, Multirate signal Processing, PH International, Englewood Cliffs
4. C. S. Burrus, Ramose and A. Gopinath, Introduction to Wavelets and Wavelet Transform, Prentice Hall Inc.

ET804M	**Adaptive Signal Processing**

Unit	Topic	Hour
1	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.	8
2	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	8
3	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. 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	11
4	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
5	Introduction to recursive least squares (RLS), vector space formulation of RL Estimation, 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	9

Text/Reference Books:

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

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

Course Code : ET805M

Title of the Course : Open Elective – 4

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

ET805M	Introduction of Neural Network and Artificial Intelligence

Course Outcomes:

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

1. Distinguish between the crisp sets and fuzzy sets.
2. Infer the operations of fuzzy sets, fuzzification and defuzzification.
3. Acquire the concepts of biological neurons and its artificial models
4. Identify neural network architectures and appropriate learning rules
5. Apply deep learning techniques to improve neural network performance.

Unit	Topic	Hour
1	Introduction: Fuzzy Sets, Logic and Systems & Applications, Real Life Applications of Fuzzy Systems, Membership Functions and its types, Nomenclature Terms and Set Theoretic Operations used in Fuzzy Sets.	9
2	Fuzzy Set Properties and Distance between Fuzzy Sets, Arithmetic Operations on Fuzzy Numbers, Complement, T-norm and S-norm for Fuzzy Sets. Projection, Cylindrical Extension and Properties of Fuzzy Relation, Composition of Fuzzy Relations and Its Properties. Linguistic Hedges, Fuzzy Inference System: Mamdani Fuzzy Model and Examples.	9
3	Biological Neurons and Their Artificial Models, Models of Artificial Neural Networks (ANN), Learning and Adaptation, Neural Network Learning Rules, Single Layer ANN, Multi-layer ANN	10
4	Perceptron representation, perceptron learning, perceptron training algorithm. Back Propagation: Introduction to Back propagation and back propagation training algorithm.	9
5	Introduction to Machine l-earning, Types of learning, Foundation of Machine Learning, Machine Intelligence applications to real time systems. Foundations of deep learning, Introduction to Deep Learning with Neural Networks, Multilayer Perceptron and Deep Neural Networks.	8

Text Books

1. Bose & Liang, "Artificial Neural Networks ", Tata McGraw Hill, 1996
2. Kosco B, "Neural Networks and Fuzzy Systems: A Dynamic Approach to Machine intelligence, Prentice Hall of India New Delhi, 1992.
3. James A. Anderson, An introduction to neural networks, Prentice Hall of India Private limited, New Delhi, 1999.
4. Jacek M. Zurada,Introduction to Artificial Neural System, Jaico Publishing Home, 2002.
5. S. Rogers and M. Girolami, A First Course in Machine Learning, 2nd edition, Chapman & Hall/CRC.

References

1. D. Drainkov, H. Hellendoorn and M. Reinfrank, An Introduction to Fuzzy Control, Narosa Publishing House, 1993.
2. T. J. Ross, Fuzzy Logic with Engineering Applications, McGraw Hill, Inc 1995.
3. Klir G.J. and Folger T.A. Fuzzy sets, "Uncertainty and Information", Prentice Hall of India, New Delhi, 1994
4. Goodfellow, I., Bengio, Y., and Courville, A Deeep Learning, MIT Press, 2016.

ET805M	Introduction of Machine learning

Unit	Topic	Hour
1	Preliminaries, what is machine learning; varieties of machine learning, learning input/output functions, bia, sample application. Boolean functions and their classes, CNF, DNF, decision lists. Version spaces for learning, version graphs, learning search of a version space, candidate elimination methods	11
2	Neural Networks, threshold logic units, linear machines, networks of threshold learning units, Training of feed forward networks by back propagations, neural networks vs. knowledge-based systems	7

3	Statistical Learning, background and general method, learning belief networks, nearest neighbor. Decision-trees, supervised learning of uni-variance decision trees, network equivalent of decision trees, over fitting and evaluation	7
4	Inductive Logic Programming, notation and definitions, introducing recursive programs, inductive logic programming vs decision tree induction	7
5	Computational learning theory, fundamental theorem, Vapnik-Chernonenkis dimension, linear dichotomies and capacity. Unsupervised learning, clustering methods based on Euclidian distance and probabilities, hierarchical clustering methods. Introduction to reinforcement and explanation-based learning	13

Text Books:

1. Introduction to Machine learning, Nils J.Nilsson
2. Machine learning for dummies, IBM Limited ed, by Judith Hurwitz and Daniel Kirsch
3. Introduction to Machine Learning with Python A guide for data scientists, Andreas, C. Muller & Sarah Guido, O'Reilly.

ET805M	**Automotive Electronics**

Unit	Topic	Hour
1	Components for electronic engine management system, open and closed loop control strategies, PID control, Look up tables, introduction to modern control strategies like Fuzzy logic and adaptive control. Parameters to be controlled in SI and CI engines	9
2	Sensors & Actuators Hall Effect, hot wire, thermistor, piezo electric, piezo resistive based sensors. Introduction, basic sensor arrangement, types of sensors, oxygen concentration sensor, lambda sensor, crankshaft angular position sensor, cam position sensor, Mass air flow (MAF) rate, Manifold absolute pressure (MAP), Throttle plate angular position, engine oil pressure sensor, vehicle speed sensor, stepper motors, relays, detonation sensor, emission sensors.	9
3	Digital Engine Control System Open loop and close loop control system, engine cooling and warm up control, idle speed control, acceleration and full load enrichment, deceleration fuel cutoff. Fuel control maps, open loop control of fuel injection and closed loop lambda control exhaust emission control, on-board diagnostics, future automotive electronic systems, Electronic dash board instruments – Onboard diagnosis system	9
4	SI Engine Management feedback carburetor system, throttle body injection and multi point fuel injection system, injection system controls, advantage of electronic ignition systems, three way catalytic converter, conversion efficiency versus lambda. Layout and working of SI engine management systems like Bosch Monojetronic, L-Jetronic and LH-Jetronic. Group and sequential injection techniques. Working of the fuel system components. Advantages of electronic ignition systems. Types of solid state ignition systems and their principle of operation, Contactless electronic ignition system, Electronic spark timing control	9
5	CI Engine Management Fuel injection system, parameters affecting combustion, noise and emissions in CI engines. Pilot, main, advanced, post injection and retarded post injection. Electronically controlled Unit Injection system. Layout of the common rail fuel injection system. Working of components like fuel injector, fuel pump, rail pressure limiter, flow limiter, EGR valve control in electronically controlled systems	9

Text Books:

1. Automobile Electrical & Electronic Equipments - Young, Griffitns - Butterworths, London.
2. Understanding Automotive Electronics, Wiliam B. Ribbens, 5th Edition, Newnes, Butterworth–Heinemann.
3. Diesel Engine Management by Robert Bosch, SAE Publications, 3rd Edition, 2004
4. Gasoline Engine Management by Robert Bosch, SAE Publications, 2nd Edition, 2004.

References:

1. Understanding Automotive Electronics – Bechfold SAE 1998
2. Automobile Electronics by Eric Chowanietz SAE.
3. Fundamentals of Automotive Electronics - V.A.W.Hilliers - Hatchin, London
4. Automotive Computer & Control System – Tomwather J. R., Cland Hunter, Prentice Inc. NJ
5. Automotive Computers & Digital Instrumentation – Robert N. Brandy, Prentice Hall

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

Course Code : ET806M

Title of the Course : Mobile Communication and Networks Lab

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
0	0	2	2	1	0	0	25	25	50

Minimum 8 experiments based on the syllabus of ET801M

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

Course Code : ET807M

Title of the Course : Digital Image & Video Processing Lab

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
0	0	2	2	1	0	0	25	25	50

Minimum 8 experiments based on the syllabus of ET802M

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

Course Code : ET808M

Title of the Course : Major Project – 2

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/ week	Credits	Duration of paper (in hrs)	MSE	IE	ESE	Total
0	0	6	6	3	0	0	50	50	100

Course Outcomes:

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

1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
3. Write comprehensive report on project work

Guidelines:

1. The Major Project work Phase-II is to be conducted in continuation of the project work Phase-I.
2. 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.
3. 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.
4. 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.