**Annexure-A**

M.E(ElectronicSystemEngineering)

Effectivefrom22Batch

SemesterBasedTentativeCourses

|  |  |  |
| --- | --- | --- |
| **Code** | **1stSemester** | **Credit Hours** |
| ESE-601 | ElectronicInstrumentationandDataAcquisitionSystem | 3+0 |
| ESE-611 | ModelingandControlofDynamicSystems | 3+0 |
| ESE-621 | AdvancedIntegratedCircuitdesign | 3+0 |
| ESE-631 | AdvancedEmbeddedSystemDesign | 3+0 |
|  | **Total** | **12** |

|  |  |  |
| --- | --- | --- |
| **Code** | **2ndSemester** | **Credit Hours** |
| ESE-641 | PowerElectronicsand Drives | 3+0 |
| ESE-651 | Microelectronics | 3+0 |
| ESE-661 | CommunicationSystemsandTechnologies | 3+0 |
| ESE-671 | Advanced DigitalSystemDesign | 3+0 |
|  | **Total** | **12** |

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| **Code** | **3rdSemester** | **Credit Hours** |
| ESE-701 | ModernTrendsinElectronicSystemsDesign | 3+0 |
| ESE-711 | ICDesignandManufacturing Techniques | 3+0 |
| ESE-721 | Thesis | 6 |
|  | **Total** | **12** |

# MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORODEPARTMENTOF ELECTRONIC ENGINEERING

**INSTITUTEOFINFORMATIONANDCOMMUNICATIONTECHNOLOGIES**

TitleofCourse : Electronic Instrumentation and Data Acquisition SystemCourse Code :ESE-601

Disciplines :M.E.ElectronicSystemEngineering

Semester :First

Effective :22ndBatchandonwards

Assessment : Sessional Work: 10% Mid Semester: 30% Final Semester: 60%CreditHours :3+0

MinimumContact Hours 42

Marks: : Theory: 100 Practical:00

Thiscourseprovidesstudentstheopportunityforhands-onapplication-oriented knowledge about sensors and transducers, dataacquisitionsystems,measurementandcontrolofelectronicinstrumentationdevicesandvirtualinstrumentation.

**AimsandObjectives:**

**DataAcquisitionSystem:**Characteristicsofsignals,SignalConditioning,basicsofdataacquisition (DAQ), Hardware and software configuration of DAQ devices, Measurement andinstrumentationsystem,Staticanddynamicperformancecharacteristicsofinstruments,Instrumentationprocessand control.

**Sensors andTransducers:** Worldof sensors, Primary andSecondary sensors, TransducersCharacteristics,principlesandclassification,TemperatureTransducers(Thermocouple,Thermistor, RTD,); Pressure sensors measurement units and scales, Industrial applications ofpressuresensors,Passiveandactivepressuretransducers,Pressuretransmitters.

**Virtual Instrumentation:** Basics of virtual instrumentations, Virtual instrument v/s traditionalinstrument, Role of hardware and software in virtual instrumentation, Virtual instrumentation fortest, industrial I/Os, control and design, basics of LabVIEW, Graphical system design usingLabVIEW,ModularprogramminginLabVIEW.

# RecommendedBooks:

1. AlanS.Morris,“PrinciplesofMeasurement Instrumentation”,2ndEdition,PrenticeHallofIndia,ISBN-81-203-1462-X,latestedition.
2. CurtisD.Johnson,“ProcessControl&InstrumentationTechnology”,PrenticeHallofIndia,ISBN81-203-2104-9,latestEdition
3. JamesR.Carstens,P.E.,”ElectricalSensorsandTransducers”,PrenticeHall,EnglewoodCliffs,ISBN0-13-249632-1, latestedition.
4. JovithaJerome,“VirtualinstrumentationusingLabVIEW,PHIlearningprivatelimited,latestedition.

Approval: Board ofStudies Res.No.45.2Dated:24.12.2020

AdvanceStudies&ResearchBoard Res.No.172.27(a) Dated: 06.04.2021AcademicCouncil Res.No.100.12(i) Dated:24.08.2021

# MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORODEPARTMENTOF ELECTRONIC ENGINEERING

**INSTITUTEOFINFORMATIONANDCOMMUNICATIONTECHNOLOGIES**

TitleofCourse : ModelingandControl ofDynamicSystemsCourse Code :ESE-611

Disciplines :M.E.ElectronicSystemsEngineering(ESE)

Semester :First

Effective :22ndBatchand onwards

Assessment : Sessional Work: 10% Mid Semester: 30% Final Semester: 60%CreditHours :3+0

MinimumContact Hours 42

Marks: : Theory: 100 Practical:00

This course aims to enable the students to have in-depth knowledgeaboutthe Modeling andSimulationofdynamicsystems.

Amajorfocusisonmathematicalmodelingofmechanicalandelectricalsystems,modelidentification,anditssimulationwhichistheinexpensivenumericalmethodandsafewaytoexperimentonsystems.

**AimsandObjectives:**

# Contents:

Introductionto ModelingandSimulation,ClassificationofDynamicSystems,BlockDiagramsforDynamicSystems,ModelsforSystems:Input-outputmodels;State-spacemodels;StandardInputFunctions, Mathematical modeling of Electrical systems, Mathematical modeling of Mechanicalsystems,MathematicalmodelingofElectromechanicalsystems,LinearizationofNonlinearSystems,Systemdynamicresponseanalysis:FrequencyResponse;TimeResponse,

Analytical Solution of Linear Dynamic Systems, Analytical Solutions toLinear DifferentialEquations:First-OrderSystemResponse;SecondOrderandhigher-orderSystemResponse;State-SpaceRepresentation andEigenvalues,Model Identification:Transientresponse estimation;Parameterestimation;LeastSquaresMethod,ModelValidation,NumericalSimulationofDynamic Systems, Simulation Tools, System Response Using MATLAB Commands, BuildingSimulations using Simulink, Simulating Linear Systems using Simulink, Simulating NonlinearSystems: Building Integrated Systems, Studying a System with a Simulation: Continuous-timesimulation;Discrete-time simulation

# RecommendedBooks:

1. CharlesM.Close,DeanK.Frederick,JonathanC.Newell,“ModelingandAnalysisofDynamicSystems,LatestEdition
2. P.P.J.vandenBosch,A.C.vanderKlauw,“Modeling,IdentificationandSimulationofDynamicalSystems”,latestedition.
3. MutanmbaraA.G.O.;DesignandanalysisofControlSystems,TaylorandFrancis,LatestEdition

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| Approval: | BoardofStudies | Res. No.45.2 | Dated:24.12.2020 |
|  | AdvanceStudies&ResearchBoard | Res.No.172.27(a) | Dated:06.04.2021 |
|  | AcademicCouncil | Res.No.100.12(i) | Dated:24.08.2021 |

# MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORODEPARTMENTOF ELECTRONIC ENGINEERING

**INSTITUTEOFINFORMATIONANDCOMMUNICATIONTECHNOLOGIES**

TitleofCourse :AdvancedIntegratedCircuitDesign

Course Code :ESE-621

Disciplines :M.E.ElectronicSystemsEngineering(ESE)

Semester :First

Effective :22ndBatchand onwards

Assessment : Sessional Work: 10% Mid Semester: 30% Final Semester: 60%CreditHours :3+0

MinimumContact Hours 42

Marks: : Theory: 100 Practical:00

TodevelopunderstandingaboutVLSIdesignusingCMOStechnology and effective use of this understanding for applicationsdesigndevelopment.

**AimsandObjectives:**

**VLSIdesignbasedonCMOStechnology:**MOSDevices,characteristicsofCMOSlogiccircuits,Power –Delay performance of MOS, MOS operation (weak, moderate, strong inversion), CMOSCombinationalLogic Design,CMOSSequentialLogic Design

**CMOS Designing:** Design Automation for Integrated Circuit, Design through various level ofabstraction, Typical Design Procedure Cell libraries, building blocks, structured design, testingComputer-Aided Design tools, Modern and emerging integrated circuit technology, Static anddynamic logic families, Noise sources, analysis and avoidance, Low power and ultra-low powerdesign,Leakagecharacteristicsandlowleakagedesign,VDD scaling

**Designing Memory and Array Structures:** Memory Classification, Memory Architectures andBuildingBlocks,MemoryCore,NonvolatileRead-WriteMemories,Read-WriteMemories(RAM), Contents-Addressable or Associative Memory (CAM), Embedded SRAM and DRAMMemory Peripheral Circuitry, The Address Decoders, Sense Amplifiers, Drivers/Buffers, TimingandControl,Digitalswitchingcircuits:Synchronoussequentialcircuitstimingandstructure(flowtable,stateassignment,race and hazards).

# RecommendedBooks:

* 1. Kamran Ehraghian,DauglasA.Pucknell andSholehEshraghiam,“Essentials of VLSICircuitsand Systems”–PHI,EEE,LatestEdition.
	2. NeilH.E.WesteandDavid.HarrisAyanBanerjee,,“CMOSVLSIDesign”–PearsonEducation.LatestEdition.
	3. Sung-MoKang,YusufLeblebici,”CMOS DigitalIntegratedCircuits”LatestEdition
	4. JanM.Rabaey,“DigitalIntegratedCircuits”PearsonEducation, Latest Edition.
	5. WayneWolf,“ModernVLSIDesign",PrenticeHall,LatestEdition.

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AcademicCouncil Res.No.100.12(i) Dated:24.08.2021

# MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORODEPARTMENTOF ELECTRONIC ENGINEERING

**INSTITUTEOFINFORMATIONANDCOMMUNICATIONTECHNOLOGIES**

TitleofCourse : AdvancedEmbeddedSystemDesign

Course Code :ESE-631

Disciplines :M.E.ElectronicSystemsEngineering

Semester :First

Effective :22ndBatchand onwards

Assessment :SessionalWork10%Mid Sem30%FinalSem60%

CreditHours : 3+0MinimumContact Hours 42

Marks : Theory: 100 Practical:00

Aims &Objectives :The main objectives of the subject are to be able to design andprogram Arm-based embedded systems and implement them usingcommercialAPI.Thespecificmicrocontrollertobeconsideredwillbe based on an 8051 microcontroller. The most recent advancedmicrocontrollerARMCortex-M3andCortex-M4willbeintroducedatapplicationlevel.

**Contents:**

**Introduction to Embedded SystemIntroduction totheMbedPlatform**

# TheArmCortex-M ProcessorArchitecture,

* ARMCortex-Mprocessors
* AdvantagesoftheCortex-Mprocessors
* ApplicationsoftheARMCortex-Mprocessors
* ResourcesforusingARMprocessorsandARMmicrocontrollers
* IntroductiontotheARMCortex-M3M4architecture
* Programmer’smodel
* Instructionset
* Memoryunit
* DigitalInputandOutput
* Exception&Interrupts
* AnalogInputandOutput,
* TimerandPulse-WidthModulation,
* SerialCommunication

# IntroductiontoCortex-MProgramming&EmbeddedSoftwareDevelopment

* Softwaredevelopmentflow
* Compilingapplications
* Softwareflow(Polling,Interrupt driven,Multi-taskingsystems)
* DatatypesinCprogramming
* Inputs,outputs,andperipheralsaccesses
* Microcontrollerinterfaces
* TheCortexM Microcontrollersoftwareinterfacestandard (CMSIS)
* MbedSDK
* Real-TimeOperatingSystems(RTOS)

# Low PowerFeaturesandSystemControlFeatures

* Lowpowerdesigns
* Lowpowerfeatures
* Developinglowpowerapplications

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# ARMCortex-M4andDSPApplications

* DSPona microcontroller
* Architectureofa traditionalDSPprocessor
* Cortex-M4DSPinstructions
* WritingoptimizedDSPcodefortheCortex-M4.

# ARMCortex-M4andFPGAApplications

* SystemonChipSoC
* SoftwareandresourcesforFPGAdesigns
* ARM- BasedSoCFPGA
* IntroductiontoARMDesignStartXilinxFPGA

# RecommendedBooks:

1. TheDefinitiveGuidetoARM Cortex-M3andCortex-M4 Processors,ByJosephYiuARM Ltd.,Cambridge,UK-Elsevier,LatestEdition.
2. ARM®Cortex®M4CookbookbyDr.MarkFisher,PaktPublishing,LatestEdition.
3. GettingStartedwith TivaARMCortexM4MicrocontrollersALabManualforTivaLaunchPadEvaluationKitbyDhananjayV.Gadre•SarthakGupta, LatestEdition.

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# MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORODEPARTMENTOF ELECTRONIC ENGINEERING

**INSTITUTEOFINFORMATIONANDCOMMUNICATIONTECHNOLOGIES**

TitleofCourse :PowerElectronicsandDrives

Course Code :ESE-641

Disciplines :M.E.ElectronicSystemsEngineering

Semester :Second

Effective :22ndBatchand onwards

Assessment :SessionalWork:10%MidSem:30% FinalSem:60%

CreditHours : 3+0MinimumContact Hours 42

Marks : Theory: 100 Practical:00

Thiscourseaimstodeveloptheunderstandingandanalysistheuncontrolledandcontrolledsolidstatepowersemiconductordevices,characterizetheoperationanddesignofACandDCmotorsdrives.

**AimsandObjectives:**

# Contents:

**Solid state power semiconductor devices:** Basics of power electronics system, classification ofsolid-state power semiconductor devices: constructional structure, geometrical design, switchingrealization,protectioncircuits,

Thyristors: Basics of thyristor, thyristor family, operational modes, triggering and commutationmethods.

**Converter Topologies:** Single phase and three phase AC-DC Rectifiers, Single phase and threephase DC-AC inverters, Single-phase and three phase AC-AC Converters, DC-DC Buck-boostconverters.

**Conventional Drives:** Basics of DC motor, Speed–torque relation, methods of speed control,braking for DC motor – Multi quadrant operation, Speed torque relation of AC motors, methodsof speed control and braking for induction motor, synchronous motor, Criteria for selection ofmotorfordrives.

**Design of DC Drives:** Single quadrant variable speed chopper fed DC drives; four quadrantvariablespeed chopperfed DCDrives.

**ConverterControlofDCDrives:**AnalysisofseriesandseparatelyexcitedDCmotorwithsinglephaseandthree phaseconvertersoperatingindifferentmodesand configurations.

**Chopper Control of DC Drives:** Analysis of series and separately excited DC motors fed fromdifferentchoppersforbothtimeratiocontrolandcurrentlimitcontrol.

**Inverter fed AC Drives:** Analysis of different AC motor with single phase and three phaseinverters,operationsindifferentmodesandconfigurations.

**Cyclo-converter fed AC Drives:** Analysis of different AC motor with single phase and threephasecycloconverters,operationsindifferentmodesandconfigurations.

**ACVoltagecontrollerfedACDrives:**Speedcontrolandbraking,analysisofdifferent ACmotorwith single phase and three phase ac voltage controllers, operations in different modes andconfigurations.

# RecommendedBooks:

1. CyrilW.Lander,“PowerElectronics”,LatestEdition,McGraw-Hill,UK,ISBN:0077077148.
2. MuhammadH.Rashid,“PowerElectronics:Circuits,DevicesandApplications”,LatestEdition,PrenticeHall,ISBN: 0131011405.
3. NedMohan,WilliamP.RobbinandToreM.Undeland,“PowerElectronics:Converters,ApplicationsandDesign”, MediaEnhanced,Latest Edition,John Wiley&Sons,ISBN:047142.
4. Subramanyam,V.“ElectricDrives–Conceptsandapplications”,TataMcGrawHillPublishingCo.,Latestedition.

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# MEHRANUNIVERSITYOFENGINEERINGANDTECHNOLOGY, JAMSHORO

**DEPARTMENTOFELECTRONICENGINEERING**

# INSTITUTEOFINFORMATIONANDCOMMUNICATIONTECHNOLOGIES

TitleofCourse :Microelectronics

Course Code :ESE-651

Disciplines :M.E.ElectronicSystemsEngineering

Semester :Second

Effective :22ndBatchand onwards

Assessment :SessionalWork:10%MidSem:30% FinalSem:60%

CreditHours : 3+0MinimumContact Hours 42

Marks : Theory: 100 Practical:00

**Aims &Objectives**:The aim of this course is to enable the students to have in depthknowledgeaboutthemicroelectronicsandapplythosetodesignthesystematmicrolevel.

**Noiseinelectroniccomponents,circuitsandsystems**–Compositionofthesignal-mathematical description of the noise - Representation of noise in linear electrical networks -physical sources of noise - Noise in electronic components - Assessment of noise in the circuitarchitecturesmostfrequentlyused-Numericalexamplesofcalculationofthenoise;

**The degree of coupling (matching) and offset components and circuits** – Mismatch of size (inbipolar and CMOS) and threshold (CMOS) - Dependence on the size - Impact on the accuracy ofthecircuits -Compromise accuracy,powerand speed;

**OperationalamplifiersinbipolartechnologyandBifet**–Inputstages:characteristicparameters, the problem of the level shift, basic configurations, design criteria, examples ofrealization - Errors in continuous, CMRR, slew rate - Stages of intermediate load function of thefirst stage of level shifting, steering of the output stage, for frequency compensation, problems offrequencyresponseandsettlingtime,examplesofproject-outputstages:characteristicparameters, fundamental configurations, polarization techniques, problems of coupling with theintermediatestage,stages"allnpn"stadiumslowdrop;

**Outline the stages of output power** - Classes of operation - Power devices and monolithicconstruction problems - Protection Techniques – Distortion; Comparator: Comparators in CMOSandBiCMOStechnology-Structure accordingtoPreamplifierandlatch-Limitsofaccuracyandspeed -OffsetReductionTechniques:samplingtheinputandoutput.

**RF Microelectronics:** Introduction and application of RF electronics in modern system. MEMSdevices:MEMSoperatingprinciple(electrostatic,piezoresistive,thermal),applications,accelerometers/combo-drive,RFswitch,micromirror.

# RecommendedBooks:

1. FundamentalsofMicroelectronics,LatestEdition, BehzadRazavi, ISBN:978-1-118-15632-2.
2. ChangLiu,“FoundationofMEMS”,LatestEdition,PrenticeHall,ISBN:0131472860,
3. NadimMalufandKirtWilliams,“AnIntroductiontoMicro-electromechanicalSystemsEngineering”,LatestEdition,ArtechHousePublishers,ISBN:1580535909.

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# MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORODEPARTMENTOF ELECTRONIC ENGINEERING

**INSTITUTEOFINFORMATIONANDCOMMUNICATIONTECHNOLOGIES**

TitleofCourse :CommunicationSystemsandTechnologiesCourse Code :ESE-661

Disciplines :M.E.ElectronicSystemsEngineering

Semester :Second

Effective :22ndBatchand onwards

Assessment :SessionalWork:10%MidSem:30% FinalSem:60%

CreditHours : 3+0MinimumContact Hours 42

Marks : Theory: 100 Practical:00

Thiscourseprovidesthefoundationandfutureofanalog/digitalcommunicationsystemsandtechnologies.

Students learn the fundamentals concepts of communications systemsand techniques, and principles of modern and future communicationsystemsand technologies.

AimsandObjectives:

# CourseContents:

Analoganddigitalsignaling,noise,bandwidth,basebandandcarriercommunication.Amplitudemodulation:DSB-AM,DSB-SC,QAM,SSBVSB.

Anglemodulation: FMandPM,Narrowband FMand WidebandFM.ModulationandDemodulationTechniquesforAM,FMand PM.

Multiplexing and multiple accessing techniques, FDMA, TDMA, CDMA, OFDM, DSSS, FHSS.Digital modulation, Pulse Modulations, PAM, PWM, PPM, PCM, DPCM and Delta ModulationTransmissionImpairments,Noise,AWGN,Mathematicalmodelingofnoiseincommunicationsystems.

Mobilecommunication,Generationsofcellularnetworks,1Gto5G.NetworkarchitecturesofcellulartechnologiesincludingAMPS,GSM,UMTS,LTE,AdvanceLTE.

Broadband communication and networking technologies, X.25 and frame relay, fiber channels, asynchronousopticalnetwork(SONET),avirtualprivatenetwork(VPN),anintegratedservicedigitalnetwork (ISDN), broadband ISDN (B-ISDN), and ATM. Access networks, digital subscriber lines(DSL).

# RecommendedBooks:

1. LathiBP;ModernDigitalandAnalogCommunicationSystems,4thEd.,OxfordUniversityPress,NewYork,LatestEdition.
2. HaykinS;MoherM;CommunicationSystems, 5thEd., Wiley,LatestEdition.
3. FrenzelL;PrinciplesofElectronicCommunicationSystems,McGraw-Hill, LatestEdition.
4. CajetanM.Akujuobi,MatthewN.O.Sadiku,IntroductiontoBroadbandCommunicationSystems,LatestEdition.
5. GordonL.Stüber,PrinciplesofMobileCommunication, LatestEdition, Springers

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# MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORODEPARTMENTOF ELECTRONIC ENGINEERING

**INSTITUTEOFINFORMATIONANDCOMMUNICATIONTECHNOLOGIES**

TitleofCourse :AdvancedDigitalSystemDesign

Course Code :ESE-671

Disciplines :M.E.ElectronicSystemsEngineering

Semester :Second

Effective :22ndBatchand onwards

Assessment :SessionalWork:10%MidSem:30% FinalSem:60%

CreditHours : 3+0MinimumContact Hours 42

Marks : Theory: 100 Practical:00

The unit will focus on modern techniques of complex hardware designusing hardware description language and field programmable gate arraydevices.Emphasisisgiventoreconfigurablelogicasanimplementationmedium.ThetopicmaterialwillbesupportedbyindustrystandardEDAtoolsfordesign,synthesis,simulation,verificationand implementation.

AimandObjectives:

# CourseContents:

Designing complex, high-speed digital circuits and systems ; use of modern EDA tools in thedesign, simulation, synthesis and implementation; Application of a hardware description languagesuch as VHDL to model digital systems at Behavior and RTL level; FPGA and its architecture;FPGA Design Flowbased on VHDL (Place and Route, Synthesize& Fitting); Finite StateMachines (FSMs) for establishing Sequencing and Control: types and examples; Design andimplementationofdigitalsystembuildingblockssuchasarithmeticcircuits,datapaths,microprocessors,I/Omodules,UARTs,frequencygenerators,memoriesetc.

# RecommendedBooks:

1. WayneWolf,“FPGABasedSystemDesign”,PRENTICEHALL,LatestEdition,ISBN:0-13-142461-0.
2. CharlesH.Roth,Jr.“DigitalSystemDesignUsingVHDL”,CengageLearning,LatestEdition,ISBN:978-0534384623.
3. VoleiA.Pedroni“CircuitDesignandSimulationwithVHDL”,MITPress,LatestEdition,ISBN:978-81-203-4301-6.
4. KennethL.Short“VHDLForEngineers”, PrenticeHall, Latest Edition,ISBN:978-0131424784.
5. CliveMaxfiield,“TheDesignWorriesGuidetoFPGAs”,ELSEVIER,LatestEdition,ISBN:0-7506-7604-3.

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AdvanceStudies&ResearchBoard Res.No.172.27(a) Dated: 06.04.2021AcademicCouncil Res.No.100.12(i) Dated:24.08.2021

# MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORODEPARTMENTOF ELECTRONIC ENGINEERING

**INSTITUTEOFINFORMATIONANDCOMMUNICATIONTECHNOLOGIES**

TitleofCourse : Modern Trends in Electronic Systems DesignCourse Code :ESE-701

Disciplines :M.E.ElectronicSystemsEngineering

Semester :Third

Effective :22ndBatchand onwards

Assessment :SessionalWork:10%MidSem:30% FinalSem:60%

CreditHours : 3+0MinimumContact Hours 42

Marks : Theory: 100 Practical:00

**Aims& Objectives:**The aim of this course is to enable the students to have a latestknowledge of technologies and techniques and apply this knowledgeto design anddepth knowledge about the advanced DSP techniquesandapplythosetosolveengineering problems.

# Contents:

System design based on quantitative performance concepts; design of electronic systems usingdiscrete devices; integrated circuits including analog, digital, and hybrid circuits; linear andnonlinear amplifiers; active filters; signal generators; signal modulators; switched-mode powerconverters and analog/digital data conversion; sensors and actuators; combinational logic design;design of microprocessor-based and microcomputer-oriented subsystems; design of continuousanddigitalcontrolsystemsusingmodernanalyticandcomputerdesigntools.

Advance trendsin electronics Systems Design:RecentDevelopments on Electron–PhononInteractionsinStructuresforQuantum-BasedElectronicandOptoelectronicDevices,ChemicallySelf-Assembled Nanoelectronic Computing Networks, Carbon Nanotubes and Nanotube-BasedNano Devices,MultiplierandHarmonicGeneratorTechnologiesfor TerahertzApplications.

# RecommendedBooks:

1. C.D.MotchenbacherandJ.A.Connelly,“Low-NoiseElectronicSystemDesign,”,JohnWiley&SonsISBN: 0471577421.
2. KennethR.LakerandWillyM.C.Sansen,“Designof AnalogIntegratedCircuits andSystems,”LatestEdition,McGraw-Hill,ISBN: 007036060X.
3. MohamedRafiquzzaman,“IntroductiontoMicroprocessorsandMicrocomputer-BasedSystemDesign,”SecondEdition,LatestEdition,CRC Press,ISBN:0849344751.
4. SteveHeath,“EmbeddedSystemsDesign,”SecondEdition,LatestEdition,Newnes,ISBN:0750655461.
5. JeremyRamsden, “Nanotechnology”,LatestEdition,Elsevier,ISBN:9780080964478

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# MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORODEPARTMENTOF ELECTRONIC ENGINEERING

**INSTITUTEOFINFORMATIONANDCOMMUNICATIONTECHNOLOGIES**

TitleofCourse :ICDesign&ManufacturingTechniques

Course Code :ES-711

Disciplines :M.E.ElectronicSystemsEngineering

Semester :Third

Effective :22ndBatchand onwards

Assessment :SessionalWork:10%MidSem:30% FinalSem:60%

CreditHours : 3+0MinimumContact Hours 42

Marks : Theory: 100 Practical:00

**AimsandObjectives:** Teachthedesign,layoutandsimulationofdigitalintegratedcircuits.

# Contents:

Issues in Digital Integrated Circuit Design, Quality Metrics of a Digital Design, manufacturingCMOSIntegratedCircuits,CMOSlogic,CMOSprocesssteps;designrules,stickdiagrams,layoutdesign concepts/techniques, packaging integrated circuits , Introduction to ASIC design, differentASIC design styles and technologies, design flow, full-custom/semi-custom circuit techniques,ASIC library design, design methodology, layout of full-custom CMOS ICs, design-for-test, useoffull-customICdesigntools,behavioralmodelingandhardwaredescriptionlanguage,simulation(differenttypesandlevels),computeraided design.

# RecommendedBooks:

1. JanM.Rabaey,AnanthaChandrakasanandBorivojeNikolic“DigitalIntegratedCircuits:ADesignPerspective,”LatestEdition,PrenticeHall,ISBN: 0130909963.
2. NeilH.E.WesteandDavidHarris,“CMOSVLSIDesign,”LatestEdition,AddisonWesley,ISBN:0321149017.
3. MichaelJohnSebastianSmith,“ApplicationSpecificIntegratedCircuits,”LatestEdition,AddisonWesley,ISBN: 0201500221.

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