Design Lab- II

Programme: B.Tech. (ECE) Year: 3rd Semester: EVEN
Course: Credits: Hours:

Course Context and Overview (100 words): This course helps to simulate and evaluate Bit error rate performance of various modulation schemes over wired/wireless systems. Course covers simulation of various wireless systems using C++ based S-function. It also helps to understand industrial implementation of communication system using System On Chip (SOC) based or DSP processor based implementation.

Prerequisites Courses: Matlab, C, C++, Digital Signal processing, Digital communication, Probability theory.

Course outcomes (COs):

On completion of this course, the students will have the ability to:
CO1 **Evaluate** BER performance of Wired system.
C02 **Explain and analyse** Wired and Wireless Bit error rate performance.
C03 **Simulate** M-QAM performance over Wired/Wireless channel using single/Multiple antenna system.
C04 **Simulate** C++ based communication system and S-function based Simulink model.
C05 **Realize** Hardware using SOC (System On Chip) in ZED-Board/ZYBO Boards.

Course Topics:

Topics	Lecture Hours	
UNIT – I **1. BER performance evaluation over wired channel.**		
1.1 Evaluation of BER performance of BPSK modulation in AWGN environment.	1	3
1.2 Evaluation of BER performance of M-QAM modulation in AWGN environment.	1	
1.3 Simulink model based wired system evaluation.	1	
UNIT – II **2. BER performance evaluation over wireless channel.**		3
2.1 Evaluation of BER performance of BPSK modulation in Rayleigh environment.	1	

2.2 Evaluation of BER performance of M-QAM modulation over Rayleigh channel.	1	
2.3 Simulink model based wireless system evaluation.	1	
UNIT – III **3. BER performance evaluation over wireless channel for multiple receiving antenna system.**		3
3.1 Evaluation of BER performance of BPSK modulation using MRC receiver.	1	
3.2 Evaluation of BER performance of M-QAM modulation using MRC receiver.	1	
3.3 Simulink model based wireless system evaluation.	1	
UNIT – IV **4. C++ based M-QAM modulation and Demodulation over wired/wireless channel.**		3
4.1 C++ based QPSK demodulation over Wired/Wireless channel.	1.5	
4.2 C++ based QAM modulation-demodulation over Wired/Wireless channel.	1.5	
UNIT – V **5. Gaussian noise generation and end to end S-function (C++) based Simulation for M-QAM.**		3
5.1 C++ based Gaussian noise generation.	1	
5.2 S-function based end to end simulation of wired/wireless system.	1	
5.3 S-function based end to end system BER performance evaluation.	1	
UNIT – VI **6. SOC (System on Chip) based Hardware realization of QPSK/M-QAM Transmitter Receiver for Multimedia applications.**		3
6.1 Bit stream generation from given multimedia file.	1	
6.2 Understanding SOC(System on Chip) based signal transmission reception.	1	
6.3 Implementing Multimedia transmission over ZED-Board SOC.	1	
UNIT – VI **7. Project: Simulation(s-function) based /SOC based Hardware implementation/ FPGA based Hardware implementation of communication blocks/ protocols /systems.**	12	12

Software : Matlab, C, C++, VHDL

Additional Resources (NPTEL, MIT Video Lectures, Web resources etc.):

Evaluation Methods:

Item	Weightage
In Lab evaluation	40
Project	15
Midterm	15
Final Examination	30

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