EASWARI ENGINEERING COLLEGE

Department of Electronics and Communication Engineering

Regulation: 2017

Course/Branch	:	**B.E. /ECE**		**Total no. of hours given in syllabus:**		
Subject Code	:	EC 8351		Lecture	:	45
Subject Title	:	ELECTRONICS CIRCUITS I		Tutorials	:	0
Year/Semester	:	II/III		Practical	:	0
Faculty Name	:	Dr.S.Sudha		**TOTAL**	:	**45**

Course Outcomes:
Students must be able to
CO1.Learn about biasing of BJTs and MOSFETs
CO2.Designing the biasing circuits of BJTs and MOSFETs
CO3.Design and construct BJT amplifiers
CO4.Construct amplifiers with active loads
CO5.Study high frequency response of all amplifiers
CO6.To design Power supplies and device testing.

Program Outcomes:
PO1: Engineering Knowledge
PO2: Problem Analysis
PO3: Design/Development of Solutions
PO4: Conduct investigations of complex problems
PO5: Modern Tool Usage
PO6: The Engineer and Society
PO7: Environment and Sustainability
PO8: Ethics
PO9: Individual and Team Work
PO10: Communication
PO11: Project Management and Finance
PO12: Life Long Learning

PROGRAM SPECIFIC OUTCOMES:
PSO1: Design and construct Electronic circuits and to Simulate the circuits with software tools which lead to the development of Electronic gadgets.
PSO2: Design and analyze various signal processing blocks for Image and Signal processing systems
PSO3: Analyze various Networking and Communication areas and its impact in real time applications
PSO4: Implement their professional skills and techniques in the integrated circuit design which are applicable to industrial and societal needs.

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM OBJECTIVES:

CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**
EC8351.1	3	2	3	2	2	-	-	-	-	-	-	1
EC8351.2	3	3	2	2	2	-	-	-	-	-	-	1

EC8351.3	3	3	3	2	2	-	-	-	-	-	-	1
EC8351.4	3	2	3	2	2	-	-	-	-	-	-	1
EC8351.5	3	2	3	2	2	-	-	-	-	-	-	1
EC8351.6	3	3	2	2	2	-	-	-	-	-	-	1
EC8351	3	3	3	2	2	-	-	-	-	-	-	1

Justification of the mapping:

EC8351.1	An in-depth knowledge of mathematics and engineering is required to understand the basics of BJT & FET biasing (PO1). Problems on biasing design can be formulated and analyzed with the fundamentals learnt (PO2).
EC8351.2	A good mathematical and engineering fundamental is required to define BJT amplifiers(PO1) and hence formulate problems on designing BJT amplifiers (PO2). Biasing with MOSFET by conducting experiments (PO4) and thereby develop solutions to cater to the societal needs (PO3). Usage of biasing simulated design tools (PO5) is needed to indulge in persistent learning (PO12).
EC8351.3	Adequate ability to illustrate the various types of BJT amplifiers. (PO1). With the knowledge assimilated, problems related to designing the parameters (PO2).
EC8351.4	Engineering and mathematical background is essential to assimilate the types of FET amplifiers (PO1). Usage of biasing simulated design tools (PO5) is needed to indulge in persistent learning (PO12).
EC8351.5	Competent analytical and engineering knowledge is needed to comprehend the frequency analysis of amplifiers (PO1). Problems encountered during design of low frequency and high frequency components in the literature (PO2) is analyzed with modern tools (PO5) and solutions are developed (PO3) through experimentation (PO4). Henceforth an overall interested is inculcated to stay updated with the latest trends (PO12).
EC8351.6	Linear mode power supply requires thorough understanding of mathematics and the engineering concepts learnt (PO1) to formulate the selection of type of regulator for application (PO2). Conclusions derived through experiments (PO4) are utilized to design power supply with active loads (PO3) with the aid of specific simulating tools (PO5). An overall scope for updating the technological changes (PO12) is possible.

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	2	2
CO2	3	2	2	2
CO3	3	1	2	2
CO4	3	1	2	2
CO5	-	1	1	2
CO6	3	2	2	2
EC8351	3	2	2	1

Justification of the mapping:

CO1	An abstract knowledge of signal processing (PSO2) and analysis of parameters is required for a (PSO3). An overall ability to develop transistor comprising electronic circuits (PSO1) with novel techniques is imparted (PSO4).
CO2	Biasing parameters are to be identified and studied (PSO4) to design amplifiers (PSO1) with an overview of the underlying analysis (PSO2) for application in communication regime (PSO3).
CO3	An overall impact of electronic circuits design on BJT & FET amplifiers (PSO1) with limited signal processing concepts (PSO2) is identified to apply in real- time scenarios (PSO3) through innovative techniques (PSO4).
CO4	An overall understanding of signal processing concepts (PSO2) for designing the MOSFET amplifiers (PSO1) as per the industry demands (PSO4) in the area of Electronics (PSO3).
CO5	Adequate signal understanding (PSO2) is required to cater to the industrial needs (PSO4) for real-time scenarios (PSO3).
CO6	Moderate analysis in the field of communication (PSO3) is required to evaluate the

	performance of signal processing on MOSFET amplifiers (PSO2). Basic design of electronic circuits is needed highly for designing amplifiers (PSO1) as demanded by the industries (PSO4).

Course/Branch	:	B.E./ECE		Total no. of hours given in syllabus:		
Subject Code	:	EC 8451		Lecture	:	60
Subject Title	:	Electromagnetic Fields		Tutorials	:	-
Year/Semester	:	II/IV		Practical	:	Nil
Faculty Name	:	Dr. S. Sudha / Mrs.A. Usha		**TOTAL**	:	**60**

CO1: Analyze field potentials due to static charges and static magnetic fields.
CO2:Understand the fundamental electromagnetic laws and concepts.
CO3: Write Maxwell's equations in integral, differential and phasor forms and explain their physical significance.
CO4: Understand the principles of electromagnetic wave propagation in lossy and in lossless media.
CO5: Solve simple problems requiring estimation of electric and magnetic quantities based on these concepts and laws.
CO6: Analyze transmission line problems and understand the application of Electromagnetic waves in real world problems.

Program Outcomes:
PO1: Engineering Knowledge
PO2: Problem Analysis
PO3: Design/Development of Solutions
PO4: Conduct investigations of complex problems
PO5: Modern Tool Usage
PO6: The Engineer and Society
PO7: Environment and Sustainability
PO8: Ethics
PO9: Individual and Team Work
PO10: Communication
PO11: Project Management and Finance
PO12: Life Long Learning

PROGRAM SPECIFIC OUTCOMES:

PSO1: To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.
PSO2: To apply design principles and best practices for developing quality products for scientific and business applications
PSO3: To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing / novel problems

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM OBJECTIVES:

CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	3	3	-	-	-	-	3	3
CO2	3	3	3	3	3	3	-	-	-	-	3	3
CO3	3	3	3	3	3	3	-	-	-	-	3	3
CO4	3	3	3	3	3	3	-	-	-	-	3	3
CO5	3	3	3	3	3	3	-	-	-	-	3	3
CO6	3	3	3	3	3	3	-	-	-	-	3	3
EC8451	3	3	3	3	3	3	-	-	-	-	3	3

Justification of the mapping:

CO1	An in-depth knowledge of mathematics in specific vector analysis is required to

	understand the coordinate system. (PO1). Problems on fields can be formulated and analyzed with the fundamentals learnt (PO2). It inculcates the ability to develop solutions for transmission lines, waveguides and antennas (PO3) through experimentation (PO4) on static fields, time-varying fields, transmission lines, waveguides, antenna design tools (PO5) by incorporating the day to day modification(PO7) update with the recent trends (PO12).
CO2	A moderate mathematical and engineering fundamental is required to define electric and magnetic materials (PO1) and hence formulate problems on effect of materials encountering those fields (PO2& PO3). Field pattern of different materials (PO4) can be studied by using tools(PO5)and provide knowledge of behavior of material when they encounter interface or connected together.(PO7)
CO3	Adequate ability to illustrate the various types of fields behavior, is acquired through competent comprehension of necessary mathematics and engineering concepts (PO1). With the knowledge assimilated, problems related (PO3) to static and time varying fields were identified and analyzed (PO4) to the societal needs (PO8).
CO4	Engineering and mathematical background is essential to assimilate the types of propagation of uniform plane wave (PO1) and their reflection at boundaries (PO2). Issues on transmission lines, waveguides are identified to develop solutions for societal requirements (PO3) by conducting experiments(PO4) and express(PO10) the behavioural pattern for different transmission lines (PO8).
CO5	Competent analytical and engineering knowledge is needed to comprehend wave propagation (PO1). Problems encountered during wave propagation as identified by analysis (PO3) and conducting experiments (PO4) on different transmission lines(PO7) is analyzed(PO8) with modern tools (PO5) and providing solutions(PO10)
CO6	Application of electromagnetic problems in understanding wave propagation gn requires thorough mathematics and the engineering concepts learnt (PO1) to formulate the selection of appropriate antennas and transmission lines (PO2) by analyzing problems(PO4) and provide design solutions(PO3). Conclusions(PO10) derived through experiments (PO8) for real time communication problems(PO7)

MAPPING OF PROGRAMMME OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

Program Specific Objectives	Programme Outcomes											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
1	3	3	2	3	2	1	1	1	1	1	1	2
2	3	3	3	3	3	2	2	3	1	3	3	3
3	3	3	3	3	3	3	3	2	1	1	1	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO	PSO1	PSO2	PSO3
CO1	3	2	2
CO2	3	2	2
CO3	2	2	2
CO4	2	2	2
CO5	3	2	3
CO6	3	2	3
EC8451	3	2	2

Justification of the mapping:

CO1	An abstract knowledge of parameter and materials (PSO1) and analysis of devices, components their behavior required for understanding the signal propagation(PSO3) for the societal needs
CO2	Different Material parameters are to be identified and studied (PSO1) to design transmission lines and antenna (PSO4)for wave propagation (PSO2) in communication(PSO3).
CO3	An overall impact of electric and magnetic materials (PO1) their behavior helps in

	design analysis(PSO2) waves in time varying and static mode with limited signal processing concepts (PSO3) is identified to apply in real- time scenarios.
CO4	An overall understanding of signal processing concepts (PSO2) for designing transmission lines, wired or wireless for the propagation of waves (PSO1) as per the industry demands in the area of communication (PSO3).
CO5	Adequate signal understanding (PSO2) is required to cater to the industrial needs for real-time scenarios (PSO3) with analytical and experimental results.(PSO1).
CO6	Competent analysis in the field of communication (PSO3) is required to evaluate the performance of signal processing on specific propagation of Electromagnetic waves for wired or wireless communication (PSO2). Basic design of electronic circuits is needed for developing application specific antenna and transmission lines (PSO1) as demanded by the industries.

Course/Branch	:	B.E/ECE		Total no. of hours given in syllabus		
Subject Code	:	191ECC401T		Lecture	:	45
Subject Title	:	ANALOG AND INTEGRATED CIRCUITS		Tutorials	:	0
Year/Semester	:	II/IV/A, B & C		Practical	:	0
Faculty Name	:	Dr. R. Senthamizh selvi , Ms.T. Gophika Dr.S.R.Sriram		TOTAL	:	45

Course Outcomes:
Students must be able to
CO1: Design and analyze various feedback amplifiers.
CO2: Ability to design oscillator circuits operating at different frequencies.
CO3: Analyze performance of tuned amplifiers.
CO4: Design and analyze wave shaping circuits and multivibrators.
CO5: Understand the working principles of electronic circuits like clipper, clamper and understand methods to analyze and characterize these circuits.
CO6: Understand the use of power amplifiers and DC-DC convertors.

Program Outcomes:
PO1: Engineering Knowledge
PO2: Problem Analysis
PO3: Design/Development of Solutions
PO4: Conduct investigations of complex problems
PO5: Modern Tool Usage
PO6: The Engineer and Society
PO7: Environment and Sustainability
PO8: Ethics
PO9: Individual and Team Work
PO10: Communication
PO11: Project Management and Finance
PO12: Life Long Learning

PROGRAM SPECIFIC OUTCOMES:
PSO1: To analyze, design and develop solutions by applying foundational concepts of Electronics and Communication Engineering.
PSO2: To apply design principles and best practices for developing quality products for scientific and business applications.
PSO3: To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.
MAPPING OF COURSE OUTCOMES WITH THE PROGRAM OBJECTIVES:

CO/PO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	1	-	-	-	-	-	-	1

CO2	1	3	3	3	2	-	1	1	-	1	-	1
CO3	3	1	2	2	1	-	-	-	-	-	-	-
CO4	3	3	3	3	2	-	-	-	-	-	-	1
CO5	1	1	1	1	1	-	-	-	-	-	-	-
CO6	1	1	2	2	2	-	-	-	-	-	-	-
EC8452	3	3	3	3	2	-	1	1	-	1	-	1

Justification of the mapping:

CO1	An in-depth knowledge of mathematics and engineering is required to understand the basics of electronic circuits (PO1). Problems on feedback design can be formulated and analyzed with the fundamentals learnt (PO2). It inculcates the ability to develop solutions for negative feedback amplifiers (PO3) through experimentation (PO4) and through PSPICE (PO5). Vigor is instilled to constantly update with the recent trends (PO12).
CO2	A little mathematical and engineering fundamental is required to define oscillators (PO1) and hence formulate problems (PO2). Various RC and LC oscillators are perceived by conducting experiments (PO4) and thereby develop solutions to cater to the societal needs (PO3). Usage of design tools (PO5) is needed to indulge in environmental (PO7), ethical (PO8) and persistent learning (PO12).
CO3	Adequate ability to illustrate the various types of aperture and array antennas is acquired through competent comprehension of necessary mathematics and engineering concepts (PO1). With the knowledge assimilated, problems are identified and analyzed (PO2). Design of tuned amplifiers can be done by performing experiments (PO4) to cater to the societal needs (PO3) with the usage of design tools (PO5).
CO4	Engineering and mathematical background is essential to assimilate the types of wave shaping circuits (PO1). Various types of multivibrators are identified (PO2) to develop solutions for societal requirements (PO3) by conducting experiments (PO4). Simulation tools are utilized to observe the waveforms (PO5) and gain a lasting experience (PO12).
CO5	Slight engineering knowledge is needed to comprehend various clipper and clamper circuits (PO1). Problems encountered are identified in the literature (PO2) is analyzed with modern tools (PO5) and solutions are developed (PO3) through experimentation (PO4).
CO6	Application of blocking oscillators require understanding of engineering concepts learnt (PO1) to formulate the selection of appropriate one (PO2). Conclusions derived through experiments (PO4) are utilized to design blocking oscillators (PO3) with the aid of design tools (PO5).

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO	PSO1	PSO2	PSO3
CO1	3	1	2
CO2	3	1	2
CO3	2	-	1
CO4	3	1	1
CO5	2	1	1
CO6	1	-	1
EC8452	3	1	2

Justification of the mapping:

CO1	An little knowledge of signal processing (PSO2) and analysis of parameters is required (PSO3). Feedback amplifiers are designed with modern tools (PSO1) and novel techniques are imparted (PSO4).
CO2	Various types of RC and LC oscillators are to be identified and studied (PSO4) and

	designed (PSO1) with an overview of the underlying signal processing (PSO2) for application in communication regime (PSO3).
CO3	An overall impact of electronic circuits design on tuned amplifiers (PSO1) and is applied in real- time scenarios (PSO3) through various techniques (PSO4).
CO4	An light understanding of signal processing concepts (PSO2) for designing the multivibrator circuits (PSO1) as per the industry demands (PSO4) in the area of communication (PSO3).
CO5	Design (PSO1) is required to cater to the industrial needs (PSO4) for real-time scenarios (PSO3).
CO6	Competent analysis in the field of communication (PSO3) is required to design power amplifiers and converters (PSO1) as demanded by the industries (PSO4).

Course/Branch	:	B.E /ECE		Total no. of hours given in syllabus:		
Subject Code	:	EC 8553		Lecture	:	60
Subject Title	:	Discrete-Time Signal Processing		Tutorials	:	-
Year/Semester	:	III/V		Practical	:	Nil
Faculty Name	:	Dr. R. Senthamizh selvi / Mrs.A. Usha		TOTAL	:	60

Course Outcomes:

Students must be able to:

CO1: Apply DFT for the analysis of digital signals and systems
CO2: Design IIR and FIR filters
CO3: Characterize finite Word length effect on filters
CO4: Design the Multirate Filters
CO5: Apply Adaptive Filters to equalization
CO6: Analyze and apply suitable DSP algorithm for specific application

Program Outcomes:

PO1: Engineering Knowledge
PO2: Problem Analysis
PO3: Design/Development of Solutions
PO4: Conduct investigations of complex problems
PO5: Modern Tool Usage
PO6: The Engineer and Society
PO7: Environment and Sustainability
PO8: Ethics
PO9: Individual and Team Work
PO10: Communication
PO11: Project Management and Finance
PO12: Life Long Learning

PROGRAM SPECIFIC OUTCOMES:

PSO1: To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering
PSO2: To apply design principles and best practices for developing quality products for scientific and business applications
PSO3: To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing / novel problems

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM OBJECTIVES:

CO/PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	3	2	2	3	3	-	-	-	-	2	1
CO2	3	3	3	3	3	3	-	-	-	-	1	1

CO3	3	3	2	2	2	3	-	-	-	-	1	1
CO4	3	3	3	3	3	3	-	-	-	-	1	1
CO5	3	3	2	3	2	3	-	-	-	-	1	1
CO6	3	3	3	3	2	3	1	1	-	1	2	1
EC8553	3	3	3	3	3	3	1	1	-	1	1	1

Justification of the mapping:

CO1	An in-depth knowledge of mathematics and engineering is required to understand the basics of Signals, systems and DFT (PO1). Problems on analysis of digital signals and systems design can be formulated and analyzed using DFT. (PO2). It inculcates the ability to develop solutions for digital systems (PO3) through experimentation (PO4) and DSP design tools (PO5). Signal processing tools are instilled to constantly update project management (PO11) with the recent trends (PO12).
CO2	A good mathematical and engineering fundamental is required to design digital filters like IIR and FIR (PO1) and hence formulate problems on implementation of filters (PO2). Filter parameters are analyzed by conducting experiments (PO4) and thereby develop solutions to cater to the societal needs (PO3). Usage of signal processing tools (PO5) is needed to indulge in persistent learning (PO12) and for project management (PO11).
CO3	Adequate ability to characterize finite word length effect on filters is acquired through competent comprehension of necessary mathematics and engineering concepts (PO1). With the knowledge assimilated, problems related to finite word length effects on filters are identified and analyzed (PO2). Design of digital filters with negligible finite word length effects can be done by performing experiments (PO4) to cater to the societal needs (PO3),(PO6). Usage of signal processing tools (PO5) is essential to engage in project management (PO11) and long-term study (PO12).
CO4	Engineering background and mathematical knowledge is essential to study about multirate signal processing (PO1). Issues on developing multirate filters are identified (PO2) to develop solutions for societal requirements (PO3), (PO6) by conducting experiments (PO4). Signal processing tools Digital signal processors are utilized to observe the performance of the multirate filters (PO5) and gain a good project management (PO11) and long-lasting experience (PO12).
CO5	Competent analytical and engineering knowledge is needed to comprehend adaptive filters (PO1). Problems encountered in application of adaptive filters are identified in the literature (PO2) is analyzed with modern tools (PO5) and solutions are developed (PO3) through experimentation (PO4) for engineering and society (PO6). Henceforth an overall interested is inculcated to stay updated with the latest trends (PO12) and for a good project management (PO11).
CO6	Application of suitable DSP processor for specific application requires thorough understanding of Architecture and programming skills (PO1) to formulate the selection of appropriate DSP algorithm (PO2). Conclusions derived through experiments (PO4) are utilized to design application-specific digital system (PO3) with the aid of signal processing tools (PO5). An overall scope for updating the technological changes (PO12), a good project management (PO11) is possible for better communication (PO10), sustainability and environment (PO7).

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO	PSO1	PSO2	PSO3
CO1	1	3	2
CO2	1	3	2
CO3	1	3	1
CO4	1	3	1
CO5	1	3	2
CO6	1	3	2
EC8553	1	3	2

Justification of the mapping:

CO1	An abstract knowledge of signal processing (PSO2) and analysis of parameters is required for digital system design (PSO3). An overall ability to develop any digital system electronic circuits (PSO1).
CO2	To design digital filters (PSO1) with an overview of the underlying signal processing (PSO2) for application in communication regime (PSO3).
CO3	An overall impact of electronic circuits design on digital system (PSO1) with strong signal processing concepts (PSO2) is identified to apply in real- time scenarios (PSO3).
CO4	An overall understanding of signal processing concepts (PSO2) for designing any digital system and the underlying circuitry (PSO1) in the area of communication (PSO3).
CO5	To design any electronic gadgets for real-time scenarios (PSO3), strong understanding of signal processing concepts (PSO2) is required to cater to the industrial needs.
CO6	Competent analysis in the field of communication (PSO3) is required to evaluate the performance of signal processing on specific digital system (PSO2). Basic design of electronic circuits is needed for developing application specific digital system (PSO1).

Course/Branch	:	B.E. / ECE		Total no. of hours given in syllabus:		
Subject Code	:	EC8501		Lecture	:	45
Subject Title	:	Digital Communication		Tutorials	:	-
Year/Semester	:	III / V		Practical	:	-
Faculty Name	:	Dr. B. Jesvin Veancy Ms. K. Suriya Mrs. P. Bini Palas		TOTAL	:	45

Course Outcomes:

Students must be able to

CO1: Understand the limits set by information theory
CO2: Understand the various waveform coding schemes.
CO3: Design and implement base band transmission schemes.
CO4: Design and implement band pass signaling schemes.
CO5: Analyze the spectral characteristics of band pass signaling schemes and their noise performance.
CO6: Design Error control coding schemes.

Program Outcomes:

PO1: Engineering Knowledge
PO2: Problem Analysis
PO3: Design/Development of Solutions
PO4: Conduct investigations of complex problems
PO5: Modern Tool Usage
PO6: The Engineer and Society
PO7: Environment and Sustainability
PO8: Ethics
PO9: Individual and Team Work
PO10: Communication
PO11: Project Management and Finance
PO12: Life Long Learning

Program Specific Outcomes:

PSO1: To analyze, design and develop solutions by applying foundational concepts of Electronics and Communication Engineering.

PSO2: To apply design principles and best practices for developing quality products for scientific and business applications.

PSO3: To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM OBJECTIVES:

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	-	-	1	-	-	-	1
CO2	3	3	3	3	2	1	-	-	-	1	-	1
CO3	3	3	3	3	2	-	-	1	-	-	-	1
CO4	3	3	2	2	2	-	-	-	1	-	-	-
CO5	3	3	3	3	2	1	-	-	1	-	1	1
CO6	3	3	3	3	2	-	-	1	-	1	1	1
EC8501	3	3	3	3	2	1	-	1	1	1	1	1

Contribution 1: Reasonable 2: Significant 3: Strong

Justification of the mapping:

CO1	To understand the limits set by the information theory, basic knowledge of probability is required (PO1) and can be analyzed with mathematical principles (PO2) which involves complex problems (PO3) and investigation of engineering problems (PO4). The coding can be effectively understood with the usage of modern tools (PO5) with ethics in work done (PO8) in the broadest context of technological change (PO12).
CO2	A good mathematical and engineering fundamental is required to understand the various waveform coding (PO1) and hence formulate problems on various types of coding systems (PO2). Perfect PCM systems are perceived by conducting experiments (PO4) and thereby develop solutions to cater to the societal needs (PO3). Usage of PCM systems simulation tools (PO5) with effective communincation (PO10) is needed to indulge in persistent learning (PO12).
CO3	Adequate ability to design and implement the base band transmission schemes (PO1). With the knowledge assimilated, problems related to base band transmission schemes are identified and analyzed (PO2). Design of base band transmission can be done by performing experiments (PO4) to cater to the societal needs (PO3). Usage of base band transmission schemes design tools (PO5) with good code of ethics (PO8) is essential to engage in long-term study (PO12).
CO4	Engineering and mathematical background is essential to assimilate the band pass transmission schemes (PO1). Issues on band pass transmission schemes are identified (PO2) to develop solutions for societal requirements (PO3) by conducting experiments (PO4). Band pass transmission schemes simulation tools are utilized to observe the transmission of signals (PO5) and gain a lasting experience (PO12) working as a team (PO9).
CO5	Competent analytical and engineering knowledge is needed to comprehend the spectral characteristics of band pass signaling schemes and noise performance.(PO1). Problems encountered during study of spectral characteristics of band pass signaling scheme noise performance (PO2) is analyzed with modern tools (PO5) and solutions are developed (PO3) through experimentation (PO4). Henceforth an overall interested is inculcated to work as an individual (PO9) with best project management ideas (PO11) and stay updated with the latest trends (PO12).
CO6	Error control coding schemes are required thorough understanding of Mathematics and the engineering concepts learnt (PO1) to formulate the selection of appropriate antennas (PO2). Conclusions derived through experiments (PO4) are utilized to design application-specific antennas (PO3) with the aid of specific antenna design tools (PO5) following ethics (PO8) with an high level of communication (PO10). An overall scope for updating the technological changes (PO12) is possible with effective project management (PO11).

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO	PSO1	PSO2	PSO3
CO1	3	1	2
CO2	3	1	2
CO3	3	1	2
CO4	3	1	2
CO5	3	1	1
CO6	3	1	2
EC8501	3	1	2

Justification of the mapping:

CO1	To understand the limits set by the information theory, good knowledge about the basics of channel capacity is required (PSO1 to solve problems in the channel (PSO3).
CO2	PCM systems can be designed and constructed with the basic concepts(PSO1) with an overview of the underlying signal processing (PSO2) for application in communication regime (PSO3).
CO3	An overall impact of circuits design on base band transmitter (PSO1) with limited signal processing concepts (PSO2) is identified to apply in real- time scenarios (PSO3).
CO4	An overall understanding of band pass transmission schemes (PSO1) for designing the special antennas and the underlying circuitry (PSO2) in the area of communication using ICT tools(PSO3).
CO5	Adequate understanding of spectral characteristics (PSO1) is required to study the noise performance (PSO2) for real-time scenarios (PSO3).
CO6	Competent analysis in the field of error control coding (PSO2) is required to evaluate the performance of communication systems (PSO1) to solve the existing problems(PSO3)

Course/Branch	:	EC8095		Total no. of hours given in syllabus:		
Subject Code	:	VLSI Design		Lecture	:	45
Subject Title	:	B.E./ECE / VI		Tutorials	:	-
Year/Semester	:	Dr.K.Rahimunnisa, Dr. D. Jessintha, Mr.B.Arivuselvam		Practical	:	-
Faculty Name	:	EC8095		TOTAL	:	45

COURSE OUTCOMES

EC8095.1: Students will be able to Realize the concepts of digital building blocks using MOS transistor
EC80952: Students will be able to Design combinational MOS circuits and power strategies
EC8095.3: Students will be able to Design and construct Sequential Circuits and Timing systems
EC8095.4: Students will be able to Design arithmetic building blocks and memory subsystems.
EC8095.5: Students will be able to Apply and implement FPGA design flow and testing
EC8095.6: Students will be able to model digital circuits using VLSI concepts .
.PROGRAM OUTCOMES:
PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of the complex engineering problems
PO2: Problem analysis: identify formulate, review research literature, and analyze complex engineering problems and reaching sustained conclusion using the principle of mathematics , natural sciences and engineering sciences
PO3: Design development of solutions: design the solutions for complex engineering problem and design system components or processes that meet the specified needs with appropriate considerations for the public health and safety and cultural and societal and environmental considerations
PO4: Conduct investigations of complex problem: Use research based knowledge and research method including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions

PO5: Modern tool usage: create, select and apply appropriate techniques, resources, modern engineering and IT tools including prediction and modeling to complex engineering activities with understanding of the limitations
PO6: Engineer and society: Apply reasoning informed by contextual knowledge, to assess societal health, safety, legal and cultural issues and consequent responsibility relevant to professional engineering practices.
PO7: Environment and sustainability: Understand the impact of professional engineering solution in societal and environmental context and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practices.
PO9: Individual and team work: Function effectively as an individual and as a member or leader in diversity and multi disciplinary settings.
PO10: Communications: communicate effectively on complex engineering activities with the engineering community and with society at large such as being able to comprehend and write effective reports and design documentations, make effective presentations and view and receive clear instructions.
PO11: Project Management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team to manage project and in multi disciplinary environments.
PO12: Lifelong learning: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES:

PSO1. To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.
PSO2. To apply design principles and best practices for developing quality products for scientific and business applications.
PSO3. To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM OBJECTIVES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC8095.1	3	2	3	1	2	2	-	-	-	-	2	1
EC8095.2	3	2	2	2	2	1	-	-	-	-	1	1
EC8095.3	3	2	3	2	1	1	-	-	-	-	1	1
EC8095.4	3	2	1	2	1	2	-	-	-	-	1	1
EC8095.5	2	1	1	1	1	2	-	-	-	-	2	2
EC8095.6	3	2	2	2	2	2	-	-	-	-	2	1
EC8095	3	2	3	2	2	2	-	-	-	-	2	2

EC8095.1	An in-depth knowledge of engineering is required to understand the basics of logic gates (PO1). Problems on number of buffers required and transition time can be formulated and analyzed with the fundamentals learnt (PO2). It inculcates the ability to develop solutions for integrated chip (PO3) through experimentation (PO4) and VLSI design tools (PO5). Vigor is instilled to constantly update with the recent trends (PO12).
EC8095.2	A good mathematical and engineering fundamental is required to define power and delay analysis (PO1) and hence formulate problems on system on chip (PO2). Combination circuits and sequential circuits are perceived by conducting experiments (PO4) and thereby develop solutions to cater to the needs (PO3). Usage of VLSI design tools (PO5) is needed to indulge in persistent learning (PO12).
EC8095.3	Adequate ability to illustrate the various types of adder and multipliers are acquired through competent comprehension of necessary mathematics and engineering concepts (PO1). With the knowledge assimilated, problems related to system on chip are identified and analyzed (PO2). Design of sub systems can be done by performing experiments (PO4) to cater to the needs (PO3). Usage of Application specific integrated circuit (PO5) is essential to engage in long-term study (PO12).
EC8095.4	An in-depth knowledge of hardware description language is required to to model the digital system (PO1). Problems on number of logic gates required can be formulated and

	programmed (PO2). It inculcates the ability to develop solutions for integrated chip (PO3) through experimentation (PO4) and VLSI design tools (PO5). Vigor is instilled to constantly update with the recent trends (PO12).
EC8095.5	A knowledge of various design flow procedure is required to to model implement the digital system (PO1). With the knowledge of problem analysis (PO2) develop solutions for integrated chip (PO3) through experimentation (PO4) and VLSI design tools (PO5).
EC8095.6	An adequate ability to design an VLSI circuits with the basic knowledge(PO1) of various design methodologies is required to model and implement the digital VLSI system (PO3). With the knowledge of problem analysis (PO2) and with new technologies(PO4) and with modern tools (PO5) various new innovative transistors can be found.

Justification of the mapping:

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO	PSO1	PSO2	PSO3
EC8095.1	3	2	1
EC8095.2	2	2	1
EC8095.3	3	3	1
EC8095.4	2	3	1
EC8095.5	3	2	1
EC8095.6	3	2	1
EC8095	3	2	1

Justification of the mapping:

EC8095.1	An abstract knowledge of signal (PSO2) and analysis of parameters is required for VLSI design (PSO1). An overall ability to develop logic gates comprising electronic circuits (PSO1) with novel techniques is imparted (PSO2).
EC8095.2	VLSI design parameters are to be identified and studied (PSO1) to design ICs (PSO1) with an overview of the underlying signal(PSO2) for application in communication regime (PSO1).
EC8095.3	An overall impact of electronic circuits design on aperture and array antennas (PSO1) with limited signal processing concepts (PSO2) is identified to apply in real- time scenarios (PSO3) through innovative techniques (PSO2).
EC8095.4	A hardware description language are used to simulate and synthesis the various analog and digital VLSI circuits(PSO1,PSO2)
EC8095.5	Various design procedures are applied to implement analog and digital circuits in FPGA (PSO3)
EC8095.6	An Innovative methodology to design an device for future applications using new challenging modern tools which should be useful for industry and society.(PSO1,PSO3)

Course/Branch	:	ECE		Total no. of hours given in syllabus:		
Subject Code	:	MG8591		Lecture	:	45
Subject Title	:	Principles of Management		Tutorials	:	-
Year/Semester	:	III/VI		Practical	:	-
Faculty Name	:	Mrs.Bindu AP/ECE Mrs.Madhavi AP/ECE Dr.Saranya AP/ECE		TOTAL	:	45

COURSE OUTCOMES (Cos)

1. The will be aware of management process, functions, factors leading to changes in management thought & strategies for globalization
2. The students will know the different types of plans, how to plan & various decision making techniques.
3. At the end of this unit the students will know about organizing –using the appropriate organization structure & factors influencing organization structures.
4. At the end of this unit the students can able to know about communicating effectively & the need for managing diversity.
5. The Students will know the techniques of control to improve the performance**.**

PROGRAMME OUTCOMES (POs):
On successful completion of the programme,

PO1. Ability to apply the business acumen gained in practice.
PO2. Ability to understand and solve managerial issues.
PO3. Ability to communicate and negotiate effectively, to achieve organizational and individual goals.
PO4. Ability to upgrade their professional and managerial skills in their workplace.
PO5. Ability to explore and reflect about managerial challenges, develop informed managerial decisions in a dynamically unstable environment.
PO6. Ability to take up challenging assignments.
PO7. Ability to understand one's own ability to set achievable targets and complete them.
PO8. Ability to pursue lifelong learning.
PO9. To have a fulfilling business career.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
MG8591.1	1	1	1	2	1	3	3	3	3
MG8591.2	1	1	1	2	1	3	3	3	3
MG8591.3	1	1	1	2	1	3	3	3	3
MG8591.4	1	1	1	2	1	3	3	3	3
MG8591.5	1	1	1	2	1	**3**	**3**	**3**	**3**
MG8591.6	1	1	1	2	1	**3**	**3**	**3**	**3**

Justification of the mapping:

MG8591.1	The students can understand the basic management concepts that help them to gain knowledge in the field of business organization. The new techniques adopted by the business organization need to be learned by students to update them in the field of business.
MG8591.2	Students will have the ability to plan and analyze complex problems, but in reality the students unable to take decisions considering external factors. Students will have the ability to engage in independent and life-long learning in the broadest context of technological change.
MG8591.3	The students will understand the structure of an organization and analyze complex engineering problems; students gain knowledge on the functions of Human Resource management, they can communicate and run the business effectively.
MG8591.4	The students will have the ability to understand various communication methods available. The students should use the proper method of communication during the time of challenges in business.
MG8591.5	The students gain knowledge about control process and types that meet the specified needs with appropriate management consideration to reach the goals and objectives of the organization.

PROGRAM SPECIFIC OUTCOMES:

PSO1: Students will possess the ability to apply management techniques for rational decision making and innovative thinking.
PSO2: Students will be competent professionals in their area of specialization.
PSO3: Students will obtain expected business intricacies and become socially responsible citizens.

***MAPPING WITH COURSE OUTCOME (CO) WITH PROGRAMME OBJECTIVE (PO).**

CO PSO	PSO1	PSO2	PSO3
MG8591.1	1	2	3
MG8591.2	1	2	3
MG8591.3	1	2	3
MG8591.4	1	2	3
MG8591.5	1	2	3
MG8591.6	1	2	3

Justification of mapping with Program specific Outcome (PSO)

PSO.1	The students will get only a part of management knowledge in the subject and it covers the basic functions in the management.
PSO.2	The basic idea of planning and decision making was given importance rather than analyses of business situations.
PSO.3	The various functions and activities of the management were discussed to students. Some of the topics need to be taught related to management.
PSO.4	The topic gives more idea about communication and culture followed in various management. The students need to learn the culture in the international perspective.
PSO.5	The unit covers the over control system followed in the management and some technical assessment to be taught to make them clear and evaluate the best practices.

Course/Branch	:	**B.E. / ECE**		**Total no. of hours given in syllabus:**		
Subject Code	:	EC8073		Lecture	:	45
Subject Title	:	Medical Electronics		Tutorials	:	-
Year/Semester	:	III / V		Practical	:	-
Faculty Name	:	Ms. Bindu Babu/ Ms. T. Gophika		**Total**	:	**45**

COURSE OUTCOMES:

Students must be able to
EC8073.1: Know the human body electro- physiological parameters and recording of bio-potentials
EC8073.2: Comprehend the non-electrical physiological parameters and their measurement – body temperature, blood pressure, pulse, blood cell count, blood flow meter etc.
EC8073.3: Interpret the various assist devices used in the hospitals viz. pacemakers, defibrillators, dialyzers and ventilators
EC8073.4: Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgical diathermies , and bio-telemetry principles and methods
EC8073.5: Know about recent trends in medical instrumentation

PROGRAM OUTCOMES:

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

1. To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.
2. To apply design principles and best practices for developing quality products for scientific and business applications.
3. To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM OBJECTIVES:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
EC 8073.1	3	3	3	3	2	3	3	-	-	3	2	3	3	3	3
EC 8073.2	3	3	3	3	1	3	3	-	-	3	2	3	3	3	3
EC 8073.3	2	3	3	3	1	2	2	-	-	3	2	3	3	3	3
EC 8073.4	3	3	3	3	1	3	3	-	-	3	2	3	3	3	3
EC 8073.5	3	3	2	3	1	3	3	-	-	3	2	3	3	3	3
EC 8073	3	3	3	3	2	3	3	-	-	3	2	3	3	3	3

Justification of the mapping:

EC8073.1	Electro Physiology and bio potential recording requires strong knowledge of Mathematics and Science(PO1), problem analysis of ECG,EEG,EMG(PO2)(PSO3), solutions based design(PO3)(PSO1), interpretation of data at various conditions(PO4), moderate usage of IT tools(PO5)(PSO2), strong contribution towards society(PO6), sustainable design(PO7),strongly maintaining the patient history(P010) which moderate improves finance of project(PO11), implies strong life- long learning (PO12).
EC8073.2	Non electrical parameter measurement requires strong knowledge of Mathematics and Science(PO1) (PSO1), problem analysis of biochemical measurement(PO2)(PSO3), design methodologies (PO3) (PSO2) , interpretation of data at various patient conditions(PO4), week usage of IT tools(PO5), strong contribution towards society(PO6), sustainable design(PO7),maintain blood pressure and blood cell counter reports (PO10),strongly requires life- long updation in non electrical parameter measurement(12).
EC8073.3	Various assist devices need moderate knowledge of Mathematics and Science(PO1),fundamental concept can be used to design modern devices(PSO1), good identification of parameters (PO2), well designed instruments (PO3)(PSO2), analysis of data at various patient conditions(PO4), week usage of IT tools(PO5), strong towards society(P06), moderate contribution to sustainable design(PO7)strong individual and team work in assist devices(P09), Strongly maintain patient history(P010), moderate quality of instruments decides finance of project(PO11),creative method requires life-long learning (PO12)(PSO3).
EC8073.4	Physical medicine and biotelemetry need strong knowledge of Mathematics and

	Science(PO1)(PSO1), good identification of physiological parameters (PO2), well designed instruments (PO3)(PSO2), analysis of data at various patient conditions(PO4), usage of IT tools(PO5), strong contribution towards society(P06), sustainable development(PO7), strongly maintain records of patient(P010),quality of instruments decides finance of project(PO11), biotelemetry requires life- long learning (PO12)(PSO3).
EC8073.5	Recent trends in medical instruments need knowledge of Mathematics and Science(PO1)(PSO1), good identification of problems (PO2), moderate design of instruments(PO3)(PSO2), analysis of data at various physiological measurements(PO4), strong usage of IT tools(PO5), strong contribution towards society(P06),sustainable design(PO7), maintaining patient records (PO10), moderately decides finance of project(PO11), telemedicine technology requires life- long learning (PO12)(PSO3).

Course/Branch	:	B.E. / ECE		Total no. of hours given in syllabus:		
Subject Code	:	EC8652		Lecture	:	45
Subject Title	:	Wireless Communication		Tutorials	:	-
Year/Semester	:	III / VI		Practical	:	-
Faculty Name	:	Mrs. S. Uma Maheswari Mrs. S. Caroline Jebakumari Mrs. P. Bini Palas		**Total**	:	**45**

COURSE OUTCOMES:

Students must be able to

EC8652.1: Characterize a wireless channel and evolve the system design specifications
EC8652.2: Design a cellular system based on resource availability and traffic demands EC8652.3: Implement various signaling schemes for fading channels.
EC8652.4: Identify suitable signaling and multipath mitigation techniques for the wireless channel
EC8652.5: Design and implement systems with transmit / receive diversity.
EC8652.6: Analyze the performance of MIMO systems.

PROGRAM OUTCOMES:

PO1: Engineering Knowledge
PO2: Problem Analysis
PO3: Design/Development of Solutions
PO4: Conduct investigations of complex problems
PO5: Modern Tool Usage
PO6: The Engineer and Society
PO7: Environment and Sustainability
PO8: Ethics
PO9: Individual and Team Work
PO10: Communication
PO11: Project Management and Finance
PO12: Life Long Learning

PROGRAM SPECIFIC OUTCOMES:

PSO1. To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.
PSO2. To apply design principles and best practices for developing quality products for scientific and business applications.

PSO3. To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

Mapping of Course Outcomes with the Program Objectives:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
EC8652.1	3	3	3	3	2	1	1	1	-	-	-	-
EC8652.2	3	3	3	3	2	1	1	1	-	1	-	2
EC8652.3	3	3	3	3	2	-	-	-	-	-	-	2
EC8652.4	3	3	3	3	-	-	-	1	-	-	-	-
EC8652.5	3	3	3	3	-	-	1	1	-	1	-	2
EC8652.6	3	3	3	3	2	1	1	1	-	-	-	2
EC8652	3	3	3	3	2	1	1	1	-	1	-	2

Justification of the mapping:

EC8652.1	Analyzing and characterizing the wireless channels require more engineering knowledge (PO1). Analyzing the problem of fading and link budget design need good problem analysis skill (PO2). Knowledge of the path loss models is helpful for the development of solutions (PO3). Learning the mode of propagation conducts investigation of complex problems (PO4). Analyzing the networks require modern tool usage (PO5). Fading effects are analyzed with an eye on the contribution to the society (PO6) considering the level of sustainability (PO7) following the code of ethics (PO8).
EC8652.2	Designing the cellular system requires good engineering knowledge (PO1). Analysis of the architecture good problem analysis skill (PO2). Knowledge of the multiple access schemes is helpful for design/development of solutions (PO3). Trunking and Grade of Service involve complex problems (PO4). Analyzing the capacity of each cell requires modern tool usage (PO5). Channel planning should be done to satisfy the needs of the society (PO6) and friendly to the environment (PO7) in an ethical (PO8) manner. Design and display of the architecture involves communication (PO10) between service provider and end user. Methods deployed for increasing the capacity needs lifelong learning (PO12).
EC8652.3	Implementation of signaling schemes require good engineering knowledge. (PO1), Analysis of signal parameters need good problem analysis skill (PO2), and more concentration on BER measurements provide good design/development solutions (PO3). Working on probability of error relates to complex problems (PO4). Modern tool usage (PO5) is required to trace the performance of the system. Lifelong learning (PO12) is needed to cope up with the emerging trends in digital techniques that are being adopted.
EC8652.4	Implementation of diversity techniques needs basic engineering knowledge (PO1). Analysis of the related parameters needs good problem analysis skill (PO2). More concentration on the design (PO3) of environment to suit the choice of diversity technique is expected. Want for investigation of complex problems is seen (PO4). The mitigation technique is chosen ethically (PO8).
EC8652.5	Designing the system with consideration on diversity requires good engineering knowledge (PO1). Good problem analysis skill needed (PO2), and an eye on probability of error provides good development solutions (PO3). More want for solving complex problems (PO4), is required. The adopted technique is to be monitored in regard with environment (PO7) and worked on ethically (PO8). Communication (PO10) on the level of problem analysis and choice of diversity is required. There is a reasonable need for continuous learning (PO12).
EC8652.6	Good engineering knowledge is needed to have a study on the multiple antenna systems (PO1). Analysis of parameters involved in design of the system needs good problem analysis skill (PO2). Choosing the diversity technique provides good design solutions (PO3). Complex problems are to be solved in identifying the right diversity technique (PO4). Need for modern tool usage, makes learning easier (PO5). Adoption of MIMO satisfies the needs of the society (PO6) and should be friendly to the environment (PO7) in an ethical (PO8) manner. Getting updated with new trends in MIMO makes learning, better (PO12).

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO	PSO1	PSO2	PSO3	PSO4
EC8652.1	-	3	3	2
EC8652.2	1	3	3	2
EC8652.3	1	3	3	2
EC8652.4	-	3	3	2
EC8652.5	-	3	3	-
EC8652.6	1	3	3	2
EC8652	1	3	3	2

Justification of the mapping:

EC8652.1	Signal processing blocks are carefully catered to design and characterize the wireless channels (PSO2). Application of the developed system to meet the real time need (PSO3) requires professional skill to be made useful to the society.
EC8652.2	Basic cellular system design requires the knowledge on the basics of electronics (PSO1), to build the different blocks of the proposed architecture (PSO2) and analyze the specific multiple access technique to be deployed (PSO3) in order to suit the societal needs (PSO4)
EC8652.3	Setting up of the digital communication link demands the needs for knowledge on electronics (PSO1). Functional blocks of the transceiver system has to be analyzed (PSO2), to analyze the different parameters in a highly networked environment (PSO3). There is a need for utilizing the specific signaling method for better development to meet the societal needs
EC8652.4	Working of functional blocks is examined (PSO2) to choose the best multipath mitigation methodology to satisfy the real time needs (PSO3).
EC8652.5	Working and coordination of different blocks of transceiver is analyzed to suit the emerging trend (PSO2) and the digital technology advancements in networking (PSO3) are adopted.
EC8652.6	Designing the multiple antenna system requires the basics of electronics (PSO1) in developing the various communication blocks (PSO2) and networking (PSO3).

Course/Branch	:	B.E. / ECE		Total no. of hours given in syllabus:		
Subject Code	:	EC8094		Lecture	:	45
Subject Title	:	Satellite Communication		Tutorials	:	-
Year/Semester	:	IV / VII		Practical	:	-
Faculty Name	:	Dr. Resmi R Nair Mrs. P. Bini Palas Mrs. Bindu Babu		Total	:	45

COURSE OUTCOMES:

Students must be able to
EC8094.1: Explain the concept of satellite systems in relation to other terrestrial systems. EC8094.2: Analyze the satellite orbits and launching methodologies.
EC8094.3: Analyze the space segment components.
EC8094.4: Identify and work on the satellite access by various users. EC8094.5: Understand the need for DTH and compression standards.
EC8094.6: Associate the different applications with the related satellite parameters.

PROGRAM OUTCOMES:
PO1: Engineering Knowledge PO2: Problem Analysis
PO3: Design/Development of Solutions
PO4: Conduct investigations of complex problems PO5: Modern Tool Usage
PO6: The Engineer and Society
PO7: Environment and Sustainability PO8: Ethics
PO9: Individual and Team Work PO10: Communication
PO11: Project Management and Finance PO12: Life Long Learning

PROGRAM SPECIFIC OUTCOMES:

PSO1: To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.
PSO2: To apply design principles and best practices for developing quality products for scientific and business applications.
PSO3: To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM OBJECTIVES:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
EC8094.1	3	3	3	3	1	-	-	-	-	1	-	1
EC8094.2	3	3	3	3	2	-	-	-	-	-	-	1
EC8094.3	3	3	3	3	2	-	1	1	-	-	-	1
EC8094.4	3	3	3	3	2	2	1	1	-	-	-	1
EC8094.5	3	3	2	3	1	2	-	-	-	-	-	1
EC8094.6	3	3	3	3	1	3	1	1	-	1	-	1
EC8094	3	3	3	3	2	3	1	1	-	1	-	1

Justification of the mapping:

EC8094.1	In-depth knowledge of mathematics and engineering is required to understand the basics of satellite systems (PO1). Problems on satellite system design can be formulated and analyzed with the fundamentals. (PO2). It builds the ability to develop satellite systems (PO3) through experimentation (PO4) and system design tools (PO5). Effective communication on complex engineering activities is needed to understand about the satellite systems (PO10) Constant updation with the recent trends is provided (PO12).
EC8094.2	A good mathematical and engineering fundamental is required to define the orbital parameters (PO1) and hence formulate problems on satellite launch methodologies (PO2). Design of solutions for satellite launch needs engineering concepts of orbits to be dealt with (PO3). Satellite launch is perceived by conducting experiments (PO4). Usage of satellite launch procedure design tools (PO5) to indulge in persistent learning (PO12).
EC8094.3	Adequate ability to illustrate the various earth segment and space segment components is acquired through applying the necessary mathematics and engineering concepts (PO1). With the knowledge assimilated, problems related to the different segments are identified and analyzed (PO2). Design of the subsystems can be done by performing experiments (PO4) to cater the societal needs (PO3). Usage of subsystem design tools (PO5) is essential to provide a professional solution (PO7) in an ethical manner to satisfy the needs (PO8) and make the updates through constant learning (PO12).
EC8094.4	Engineering and mathematical background is essential to the types of satellite access (PO1). Issues on the access methods to be followed are identified (PO2) to develop solutions for the varying applications (PO3) by conducting test experiments (PO4). Developing models and utilization of simulation tools are needed to observe the access methods in particular for a system (PO5). Considering the society (PO6) the impact on the solution provided (PO7) should be dealt with, ethically (PO8) to gain a long lasting experience (PO12).

EC8094.5	Competent analytical and engineering knowledge is needed to know about the compression standards (PO1). Problems encountered during propagation are identified and analyzed (PO2). The societal needs are to be met with a keen eye on environmental considerations (PO3). Interpretation of data and synthesis of the collected information is done (PO4) with modern tools (PO5). Working with an eye on the society (PO6), interested on the developing standards and a thirst to stay updated with the latest trends is sown (PO12).
EC8094.6	Application for which the satellite is positioned in space is made thorough with the understanding of mathematics and the engineering concepts learnt (PO1) to formulate and deal with the appropriate need (PO2). The specific application dealt with should cater the needs of the society (PO3). Simulation of the formulated system (PO5) must be related to the specified to the documented need of the society (PO6), environment (PO7) and the application should meet an ethical cause (PO8). Communication on the effected engineering activities and effective reports on design documentation makes the application more specific (PO10). An overall scope for updating the technological changes (PO12) is possible.

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO	PSO1	PSO2	PSO3
EC8094.1	1	-	3
EC8094.2	3	3	3
EC8094.3	3	3	3
EC8094.4	3	3	3
EC8094.5	3	3	3
EC8094.6	3	3	3
EC8094	3	3	3

Justification of the mapping:

EC8094.1	Good understanding of the basic concepts (PSO1) and adapt emerging information (PSO3).
EC8094.2	Applying foundational concepts of electronics and communication engineering (PSO1) in launching with best practices (PSO2) and providing innovative solutions (PSO3).
EC8094.3	Analyze the design of space segment (PSO1) and developing best quality equipments (PSO2) to provide novel solutions (PSO3).
EC8094.4	Develop solutions (PSO1) for developing quality products in satellite access (PSO2) for scientific innovate ideas (PSO3).
EC8094.5	Understanding the concepts of communication involved in satellite access (PSO1) for applications (PSO2) thereby providing the best solution (PSO3).
EC8094.6	Mastering the analysis, in the field of communication (PSO1) is required to evaluate the performance of the designed system (PSO3) to withstand the different business applications (PSO2).

Subject Code	:	CS8792		Total no. of hours given in syllabus		
Title	:	Cryptography and Network Security		Lecture	:	45
Course/Branch	:	B.E/ECE		Practical	:	0
Year/Semester	:	III/VI		Tutorial	:	0
Academic Year	:	2020-2021(EVEN)		TOTAL	:	45
Faculty Name	:	K. Abirami				

COURSE OUTCOMES:

Students will be able to

CS8792.1	Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
CS8792.2	Apply the different cryptographic operations of symmetric cryptographic algorithms
CS8792.3	Apply the different cryptographic operations of public key cryptography
CS8792.4	Apply the various Authentication schemes to simulate different applications.
CS8792.5	Understand various Security practices and System security standards

PROGRAM OUTCOMES (POs)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in

independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES:

PSO1: To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.

PSO2: To apply design principles and best practices for developing quality products for scientific and business applications.

PSO3: To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM OUTCOME:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8792.1	3	3	3	2	2	-	1	-	-	1	2	1
CS8792.2	3	3	3	2	2	-	1	-	1	1	2	2
CS8792.3	3	3	3	2	2	1	1	2	2	1	3	3
CS8792.4	3	3	3	3	3	1	1	2	3	3	3	3
CS8792.5	3	3	3	3	3	1	2	2	3	3	3	3
CS8792	3	3	3	3	3	1	1	2	3	3	3	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO	PSO1	PSO2	PSO3
CS8792.1	3	3	3
CS8792.2	1	2	3
CS8792.3	1	3	3
CS8792.4	1	2	3
CS8792.5	2	3	3
CS8792	1	3	3

Justification of the mapping:

CS8792.1	By having the knowledge about the OSI security architecture and classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory,students can develop Engineering knowledge(PO1),analyse the problem(P02),(PS01) design and implement various cryptographic techniques(P03). Demonstrate knowledge and understanding of the engineering(P011)
CS8792.2	By understanding various block cipher and stream cipher models and describing the principles of public key cryptosystems,hash functions and digital signature, students can apply the knowledge of mathematics, science and engineering fundamentals (P01),able to analyze a problem, identify and define the computing requirements appropriate to its solution(P02),(PS01), able to design, implement and evaluate a computer-based system, process,component, or program to meet desired needs (PO3) and manage projects in multidisciplinary environments (P011) .
CS8792.3	By studying about different authentication services and system security and study about Application layer,Transport layer and Network layer security,students can apply the knowledge of mathematics, science and engineering fundamentals (P01),able to analyze a problem, identify and define the computing requirements appropriate to its solution(P02),(PS01), able to design, implement and evaluate a computer-based system, process,component (P03),(PS02), demonstrate knowledge and understanding of the engineering(P011) ,ability to engage in independent and life-long learning(P012), able to analyze the impact of computing on individuals, organizations, and society(PS03),use current techniques, skills, and tools necessary for industrial needs.

CS8792.4	By Comparing various Cryptographic Techniques students can apply the knowledge of mathematics, science and engineering fundamentals (P01),able to analyze a problem, identify and define the computing requirements appropriate to its solution(P02),(PS01), able to design, implement and evaluate a computer-based system, process,component (P03),(PS02), Able to use the techniques, skills, and modern engineering tools(P05) , Function effectively as an individual, and as a member in multi-disciplinary settings (P09), Communicate effectively with the engineering community (P010), demonstrate knowledge and understanding of the engineering(P011) ,ability to engage in independent and life-long learning(P012), able to analyze the impact of computing on individuals, organizations, and society(PS03),use current techniques, skills, and tools necessary for industrial needs.
CS8792.5	By designing Secure applications,students can apply the knowledge of mathematics, science and engineering fundamentals (P01),able to analyze a problem, identify and define the computing requirements appropriate to its solution(P02),(PS01), able to design, implement and evaluate a omputer-based system, process,component (P03),(PS02), Able to use the techniques, skills, and modern engineering tools(P05) , Function effectively as an individual, and as a member in multi-disciplinary settings (P09), Communicate effectively with the engineering community (P010), demonstrate knowledge and understanding of the engineering(P011) ,ability to engage in independent and life-long learning(P012), able to analyze the impact of computing on individuals, organizations, and society(PS03),use current techniques, skills, and tools necessary for industrial needs.

Course/Branch	:	B.E./ECE		Total no. of hours given in syllabus:		
Subject Code	:	EC8701		Lecture	:	45
Subject Title	:	Antennas and MicrowaveEngineering		Tutorials	:	Nil
Year/Semester	:	IV/VII		Practical	:	Nil
Faculty Name	:	Mrs.S.Uma Maheswari& Mrs.P.Bini Palas		TOTAL	:	45

Course Outcomes:

Students must be able to

CO1:Explain the fundamentals of antennas and wave propagation.
CO2:Write about the radiation of Microstripand Reflector antennas.
CO3:Analyze the importance of frequency independent antennas.
CO4:Analyze various antenna arrays and smart antennas.
CO5:Understand the concept of active and passive microwave devices.
CO6:Design of microwave amplifier, filter and mixers.

Program Outcomes:

PO1:Engineering Knowledge
PO2:Problem Analysis
PO3: Design/Development of Solutions
PO4: Conduct investigations of complex problems
PO5: Modern Tool Usage
PO6: The Engineer and Society
PO7: Environment and Sustainability
PO8:Ethics
PO9: Individual and Team Work
PO10: Communication
PO11: Project Management and Finance
PO12: Life Long Learning

PROGRAM SPECIFIC OUTCOMES:

PSO1:Design and construct Electronic circuits and to Simulate the circuits with software tools which lead to the development of Electronic gadgets.
PSO2:Design and analyze various signal processing blocks for Image and Signal

processing systems

PSO3: Analyze various Networking and Communication areas and its impact in real time applications

PSO4: Implement their professional skills and techniques in the integrated circuit design which are applicable to industrial and societal needs.

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM OBJECTIVES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1	-	-	-	-	-	-	1
CO2	3	3	2	2	1	1	1	1	-	-	1	1
CO3	3	3	2	2	1	1	1	1	-	-	1	1
CO4	3	2	2	2	1	-	-	1	-	-	-	1
CO5	3	2	1	1	1	-	-	1	-	-	-	1
CO6	3	3	2	2	2	-	-	-	-	-	-	1
EC6602	3	3	2	2	2	1	1	1	-	-	1	1

Justification of the mapping:

CO1	An in-depth knowledge of mathematics and engineering is required to understand the basics of antenna and wave propagation (PO1). Problems on antenna design can be formulated and analyzed with the fundamentals learnt (PO2). It inculcates the ability to develop solutions for antennas (PO3) through experimentation (PO4) and antenna design tools (PO5). Vigor is instilled to constantly update with the recent trends (PO12).
CO2	A good mathematical and engineering fundamental is required to define radiation from antenna (PO1) and hence formulate problems on antenna radiation (PO2). Antenna radiations are perceived by conducting experiments (PO4) and thereby develop solutions to cater to the societal needs (PO3). Usage of antenna elements design tools (PO5) is needed to indulge in persistent learning (PO12).
CO3	Adequate ability to illustrate the various types of aperture and array antennas is acquired through competent comprehension of necessary mathematics andengineering concepts (PO1). With the knowledge assimilated, problems related to aperture and array antennas are identified and analyzed (PO2). Design of aperture and array antennas can be done by performing experiments (PO4) to cater to the societal needs (PO3). Usage of antenna design tools (PO5) is essential to engage in long-term study (PO12).
CO4	Engineering and mathematical background is essential to assimilate the types of special antennas (PO1). Issues on special antennas are identified (PO2) todevelop solutions for societal requirements (PO3) by conducting experiments(PO4). Antenna simulation tools are utilized to observe the radiation pattern of special antennas (PO5) and gain a lasting experience (PO12).
CO5	Competent analytical and engineering knowledge is needed to comprehend microwave communication (PO1). Problems encountered in the study of active and passive microwave devices in the literature (PO2) is analyzed with modern tools (PO5) and solutions are developed (PO3) through experimentation (PO4). Henceforth an overall interested is inculcated to stay updated with the latest trends (PO12).
CO6	Specific microwave filter, amplifier and mixer design requires thorough understanding ofmathematics and the engineering concepts learnt (PO1) to formulate the selection of appropriate filter and amplifier (PO2). Conclusions derived through experiments (PO4) are utilized to design perfect amplifier, filter and mixer(PO3) with the aid of advanced design tools (PO5). An overall scope for updating the technological changes (PO12) is possible.

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	1
CO2	1	1	2	1
CO3	1	1	2	1
CO4	1	1	2	1

CO5	-	1	1	1
CO6	1	2	3	1
EC6602	1	2	3	1

Justification of the mapping:

CO1	An abstract knowledge of signal processing (PSO2) and analysis of parameters is required for antenna design (PSO3). An overall ability to develop antennas comprising electronic circuits (PSO1) with novel techniques is imparted (PSO4).
CO2	Antenna parameters are to be identified and studied (PSO4) to design feed antennas (PSO1) with an overview of the underlying signal processing (PSO2) for application in communication regime (PSO3).
CO3	An overall impact of electronic circuits design on aperture and array antennas (PSO1) with limited signal processing concepts (PSO2) is identified to apply in real- time scenarios (PSO3) through innovative techniques (PSO4).
CO4	An overall understanding of signal processing concepts (PSO2) for designing the special antennas and the underlying circuitry (PSO1) as per the industry demands (PSO4) in the area of communication (PSO3).
CO5	Adequate signal understanding (PSO2) is required to cater to the industrial needs (PSO4) for real-time scenarios (PSO3).
CO6	Competent analysis in the field of communication (PSO3) is required to evaluate the performance of signal processing on specific microwave devices(PSO2). Basic design of electronic circuits is needed for designing amplifier, filters and mixers (PSO1) as demanded by the industries (PSO4).