1.3.2

COURSES THAT INCLUDE EXPERIENTIAL LEARNING THROUGH PROJECT WORK/ FIELD WORK/ INTERNSHIP DURING

2020-2021

1.3.2 AVERAGE PERCENTAGE OF COURSES THAT INCLUDE EXPERIENTIAL LEARNING THROUGH PROJECT WORK/FIELD WORK/INTERNSHIP DURING 2020-2021

S. No.	Programme offering	Name of the course	Course code	Project / field work	Page No.
1.	B.E-Electronics and Communication Engineering	Physics for Electronics Engineering	PH8253	Field work	4
2.	B.E-Electronics & Communication Engineering	Basic Electrical and Instrumentation Engineering	BE8254	Field work	7
3.	B.E-Electronics & Communication Engineering	Circuit Analysis	EC8251	Field work	9
4.	B.E-Electronics & Communication Engineering	Electronic Devices	EC8252	Internship	11
5.	B.E-Electronics & Communication Engineering	Linear Algebra and Partial Differential Equations	MA8352	Internship	13
6.	B.E-Electronics & Communication Engineering	Fundamentals of Data Structures In C	EC8393	Internship	16
7.	B.E-Electronics & Communication Engineering	Electronic Circuits- I	EC8351	Internship	18
8.	B.E-Electronics & Communication Engineering	Signals and Systems	EC8352	Internship	21
9.	B.E-Electronics & Communication Engineering	Digital Electronics	EC8392	Internship	23
10.	B.E-Electronics & Communication Engineering	Control Systems Engineering	EC8391	Internship	26
11.	B.E-Electronics & Communication Engineering	Probability and Random Processes	MA8451	Internship	28
12.	B.E-Electronics & Communication Engineering	Electronic Circuits II	EC8452	Field work	31
13.	B.E-Electronics & Communication Engineering	Communication Theory	EC8491	Field work	34
14.	B.E-Electronics & Communication Engineering	Electromagnetic Fields	EC8451	Internship	37
15.	B.E-Electronics & Communication Engineering	Linear Integrated Circuits	EC8453	Field work	40
16.	B.E-Electronics & Communication Engineering	Digital Communication	EC8501	Internship	43

17.	B.E-Electronics & Communication Engineering	Discrete-Time Signal Processing	EC8553	Field work	45
18.	B.E-Electronics & Communication Engineering	Computer Architecture and Organization	EC8552	Field work	48
19.	B.E-Electronics & Communication Engineering	Communication Networks	EC8551	Project work	51
20.	B.E-Electronics & Communication Engineering	Medical Electronics	EC8073	Project work	55
21.	B.E-Electronics & Communication Engineering	Biomedical Instrumentation	OMD551	Project work	59
22.	B.E-Electronics & Communication Engineering	Microprocessors and Microcontrollers	EC8691	Project work	64
23.	B.E-Electronics & Communication Engineering	VLSI Design	EC8095	Internship	68
24.	B.E-Electronics & Communication Engineering	Wireless Communication	EC8652	Project work	71
25.	B.E-Electronics & Communication Engineering	Transmission Lines and RF Systems	EC8651	Project work	75
26.	B.E-Electronics & Communication Engineering	Wireless Networks	EC8004	Project work	80
27.	B.E-Electronics & Communication Engineering	Antennas and Microwave Engineering	EC8701	Project work	84
28.	B.E-Electronics & Communication Engineering	Optical Communication	EC8751	Project work	88
29.	B.E-Electronics & Communication Engineering	Embedded and Real Time Systems	EC8791	Project work	93
30.	B.E-Electronics & Communication Engineering	Adhoc & Wireless sensor networks	EC8702	Project work	98
31.	B.E-Electronics & Communication Engineering	Advanced Wireless Communication	EC8092	Project work	103
32.	B.E-Electronics & Communication Engineering	Transducer Engineering	OIC751	Project work	107
33.	B.E-Electronics & Communication Engineering	Satellite Communication	EC8094	Internship	111

PH8253 **PHYSICS FOR ELECTRONICS ENGINEERING**

(Common to BME, ME, CC, ECE, EEE, E&I,ICE)

L	T	P	C
3	0	0	3

OBJECTIVES:

- TounderstandtheessentialprinciplesofPhysicsofsemiconductordeviceandElectrontransportproperties.Becomeproficientinmagnetic,dielectricandopticalpropertiesofmaterialsandnanodevices.

UNITI ELECTRICAL PROPERTIESOFMATERIALS **9**

Classicalfree electron theory - Expression for electrical conductivity – Thermal conductivity,expression - Wiedemann-Franz law –Successand failures- electrons in metals – Particle in athree dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states –Electron in periodic potential: Bloch thorem – metals and insulators - Energy bands in solids– tightbindingapproximation-Electroneffectivemass–conceptofhole.

UNITII SEMICONDUCTORPHYSICS **9**

Intrinsic Semiconductors – Energy band diagram – direct and indirect semiconductors – Carrierconcentration in intrinsic semiconductors – extrinsicsemiconductors - Carrier concentration in N-type&P-typesemiconductors –Carriertransport:Velocity-electric fieldrelations –drift anddiffusiontransport-Einstein'srelation–Halleffectanddevices–Zenerandavalanchebreakdown in p-n junctions - Ohmiccontacts – tunnel diode - Schottky diode – MOS capacitor -powertransistor.

UNITIII MAGNETICANDDIELECTRICPROPERTIESOFMATERIALS **9**

Magnetism inmaterials –magnetic field and induction –magnetization- magnetic permeabilityand susceptibility–types of magnetic materials – microscopic classification of magnetic materials - Ferromagnetism:originandexchangeinteraction-saturationmagnetizationandCurietemperature – Domain Theory. Dielectric materials: Polarization processes – dielectric loss – internal field – Clausius-Mosottirelation-dielectricbreakdown–high-kdielectrics.

UNITIV OPTICAL PROPERTIESOF MATERIALS **9**

Classification of optical materials – carrier generation and recombination processes - Absorptionemission and scattering of light in metals, insulators and Semiconductors (concepts only)- photocurrent in a P- N diode – solar cell –photo detectors - LED – Organic LED – Laser diodes –excitons -quantumconfinedStarkeffect–quantumdotlaser.

UNITV NANOELECTRONIC DEVICES **9**

Introduction - electron density in bulk material – Size dependence of Fermi energy–quantumconfinement – quantum structures - Density of states in quantum well, quantum wire and quantumdot structures –Zener-Bloch oscillations – resonant tunneling – quantum interference effects –mesoscopic structures: conductance fluctuations and coherent transport – Coulomb blockadeeffects - Single electron phenomena and Single electron Transistor – magnetic semiconductors–spintronics -Carbonnanotubes:Propertiesandapplications.

TOTAL :45PERIODS

OUTCOMES:

Attheendofthe course, thestudentswillable to

- Gainknowledgeonclassicalandquantumelectrontheories,andenergybandstructuues,
- Acquire knowledge on basics of semiconductor physics and its applications in variousdevices,
- Getknowledgeon magneticanddielectricpropertiesofmaterials,
- Have the necessary understanding on the functioning of optical materials foroptoelectronics,
- Understand the basics of quantum structures and their applications in spintronics andcarbonelectronics..

TEXT BOOKS:

1. Kasap,S.O."PrinciplesofElectronicMaterialsandDevices",McGraw-HillEducation,2007.
2. UmeshKMishra&JaspritSingh,"SemiconductorDevicePhysicsandDesign",Springer,2008.
3. Wahab,M.A."SolidStatePhysics:StructureandPropertiesofMaterials".NarosaPublishingHouse,2009.

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REFERENCES:

1. Garcia,N.&Damask,A."PhysicsforComputerScienceStudents".Springer-Verlag,2012.
2. Hanson,G.W."FundamentalsofNanoelectronics".PearsonEducation,2009
3. Rogers, B., Adams, J. &Pennathur, S. "Nanotechnology: UnderstandingSmallSystems".CRCPress,2014

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BRIGHT TECHNOLOGY
(Institute for technical traning)

Cell : 9655913231 , 9566913231
Mail : thebrighttechnology@gmail.com

Date: 31.08.2020

To

The Principal,

NPR College of Engineering & Technology,

Natham-624401

Dear Sir,

Sub: Permission for In-Plant Training-reg

Ref: NPRCET/OFF/ECE/INT/2020-2021dated :24.08.2020

With respect to reference cited above, we permit Maniekantan T S ,MohanaPriya S , Mohan Kumar M K , Saravanakumar C ,Sathish K ,Shema S of Final year Electronics and Communication Engineering to undergo In-Plant Training in our organization from 07.09.2020 – 14.09.2020.

Thank you.

N.P.R. COLLEGE OF ENGG. & TECH. * NATHAM-624 401 *

BRIGHT TECHNOLOGY * DINDIGUL *

Dr. J.SUNDARARAJAN
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Sri Varadharaja Bavanam,Canara Bank Upstairs,
Nagal Nagar, R.S. Road, Dindigul - 624003

BE8254 **BASICELECTRICALANDINSTRUMENTATIONENGINEERING** **LTPC 3003**

OBJECTIVES:

To impartknowledgeon

- OperationofThreephaseelectricalcircuitsand powermeasurement
- Workingprinciplesof ElectricalMachines
- WorkingprincipleofVariousmeasuringinstruments

UNITI AC CIRCUITSANDPOWER SYSTEMS **9**

Three phase power supply – Star connection – Delta connection – Balanced and UnbalancedLoads-Powerequation–StarDeltaConversion–ThreePhasePowerMeasurement-Transmission & Distribution of electrical energy – Over headVs Underground system – Protectionofpowersystem –typesoftariff–powerfactorimprovement

UNITII TRANSFORMER **9**

Introduction - Ideal Transformer – Accounting For Finite Permeability And Core Loss – CircuitModel Of Transformer – Per Unit System – Determination Of Parameters Of Circuit Model OfTransformer – Voltage Regulation – Name Plate Rating – Efficiency – Three Phase Transformers -AutoTransformers

UNITIII DC MACHINES **9**

Introduction – Constructional Features– Motoring and generation principle - Emf And Torqueequation – Circuit Model – Methods of Excitation and magnetisation characteristics – Starting andSpeedControl–Universal Motor

UNITIV ACMACHINES **9**

Principle of operation of three-phase induction motors – Construction –Types – Equivalent circuit,SinglephaseInductionmotors-Construction–Types–startingandspeedcontrolmethods.Alternator- working principle–Equation of induced EMF – Voltage regulation, Synchronous motors-workingprinciple-starting methods— Torqueequation–StepperMotors–BrushlessDCMotors

UNITV MEASUREMENTANDINSTRUMENTATION **9**

Type of Electrical and electronic instruments – Classification- Types of indicating Instruments – PrinciplesofElectricalInstruments–Multimeters,Oscilloscopes-StaticandDynamicCharacteristicsofMeasurement–ErrorsinMeasurement–Transducers-ClassificationofTransducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, HalleffectandMechanical

TOTAL:45PERIODS

OUTCOMES:

Atthe endofthe course thestudentswillbe able to

- Understandthe conceptofthreephasepowercircuitsandmeasurement.
- Comprehendtheconceptsinelectricalgenerators,motorsandtransformers
- Chooseappropriatemeasuring instrumentsforgivenapplication

TEXT BOOKS:

1. DPKothariandI.JNagarath,"BasicElectricaland ElectronicsEngineering",McGrawHillEducation(India)PrivateLimited,ThirdReprint,2016
2. Giorgio Rizzoni, "Principles and Applications of Electrical Engineering", McGraw HillEducation(India)PrivateLimited,2010
3. S.K.Bhattacharya"BasicElectricalandElectronicsEngineering",PearsonIndia,2011

REFERENCES:

1. DelToro,"ElectricalEngineeringFundamentals",PearsonEducation,NewDelhi,2015.
2. LeonardSBobrow,"FoundationsofElectricalEngineering",Oxford UniversityPress,2013
3. RajendraPrasad,"FundamentalsofElectricalengineering",Prentice HallofIndia,2006
4. MittleN.,"BasicElectricalEngineering",TataMcGrawHillEdition,24th reprint2016
5. A.E.Fitzgerald, David E Higginbotham and Arvin Grabel, "Basic Electrical Engineering",McGrawHill Education(India)PrivateLimited,2009

Dr. J.SUNDARARAJAN,
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Vi Microsystems Pvt. Ltd.,

Plot No 75, Electronics Estate, Perungudi, Chennai - 600096
Tel : 044-2496 1842, 2496 1852
E-mail : sales@vimicrosystems.com Website : www.vimicrosystems.com
GSTIN : 33AAACV0909J1ZJ PAN No : AAACV0909J

Date: 26.08.2020

To

The Principal
NPR College of Engineering & Technology
Natham

Sir,

Sub: permission for In Plant Training - Reg.

Ref: NPRCET/OFF/ECE/IPT-02/2020-2021 dated **16.08.2020**

With reference to the above, we are pleased to offer in plant training to the students listed below, studying B.E-Electronics and Communication Engineering at NPR College of Engineering & Technology,Natham from 03.09.2020 -10.09.2020 in our organization.

S.No.	Name of the Student	Reg.No	Year & Branch
1.	Ms.Durgadevi S	920818106008	III ECE
2.	Ms.Kiruthika R	920818106013	III ECE
3.	Mr.Muthu Vignesh M	920818106017	III ECE
4.	Mr.Rajkumar K	920818106024	III ECE
5.	Ms.Seema Fathima S	920818106029	III ECE
6.	Ms.Varshini B	920818106036	III ECE

Vi Microsystems Pvt. Ltd., Chennai - 96

With Regards

For VI Microsystems

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

EC8251 **CIRCUIT ANALYSIS** LT PC 4004

OBJECTIVES:

- Tointroducethebasicconceptsof DCandACcircuitsbehavior
- Tostudythe transientand steadystateresponseofthecircuits subjected tostepandsinusoidalexcitations.
- Tointroducedifferentmethodsofcircuitanalysisusing Networktheorems,dualityandtopology.

UNITI BASIC CIRCUITSANALYSISAND NETWORKTOPOLOGY 12

Ohm'sLaw–Kirchhoff'slaws–Meshcurrentandnodevoltagemethodofanalysisfor D.Cand A.C. circuits - Networkterminology-Graphofanetwork-Incidenceandreduced incidencematrices – Trees –Cutsets - Fundamental cutsets - Cutset matrix – Tie sets - Link currents andTiesetschedules-TwigvoltagesandCutsetschedules,Dualityanddualnetworks.

UNITII NETWORKTHEOREMSFOR DCANDAC CIRCUITS 12

Network theorems -Superpositiontheorem,Thevenin'stheorem, Norton's theorem,Reciprocitytheorem, Millman'stheorem, and Maximum powertransfertheorem ,application ofNetwork theorems- Network reduction: voltage and current division, source transformation – stardeltaconversion.

UNITIII RESONANCEANDCOUPLED CIRCUITS 12

Resonance - Series resonance - Parallel resonance - Variation of impedance with frequency - Variation in current through and voltage across L and C with frequency – Bandwidth - Q factor - Selectivity. Selfinductance-Mutualinductance-Dotrule- Coefficient ofcoupling-Analysisofmultiwinding coupledcircuits-Series,Parallel connection of coupled inductors - Single tunedanddoubletunedcoupledcircuits.

UNITIV TRANSIENTANALYSIS 12

Natural response-Forced response - Transient response of RC, RL and RLC circuits to excitationby Step Signal, Impulse Signal and exponential sources - Complete response of RC, RL and RLCCircuits tosinusoidalexcitation.

UNITV TWOPORTNETWORKS 12

Twoportnetworks,Zparameters,Yparameters,Transmission (ABCD)parameters,Hybrid(H) Parameters,Interconnectionoftwoport networks, SymmetricalpropertiesofTandπnetworks.

TOTAL:60 PERIODS

OUTCOMES:

Atthe endofthecourse,thestudentshouldbe able to:

- Develop thecapacitytoanalyzeelectricalcircuits,applythecircuit theoremsin realtime
- Designandunderstandandevaluatethe ACandDCcircuits.

TEXT BOOKS:

1. WilliamH.Hayt,Jr.JackE.KemmerlyandStevenM.Durbin,"EngineeringCircuitAnalysis",McGrawHillScienceEngineering,EighthEdition,11th Reprint2016.
2. JosephEdministerandMahmoodNahvi,"ElectricCircuits",Schaum'sOutlineSeries,TataMcGrawHillPublishingCompany,NewDelhi,FifthEditionReprint2016.

REFERENCES:

1. CharlesK.Alexander,MathewN.O.Sadiku,"FundamentalsofElectricCircuits",FifthEdition, McGrawHill, 9th Reprint2015.
2. A.BruceCarlson, "Cicuits: Engineering Concepts andAnalysis ofLinear Electric Circuits",CengageLearning,IndiaEdition2nd IndianReprint2009.
3. AllanH.Robbins,WilhelmC.Miller,"CircuitAnalysisTheoryandPractice",CengageLearning,FifthEdition,1st IndianReprint2013.

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Natham, Dindigul (Dt) - 624 401.

megatronics

Date: 07.09.2020

To

The Principal,

NPR College of Engineering & Technology,

Natham.

Dear Sir,

Sub: Permission for Inplant Training-reg

Ref: NPRCET/OFF/ECE/IPT/2020 - 2021 dated:01.09.2020

With reference to your letter cited above, we are pleased to give permission for AFRIN SHIFANA A , BALAJI M, CHRISTIYA I, DEVISRI S, PORKODI S of Second year Electronics and Communication Engineering of your institution to undergo In-Plant Training in our organization from 15.09.2020 - 22.09.2020

Thank you.

For Megatronics,

(C.Kannan)

MEGATRONICS COIMBATORE

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

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Megatronics
65, R.K. Mills "B" Colony, Peelamedu Pudur, Coimbatore - 641 004.
Cell : 98422-85001 Phone : 0422 - 256 5001 E-mail : megatronicsindia@gmail.com
Web : www.megatronicsindia.in

EC8252 **ELECTRONIC DEVICES** LTPC 3003

OBJECTIVES:

- Toacquaintthestudentswiththeconstruction,theoryandoperationofthebasicelectronic devices such as PN junction diode, Bipolar and Field effect Transistors, Powercontroldevices,LED,LCD andotherOpto-electronicdevices

UNITI SEMICONDUCTOR DIODE 9

PN junction diode, Current equations, Energy Band diagram, Diffusion and drift current densities,forwardandreversebiascharacteristics,TransitionandDiffusionCapacitances,SwitchingCharacteristics,BreakdowninPNJunctionDiodes.

UNITII BIPOLARJUNCTIONTRANSISTORS 9

NPN -PNP -Operations-Early effect-Current equations – Input and Output characteristics of CE,CB, CC - Hybrid -π model- h-parameter model, EbersMollModel- Gummel Poon-model, MultiEmitterTransistor.

UNITIII FIELDEFFECT TRANSISTORS 9

JFETs–DrainandTransfercharacteristics,-Currentequations-Pinchoffvoltageanditssignificance-MOSFET-Characteristics-Thresholdvoltage-Channellengthmodulation,D-MOSFET,E-MOSFET-Characteristics–ComparisonofMOSFETwithJFET.

UNITIV SPECIAL SEMICONDUCTOR DEVICES 9

Metal-Semiconductor Junction- MESFET, FINFET, PINFET, CNTFET, DUAL GATE MOSFET,Schottkybarrierdiode-Zenerdiode-Varactordiode–Tunneldiode-GalliumArsenidedevice,LASERdiode,LDR.

UNITV POWER DEVICESAND DISPLAYDEVICES 9

UJT, SCR, Diac, Triac, Power BJT- Power MOSFET- DMOS-VMOS.LED, LCD, Photo transistor,OptoCoupler,Solarcell,CCD.

TOTAL:45 PERIODS

OUTCOMES:

Atthe endofthe course the studentswillbe able to:

- ExplaintheV-Icharacteristicofdiode,UJTandSCR
- Describetheequivalencecircuitsoftransistors
- Operate the basic electronic devices such as PN junction diode, Bipolar and Field effectTransistors,Powercontroldevices,LED,LCDandotherOpto-electronicdevices

TEXT BOOKS:

1. DonaldANeaman,"SemiconductorPhysicsandDevices",FourthEdition,TataMcGrawHillInc.2012.
2. Salivahanan.S,SureshKumar.N,Vallavaraj.A,"ElectronicDevicesandcircuits",ThirdEdition,TataMcGraw-Hill,2008.

REFERENCES:

1. RobertBoylestadandLouisNashelsky,"ElectronDevicesandCircuitTheory"PearsonPrenticeHall,10thedition,July2008.
2. R.S.Sedha,"ATextBookof Applied Electronics"S.ChandPublications,2006.
3. Yang,"FundamentalsofSemiconductordevices",McGrawHillInternationalEdition, 1978

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E-mail : sales@vimicrosystems.com Website : www.vimicrosystems.com
GSTIN : 33AAACV0909J1ZJ PAN No. : AAACV0909J

Date: 03.10.2020

To

The Principal,
NPR College of Engineering & Technology,
Natham.

Sir,

Sub: Permission for Internship - Reg.

Ref: NPRCET/OFF/ECE/INT/2020-2021 dated: 28.09.2020

With reference to the above, we are pleased to offer internship to the students listed below, studying B.E- Electronics and Communication Engineering at NPR College of Engineering & Technology, Natham from 12.10.2020 – 27.10.2020 in our organization.

S.No.	Name of the student	Register Number	Year& Branch
1.	S.Dhath Vetha	920819106014	II ECE
2.	B.Jyothika	920819106021	II ECE
3.	J.S.Karuniaa	920819106023	II ECE
4.	M.Keerthi	920819106024	II ECE
5.	V.Muthu Ranjani	920819106037	II ECE

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

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With Regards

For VI Microsystems

Dr. J.SUNDARARAJAN,
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Natham, Dindigul (Dt) - 624 401.

MA8352 **LINEAR ALGEBRA AND PARTIAL DIFFERENTIALEQUATIONS** LTP C
40 0 4

OBJECTIVES:

- Tointroducethebasicnotionsofgroups,rings,fieldswhichwillthenbeusedtosolverelatedproblems.
- Tounderstandtheconceptsofvectorspace,lineartransformationsanddiagonalization.
- To applytheconceptof innerproductspacesinorthogonalization.
- Tounderstandtheprocedure tosolvepartialdifferentialequations.
- Togiveanintegratedapproachtonumbertheoryandabstractalgebra,andprovideafirmbasisforfurtherreadingandstudy inthesubject.

UNITI VECTORSPACES 12

Vector spaces – Subspaces – Linear combinations andlinear system ofequations– Linearindependenceandlineardependence–Bases anddimensions.

UNITII LINEAR TRANSFORMATIONAND DIAGONALIZATION 12

Linear transformation - Null spaces and ranges - Dimension theorem - Matrix representation of alineartransformations-Eigenvaluesandeigenvectors-Diagonalizability.

UNITIII INNER PRODUCTSPACES 12

Inner product, norms - Gram Schmidt orthogonalization process - Adjoint of linear operations - Leastsquareapproximation.

UNITIV PARTIAL DIFFERENTIALEQUATIONS 12

Formation–Solutionsoffirstorderequations–Standardtypes andequationsreducibletostandardtypes – Singularsolutions–Lagrange'slinearequation–Integralsurfacepassingthrough a given curve – Classification of partial differential equations - Solution of linear equationsofhigherorderwith constantcoefficients– Linearnon-homogeneouspartialdifferentialequations.

UNITV FOURIERSERIESSOLUTIONSOFPARTIALDIFFERENTIALEQUATIONS 12

Dirichlet's conditions – General Fourier series – Half range sine and cosine series - Method ofseparation of variables – Solutions of one dimensional wave equation and one-dimensional heatequation – Steady state solution of two-dimensional heat equation – Fourier series solutions inCartesiancoordinates.

TOTAL:60PERIODS

OUTCOMES:

Uponsuccessfulcompletionofthecourse,studentsshouldbe able to:

- Explain the fundamental concepts of advanced algebra and their role in modernmathematicsandappliedcontexts.
- Demonstrate accurateandefficientuse ofadvancedalgebraictechniques.
- Demonstratetheirmasterybysolvingnon-trivialproblemsrelatedtotheconceptsandbyprovingsimpletheoremsaboutthestatementsprovenbythetext.
- Able to solve various types of partial differential equations.AbletosolveengineeringproblemsusingFourierseries.

TEXTBOOKS:

1. GrewalB.S.,"HigherEngineeringMathematics",KhannaPublishers,NewDelhi,43rdEdition,2014.
2. Friedberg,A.H.,Insel,A.J.and Spence, L.,"LinearAlgebra",PrenticeHallofIndia,NewDelhi,2004.

REFERENCES:

1. Burden,R.L.and Faires,J.D,"NumericalAnalysis",9thEdition,CengageLearning,2016.
2. James,G."AdvancedModernEngineeringMathematics",PearsonEducation,2007.
3. Kolman,B.Hill,D.R.,"IntroductoryLinearAlgebra",PearsonEducation,NewDelhi,FirstReprint,2009.
4. Kumaresan,S.,"LinearAlgebra–AGeometricApproach",Prentice–HallofIndia,NewDelhi,Reprint,2010.
5. Lay,D.C.,"LinearAlgebraanditsApplications", 5thEdition,PearsonEducation,2015.

6. O'Neil,P.V.,"AdvancedEngineeringMathematics",CengageLearning,2007.
7. Strang,G.,"LinearAlgebraand itsapplications", Thomson (Brooks/Cole),NewDelhi,2005.
8. Sundarapandian,V."NumericalLinearAlgebra",PrenticeHallofIndia,NewDelhi,2008.

Dr. J. SUNDARARAJAN, B.E., M.Tech., Ph.D.,
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Vattamalai, Erode (Dt) - 638 052.

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Never Ends

ELYSIUM TECHNOLOGIES PRIVATE LIMITED
GST No: 33AACCE2334E1ZA
CIN No: U72200TN2006PTC060465
NASSCOM MEMBER

Date: 29.09.2020

To

The Principal,

NPR College of Engineering & Technology,

Natham.

Sir,

Sub: Permission for internship-reg

Ref: NPRCET/OFF/ECE/INT-2/2020-2021 dated :

With reference to your letter we are pleased to grant permission for **Mr.D.Prasanna (920819106046), Ms.N.Singarabrindha (920819106059), Ms.K.Vishali (920819106069), Mr.B.Mohanbabu (920819106034) and Mr.M.Muthu Moorthy (920819106036)** of Second year Electronics and Communication Engineering of your institution to undergo internship in our concern from 08.10.2020 – 23.10.2020

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

Dr. J.SUNDARARAJAN,
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With Regards

(For Elysium technologies)

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Madurai-625 020, Tamilnadu, India.

EC8393 **FUNDAMENTAL SOFDATASTRUCTURESINC** LTPC 3003

OBJECTIVES:

- TolearnthefeaturesofC
- To learnthelinearandnon-lineardatastructures
- To exploretheapplicationsoflinearandnon-lineardatastructures
- Tolearntorepresentdatausinggraphdatastructure
- To learn thebasicsortingandsearchingalgorithms

UNITI C PROGRAMMINGBASICS 9

StructureofaCprogram–compilationandlinkingprocesses–Constants,Variables–DataTypes – Expressions using operators in C – Managing Input and Output operations – Decision Makingand Branching – Looping statements. Arrays – Initialization – Declaration – One dimensional andTwo-dimensional arrays. Strings- String operations – String Arrays.Simple programs- sorting-searching–matrixoperations.

UNITII FUNCTIONS,POINTERS,STRUCTURESANDUNIONS 9

Functions – Pass by value – Pass by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic. Structures and unions - definition – Structure within a structure - Union - ProgramsusingstructuresandUnions –Storageclasses,Pre-processordirectives.

UNITIII LINEAR DATASTRUCTURES 9

Arraysanditsrepresentations–StacksandQueues–Linkedlists–Linkedlist-basedimplementation of Stacks and Queues – Evaluation of Expressions – Linked list based polynomialaddition.

UNITIV NON-LINEAR DATASTRUCTURES 9

Trees–BinaryTrees–Binarytreerepresentationandtraversals–BinarySearchTrees–Applications of trees. Set representations - Union-Find operations. Graph and its representations – GraphTraversals.

UNITV SEARCHINGANDSORTINGALGORITHMS 9

LinearSearch–Binary Search.BubbleSort,Insertionsort–Mergesort–Quick sort-Hashtables – Overflowhandling.

TOTAL:45PERIODS

OUTCOMES:

Uponcompletionofthecourse,studentswillbeable to:

- Implementlinearandnon-lineardatastructure operationsusingC
- Suggestappropriatelinear/non-lineardata structureforanygiven dataset.
- Applyhashingconceptsforagivenproblem
- Modifyorsuggestnewdatastructureforanapplication
- Appropriatelychoosethe sortingalgorithmforanapplication

TEXTBOOKS:

1. PradipDeyandManasGhosh,—ProgramminginC,SecondEdition,OxfordUniversity Press,2011.
2. EllisHorowitz,SartajSahni,Susan Anderson-Freed,—FundamentalsofData Structuresin C,SecondEdition,UniversityPress,2008.

REFERENCES:

1. MarkAllenWeiss,—DataStructuresandAlgorithmAnalysisinC,SecondEdition, PearsonEducation,1996
2. AlfredV.Aho,JohnE.HopcroftandJeffreyD.Ullman,—DataStructuresandAlgorithms, PearsonEducation,1983.
3. RobertKruse,C.L.Tondo,BruceLeung,ShashiMogalla,—DataStructuresandProgram DesigninC,SecondEdition,PearsonEducation,2007
4. Jean-PaulTremblayandPaulG.Sorenson,—AnIntroductiontoDataStructureswith Applications,SecondEdition,TataMcGraw-Hill,1991.

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Date: 06.09.2020

To

The Principal,

NPR College of Engineering & Technology,

Natham-624401

Dear Sir,

Sub: Permission for internship-reg

Ref: NPRCET/OFF/ECE/INT/2020-2021dated :24.08.2020

With respect to reference cited above, we permit Uma Nanthini .N, Tharunkumar M, Sharmila Devi G, Sneha P and Nandha kumar G of Second year Electronics and Communication Engineering to undergo Internship in our organization from 13.10.2020 - 28.10.2020.

Thank you.

With Regards

For SUPERFECT SOLUTIONS,

AUTHORIZED SIGNATORY

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N.P.R. COLLEGE OF ENGG & TECH * NATHAM-624 401 *

Dr. J.SUNDARARAJAN,
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Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

EC8351	ELECTRONICCIRCUITSI	L	T	P	C
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OBJECTIVES:

- Tounderstandthemethodsofbiasingtransistors
- To designand analyze singlestageandmultistage amplifiercircuits
- Toanalyzethefrequencyresponseofsmallsignalamplifiers
- To designand analyze theregulated DCpowersupplies.
- Totroubleshootandfaultanalysisof powersupplies.

UNITI BIASINGOFDISCRETEBJT,JFETANDMOSFET **9**

BJT– Need for biasing - DC Load Line and Bias Point – DC analysis of Transistor circuits - VariousbiasingmethodsofBJT–BiasCircuitDesign-Thermalstability-Stabilityfactors-Biascompensation techniques using Diode, thermistor and sensistor – Biasing BJT Switching Circuits-JFET - DC Load Line and Bias Point - Various biasing methods ofJFET - JFET Bias CircuitDesign-MOSFET Biasing-BiasingFETSwitchingCircuits.

UNITII BJTAMPLIFIERS **9**

Small Signal Hybrid π equivalent circuit of BJT – Early effect - Analysis of CE, CC and CBamplifiers using Hybrid πequivalentcircuits - AC LoadLine Analysis- Darlington Amplifier - Bootstraptechnique-Cascade,Cascodeconfigurations-Differentialamplifier,BasicBJTdifferentialpair –Small signalanalysisandCMRR.

UNITIII SINGLESTAGEFET,MOSFETAMPLIFIERS **9**

SmallSignalHybridπequivalentcircuitofFETandMOSFET-AnalysisofCS,CDandCG amplifiersusingHybridπequivalentcircuits-BasicFETdifferentialpair-BiCMOS circuits.

UNITIV FREQUENCYRESPONSEOF AMPLIFIERS **9**

Amplifierfrequencyresponse–Frequencyresponseoftransistoramplifierswithcircuitcapacitors – BJT frequency response – short circuit current gain - cut off frequency – fα, fβ and unity gainbandwidth – Miller effect - frequency response ofFET - High frequency analysis of CE andMOSFETCSamplifier-TransistorSwitchingTimes.

UNITV POWER SUPPLIESAND ELECTRONICDEVICETESTING **9**

Linear mode power supply -Rectifiers - Filters - Half-Wave Rectifier Power Supply - Full-WaveRectifierPowerSupply-Voltageregulators:Voltageregulation-Linearseries,shuntandswitching Voltage Regulators - Over voltage protection - BJT and MOSFET – Switched modepower supply (SMPS) - Power Supply Performance and Testing - Troubleshooting and FaultAnalysis,DesignofRegulatedDC PowerSupply.

TOTAL: 45 PERIODS

OUTCOMES:

Afterstudyingthiscourse,thestudentshouldbeableto:

- Acquireknowledgeof
  - Workingprinciples, characteristicsandapplicationsof BJTandFET
  - Frequencyresponsecharacteristicsof BJTandFETamplifiers
- AnalyzetheperformanceofsmallsignalBJTandFETamplifiers-singlestageandmultistageamplifiers
- Applytheknowledgegainedinthedesignof Electroniccircuits

Dr. L.SATHIYARAJAN, B.E., M.Tech., Ph.D., Principal, N.P.R. College of Engineering & Technology, Nathamkovil (Dt) - 624 401

TEXT BOOKS:

1. Donald.A.Neamen,ElectronicCircuitsAnalysisandDesign,3rdEdition,McGrawHillEducation(India)PrivateLtd.,2010.(UnitI-IV)
2. RobertL.BoylestadandLouisNasheresky,"ElectronicDevicesandCircuitTheory",11thEdition,PearsonEducation,2013.(UnitV)

REFERENCES

1. MillmanJ,Halkias.C.andSathyabradaJit,ElectronicDevicesandCircuits,4thEdition,McGrawHill Education(India)PrivateLtd.,2015.

2. SalivahananandN.SureshKumar,ElectronicDevicesandCircuits,4thEdition,,McGrawHillEducation(India)PrivateLtd.,2017.
3. Floyd,ElectronicDevices,NinthEdition, PearsonEducation,2012.
4. DavidA.Bell,Electronic Devices&Circuits,5thEdition,OxfordUniversityPress,2008.
5. AnwarA.KhanandKanchanK.Dey,AFirstCourseonElectronics,PHI,2006.
6. RashidM,MicroelectronicsCircuits,ThomsonLearning,2007.

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megatronics

Date : 05.10.2020

INTERNSHIP CONFIRMATION LETTER

This is with the reference to your permission letter requesting internship for **Ms.V.Dharshini (920818106005), Ms.Kiruthika.R (920818106013), Ms.Nivetha K.S (920818106019), Ms.Sarmathi.R (920818106027), Ms.Swetha.M (920818106035)** studying Third year in the department of Electronics and Communication Engineering in NPR college of Engineering and Technology, Natham. We are pleased to accord permission for the above mentioned students to undergo internship in our organization starting from 15.10.2020 - 29.10.2020

For **Megatronics**,

(C.Kannan)

MEGATRONICS COIMBATORE

N.P.R. COLLEGE OF ENGG. & TECH. * NATHAM-624 401.

Dr. J.SUNDARARAJAN, B.E., M.Tech., Ph.D.
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65, R.K. Mills 'B' Colony, Peelamedu Pudur, Coimbatore - 641 004.
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Web : www.megatronicsindia.in

EC8352 **SIGNALSANDSYSTEMSL**

L	T	P	C
4	0	0	4

OBJECTIVES:

- To understandthebasicpropertiesofsignal&systems
- To knowthemethodsofcharacterization ofLTIsystemsintimedomain
- To analyzecontinuoustimesignalsandsystemintheFourierandLaplacedomain
- To analyzediscretetimesignalsand systemin the FourierandZtransformdomain

UNITI CLASSIFICATIONOFSIGNALSANDSYSTEMS **12**

Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids_Classification ofsignals – Continuous time (CT) and Discrete Time (DT) signals, Periodic &Aperiodic signals, Deterministic & Random signals, Energy & Power signals - Classification ofsystems- CT systems and DT systems- – Linear & Nonlinear, Time-variant & Time-invariant,Causal&Non-causal,Stable&Unstable.

UNITII ANALYSISOF CONTINUOUSTIMESIGNALS **12**

Fourierseriesforperiodicsignals-FourierTransform–properties-LaplaceTransformsandproperties

UNITIII LINEARTIMEINVARIANTCONTINUOUSTIMESYSTEMS **12**

Impulseresponse-convolutionintegrals-DifferentialEquation-FourierandLaplacetransformsinAnalysisofCT systems-Systemsconnectedinseries/parallel.

UNITIV ANALYSISOFDISCRETETIMESIGNALS **12**

BasebandsignalSampling–FourierTransformofdiscretetimesignals(DTFT)–PropertiesofDTFT-ZTransform&Properties

UNITV LINEAR TIMEINVARIANT-DISCRETETIMESYSTEMS **12**

Impulse response – Difference equations-Convolution sum- Discrete Fourier Transform and ZTransform Analysis of Recursive & Non-Recursive systems-DT systems connected in series andparallel.

TOTAL:60PERIODS

OUTCOMES:

Atthe endofthecourse,thestudentshouldbe able to:

- Tobeabletodetermine ifagiven systemislinear/causal/stable
- Capableofdeterminingthefrequencycomponentspresentinadeterministicsignal
- Capableof characterizingLTIsystemsinthetimedomainandfrequencydomain
- Tobeabletocomputetheoutputof anLTIsysteminthetimeandfrequencydomains

TEXTBOOK:

1. AllanV.Oppenheim,S.WilskyandS.H.Nawab,"SignalsandSystems",Pearson,2015.(Unit1-V)

REFERENCES

1. B.P.Lathi,"PrinciplesofLinearSystemsandSignals",Second Edition,Oxford,2009.
2. R.E.Zeimer,W.H.TranterandR.D.Fannin,"Signals&Systems-ContinuousandDiscrete",Pearson,2007.
3. John AlanStuller,"An Introduction to SignalsandSystems",Thomson,2007.

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megatronics

Date : 29.10.2020

TO WHOM SO EVER IT MAY

This is to certify that **Ms. Dharshini.V (920818106005)** doing B.E,Electronics and Communication Engineering in NPR college of engineering and technology,Natham has participated in the intership program offered by our organization during the period of 15.10.2020 - 29.10.2020.

We wish her every success in life.

For **Megatronics,**

(C.Kabilan)

MEGATRONICS COIMBATORE

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

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Web : www.megatronicsindia.in

EC8392OBJEC **DIGITALELECTRONICS** L T P C
3 0 0 3

TIVES:

- TopresenttheDigitalfundamentals,Booleanalgebraanditsapplicationsindigitalsystems
- Tofamiliarize withthedesignofvariouscombinationaldigitalcircuitsusinglogicgates
- Tointroducetheanalysisanddesignproceduresforsynchronousandasynchronoussequentialcircuits
- Toexplainthevarioussemiconductormemoriesandrelatedtechnology
- To introducetheelectroniccircuitsinvolved inthemakingof logicgates

UNITI DIGITAL FUNDAMENTALS 9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universalgates,Sumofproductsandproductofsums,MintermsandMaxterms,KarnaughmapMinimization andQuine-McCluskey methodofminimization.

UNITII COMBINATIONAL CIRCUITDESIGN 9

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry lookaheadAdder,BCDAdder,Multiplexer,Demultiplexer,MagnitudeComparator,Decoder,Encoder,PriorityEncoder.

UNITIII SYNCHRONOUSSEQUENTIALCIRCUITS 9

Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF,Analysis and design of clocked sequential circuits – Design - Moore/Mealy models, stateminimization, state assignment, circuit implementation – Design of Counters- Ripple Counters,RingCounters,Shiftregisters,UniversalShiftRegister.

UNITIV ASYNCHRONOUSSEQUENTIALCIRCUITS 9

Stable and Unstable states, output specifications, cycles and races, state reduction, race freeassignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazardfreecircuits.

UNITV MEMORYDEVICESANDDIGITALINTEGRATEDCIRCUITS 9

Basic memory structure – ROM -PROM – EPROM – EEPROM –EAPROM, RAM – Static anddynamicRAM-ProgrammableLogicDevices–ProgrammableLogicArray(PLA)-Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - ImplementationofcombinationallogiccircuitsusingPLA,PAL.

Digital integrated circuits: Logic levels, propagation delay, power dissipation, fan-out and fan-in,noisemargin,logicfamiliesandtheircharacteristics-RTL,TTL,ECL,CMOS

TOTAL: 45 PERIODS

OUTCOMES:

Attheendofthecourse:

- Usedigitalelectronicsin thepresentcontemporaryworld
- Designvariouscombinationaldigitalcircuitsusinglogicgates
- Dotheanalysisanddesignproceduresforsynchronousandasynchronoussequentialcircuits
- Use the semiconductormemoriesandrelatedtechnology
- Use electroniccircuitsinvolvedinthe designoflogicgates

TEXTBOOK:

1. M.MorrisManoand MichaelD.Ciletti,"DigitalDesign",5th Edition,Pearson,2014.

NPR COLLEGE OF ENGG. & TECHNOLOGY NATHAM

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Natham, Dindigul (Dt) - 624 401.

REFERENCES:

1. CharlesH.Roth."FundamentalsofLogicDesign",6thEdition,ThomsonLearning,2013.
2. ThomasL.Floyd,"DigitalFundamentals",10th Edition,PearsonEducationInc,2011
3. S.SalivahananandS.Arivazhagan"DigitalElectronics",IstEdition,VikasPublishingHousepvt Ltd,2012.
4. AnilK.Maini"DigitalElectronics",Wiley,2014.
5. A.AnandKumar"FundamentalsofDigitalCircuits",4thEdition,PHILearningPrivateLimited,2016.
6. SoumitraKumarMandal"DigitalElectronics",McGrawHillEducationPrivateLimited,2016.

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H.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

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Date: 28.10.2020

Ref No: SUP/INT/20895

INTERNSHIP TRAINING CERTIFICATE

TO WHOM IT MAY CONCERN

This is to certify that **Ms.UMA NANTHINI.N (920819106066)** pursuing his second year ECE at NPR College of Engineering & Technology, Natham, has undergone her Internship Training in our concern **from 13.10.2020 to 28.10.2020.**

We appreciate her participation with interest towards the training program.

For SUPERFECT SOLUTIONS,

AUTHORIZED SIGNATORY

SUPERFECT SOLUTIONS SALEM.

Dr. J.SUNDARARAJAN,
B.E., M.Tech., Ph.D.,
Principal
N.P.R. College of Engineering & Technology
Natham, Dindigul (Dt) - 624 401.

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

SUPERFECT SOLUTIONS

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EC8391 **CONTROLSYSTEMSENGINEERING**

L	T	P	C
3	0	0	3

OBJECTIVES:

- Tointroducethe componentsandtheirrepresentationofcontrolsystems
- Tolearnvariousmethodsforanalyzingthetimeresponse,frequencyresponseandstabilityofthesystems.
- To learnthevariousapproachforthestatevariableanalysis.

UNITI SYSTEMSCOMPONENTSAND THEIRREPRESENTATION 9

Control System: Terminology and Basic Structure-Feed forward and Feedback control theory-Electrical and Mechanical Transfer Function Models-Block diagram Models-Signal flow graphsmodels-DCandACservoSystems-Synchronous-Multivariablecontrol system

UNITII TIMERESPONSEANALYSIS 9

Transientresponse-steady stateresponse-Measures ofperformance ofthestandard firstorderand second order system-effect on an additional zero and an additional pole-steady error constantandsystem-typenumber-PIDcontrol-AnalyticaldesignforPD,PI,PIDcontrolsystems

UNITIII FREQUENCYRESPONSEAND SYSTEMANALYSIS 9

Closedloopfrequencyresponse-Performancespecificationinfrequencydomain-Frequencyresponseofstandardsecondorder system-BodePlot -Polar Plot-Nyquist plots-Designofcompensators using Bode plots-Cascade lead compensation-Cascade lag compensation-Cascadelag-leadcompensation

UNITIV CONCEPTSOFSTABILITYANALYSIS 9

Concept of stability-Bounded - Input Bounded - Output stability-Routh stability criterion-Relativestability-Root locusconcept-Guidelinesforsketchingrootlocus-Nyquiststability criterion.

UNITV CONTROLSYSTEMANALYSISUSING STATEVARIABLEMETHODS 9

State variable representation-Conversion of state variable models to transfer functions-Conversionoftransferfunctionstostatevariablemodels-Solutionofstateequations-ConceptsofControllability and Observability-Stability of linear systems-Equivalence between transfer functionand state variable representations-State variable analysis of digital control system-Digital controldesignusingstatefeedback.

TOTAL:45PERIODS

OUTCOMES:

Uponcompletionofthe course,the studentshouldbe ableto:

- Identifythevariouscontrolsystemcomponentsandtheirrepresentations.
- Analyzethe varioustimedomainparameters.
- Analysisthevariousfrequencyresponseplots andits system.
- Applythe conceptsofvarioussystemstabilitycriterions.
- Designvarioustransferfunctionsof digitalcontrolsystemusingstatevariablemodels.

TEXTBOOK:

1.M.Gopal,"ControlSystem–Principlesand Design",Tata McGrawHill,4th Edition,2012.

REFERENCES:

1. J.NagrathandM.Gopal,"ControlSystemEngineering",NewAgeInternationalPublishers,5th Edition,2007.
2. K.Ogata,'ModernControlEngineering',5thedition,PHI,2012.
3. S.K.Bhattacharya,ControlSystemEngineering,3rd Edition,Pearson,2013.
4. Benjamin.C.Kuo,"Automaticcontrolsystems",Prentice HallofIndia,7thEdition,1995.

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NASSCOM MEMBER

Date: 23.10.2020

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.D.Prasanna (920819106046), Ms.N.Singarabrindha (920819106059), Ms.K.Vishali (920819106069), Mr.B.Mohanbabu (920819106034) and Mr.M.Muthu Moorthy (920819106036)** of Second year ECE of NPR College of Engineering& Technology, Natham have successfully done the internship in our concern from 08.10.2020 – 23.10.2020.

During this period they were sincere and hardworking.

With Regards

ELYSIUM TECHNOLOGIES PVT. LTD.

(For Elysium technologies)

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

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MA8451 **PROBABILITY ANDRANDOMPROCESSES** L T P C
4 0 0 4

OBJECTIVES:

- To provide necessary basic concepts in probability and random processes for applicationssuchas randomsignals,linearsystemsincommunicationengineering.
- Tounderstandthebasicconceptsofprobability,oneandtwodimensionalrandomvariables and to introduce some standard distributions applicable to engineering which candescribereal lifephenomenon.
- Tounderstandthebasicconceptsofrandomprocesseswhicharewidelyusedin ITfields.
- Tounderstandtheconceptofcorrelationand spectraldensities.
- Tounderstandthe significanceoflinearsystemswith randominputs.

UNITI PROBABILITYAND RANDOMVARIABLES **12**

Probability – Axioms of probability – Conditional probability – Baye's theorem - Discrete andcontinuous random variables – Moments – Moment generating functions – Binomial, Poisson,Geometric,Uniform,ExponentialandNormaldistributions.

UNITII TWO-DIMENSIONAL RANDOMVARIABLES **12**

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linearregression – Transformation of random variables – Central limit theorem (for independent andidenticallydistributedrandomvariables).

UNITIII RANDOMPROCESSES **12**

Classification – Stationary process – Markov process - Markov chain - Poisson process – Randomtelegraphprocess.

UNITIV CORRELATION AND SPECTRAL DENSITIES **12**

Auto correlation functions – Cross correlation functions – Properties – Power spectral density – Cross spectraldensity–Properties.

UNITV LINEAR SYSTEMS WITHRANDOMINPUTS **12**

Linear time invariant system – System transfer function – Linear systems with random inputs – Autocorrelationandcross correlationfunctionsofinputandoutput.

TOTAL:60PERIODSOUTCOMES:

Uponsuccessfulcompletionofthecourse,studentsshouldbeableto:

- Understand the fundamentalknowledgeofthe conceptsofprobabilityand haveknowledgeofstandarddistributionswhichcandescribereallifephenomenon.
- Understandthebasicconceptsofoneandtwodimensionalrandomvariablesandapplyinengineeri ngapplications.
- Applytheconceptrandomprocessesin engineeringdisciplines.
- Understandandapplytheconceptofcorrelationand spectraldensities.
- The students will have an exposure of various distribution functions and help in acquiringskills in handling situations involving more than one variable. Able to analyze the responseofrandominputs tolineartimeinvariantsystems.

TEXT BOOKS:

1. Ibe,O.C.,"FundamentalsofAppliedProbabilityandRandomProcesses",1st IndianReprint,Elsevier,2 007.
2. Peebles,P.Z.,"Probability,RandomVariablesandRandomSignalPrinciples",TataMcGrawHill,4th Edition,New Delhi,2002.

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REFERENCES:

1. Cooper.G.R.,McGillem.C.D.,"ProbabilisticMethodsofSignalandSystemAnalysis",OxfordUniversityPress,New Delhi,3rd IndianEdition,2012.
2. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, RandomVariablesandRandomProcesses ",TataMcGrawHillEdition,NewDelhi,2004.
3. Miller.S.L.andChilders.D.G.,"ProbabilityandRandomProcesseswithApplicationstoSignalProcessingandCommunications ",AcademicPress,2004.
4. Stark. H. and Woods.J.W., "Probabilityand Random ProcesseswithApplicationstoSignalProcessing",PearsonEducation,Asia,3rdEdition,2002.
5. Yates.R.D.andGoodman.D.J.,"ProbabilityandStochasticProcesses",WileyIndiaPvt.Ltd.,Bangalore,2nd Edition,2012.

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CIN No: U72200TN2006PTC060465
NASSCOM MEMBER

Date: 23.10.2020

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr.D.Prasanna (920819106046), Ms.N.Singarabrindha (920819106059), Ms.K.Vishali (920819106069), Mr.B.Mohanbabu (920819106034) and Mr.M.Muthu Moorthy (920819106036)** of Second year ECE of NPR College of Engineering& Technology, Natham have successfully done the internship in our concern from 08.10.2020 – 23.10.2020.

During this period they were sincere and hardworking.

With Regards

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EC8452 **ELECTRONICCIRCUITSII** L T P C
3 0 0 3

OBJECTIVES:

- Togiveacomprehensiveexposuretoalltypesofamplifiersandoscillatorsconstructed with discrete components. This helps to develop a strong basis forbuildinglinearanddigitalintegratedcircuits
- Tostudyaboutfeedbackamplifiersandoscillatorsprinciples
- To designoscillators.
- To studyabout turnedamplifier.
- Tounderstandtheanalysisanddesignofl.CandRCoscillators,amplifiers,multivibrators, poweramplifiersandDCconvertors.

UNITI FEEDBACKAMPLIFIERSANDSTABILITY 9

Feedback Concepts – gain with feedback – effect of feedback on gain stability, distortion,bandwidth, input and output impedances; topologies of feedback amplifiers – analysis ofseries-series, shunt-shunt and shunt-series feedback amplifiers-stability problem-Gain andPhase-margins-Frequency compensation.

UNITII OSCILLATORS 9

Barkhausencriterionforoscillation–phaseshift,Wienbridge-Hartley&Colpitt'soscillators – Clapp oscillator-Ring oscillators and crystal oscillators – oscillator amplitudestabilization.

UNITIII TUNEDAMPLIFIERS 9

Coil losses,unloadedandloadedQoftankcircuits,small signal tunedamplifiers–Analysis of capacitor coupled single tuned amplifier – double tuned amplifier - effect ofcascadingsingletunedanddoubletunedamplifiersonbandwidth–Staggertunedamplifiers-Stabilityoftunedamplifiers–Neutralization-Hazeltineneutralization method.

UNITIV WAVESHAPINGANDMULTIVIBRATORCIRCUITS 9

Pulsecircuits– attenuators –RC integrator and differentiator circuits– diodeclampersandclippers–Multivibrators-SchmittTrigger-UJTOscillator.

UNITV POWER AMPLIFIERSAND DC CONVERTERS 9

Poweramplifiers-classA-ClassB-ClassAB-ClassC-PowerMOSFET-TemperatureEffect-Class AB Power amplifier using MOSFET –DC/DC convertors – Buck, Boost,Buck-Boostanalysisanddesign

TOTAL: 45 PERIODS

OUTCOMES:

Uponcompletionofthe course,the studentshouldbe ableto:

- Analyzedifferent typesofamplifier,oscillatorandmultivibratorcircuits
- DesignBJTamplifierandoscillatorcircuits
- Analyzetransistorized amplifierandoscillatorcircuits
- Designandanalyzefeedbackamplifiers
- DesignLCandRCoscillators,tunedamplifiers,waveshapingcircuits,multivibrators,pow eramplifierandDCconvertors.

TEXT BOOKS:

1. Sedra and Smith, "Micro Electronic Circuits"; Sixth Edition, Oxford University Press,2011.(UNIT I,III,IV,V)
2. JacobMillman,'Microelectronics',McGrawHill,2ndEdition,Reprinted,2009.(UNITI,II,IV ,V)

NPR COLLEGE OF ENGG & TECHNOLOGY NATHAM

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REFERENCES:

1. RobertL.BoylestadandLouisNasheresky,"ElectronicDevicesandCircuitTheory",10th Edition,PearsonEducation/PHI,2008
2. DavidA.Bell,"ElectronicDevicesandCircuits",FifthEdition,OxfordUniversityPress, 2008.
3. MillmanJ.andTaubH., "PulseDigitalandSwitchingWaveforms", TMH,2000.
4. MillmanandHalkias.C.,IntegratedElectronics,TMH,2007.

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GSTIN : 33AAACV0909J1ZJ PAN No.: AAACV0909J

Date: 10.09.2020

TO WHOM IT MAY CONCERN

This is to certify that **Ms.Durgadevi S (920818106008)** studying in Third year Electronics and Communication Engineering of NPR College of Engineering & Technology,Natham has undergoneIn-Plant training in our organization for 7 days from 03.09.2020 – 10.09.2020.

During the period, her conduct was found to be good.

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With Regards

For VI Microsystems

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EC8491 **COMMUNICATIONTHEORY** L T P C
3 0 0 3

OBJECTIVES:

- Tointroducetheconceptsofvariousanalogmodulationsandtheirspectralcharacteristics
- To understandthepropertiesofrandomprocess
- Toknowtheeffectofnoiseon communication systems
- Toknowtheprinciplesofsampling&quantization

UNITI AMPLITUDEMODULATION 9

Amplitude Modulation- DSBSC, DSBFC, SSB, VSB - Modulation index, Spectra, Power relationsand Bandwidth – AM Generation – Square law and Switching modulator, DSBSC Generation –Balanced and Ring Modulator, SSB Generation – Filter, Phase Shift and Third Methods, VSBGeneration – Filter Method, Hilbert Transform, Pre-envelope & complex envelope – comparison ofdifferentAMtechniques,SuperheterodyneReceiver

UNITII ANGLEMODULATION 9

Phase and frequency modulation, Narrow Band and Wide band FM – Modulation index, Spectra,Power relations and Transmission Bandwidth - FM modulation –Direct and Indirect methods, FMDemodulation–FMtoAMconversion,FMDiscriminator-PLLasFMDemodulator.

UNITIII RANDOMPROCESS 9

Randomvariables,RandomProcess,StationaryProcesses,Mean, Correlation&Covariancefunctions, Power Spectral Density, Ergodic Processes, GaussianProcess, Transmission ofaRandomProcessThroughaLTIfilter.

UNITIV NOISECHARACTERIZATION 9

Noisesources –Noise figure, noisetemperatureandnoisebandwidth–Noiseincascadedsystems. Representation of Narrow band noise –In-phase and quadrature, Envelope and Phase –Noise performance analysis in AM & FM systems – Threshold effect, Pre-emphasis and de-emphasisforFM.

UNITV SAMPLING& QUANTIZATION 9

Lowpasssampling–Aliasing-SignalReconstruction-Quantization-Uniform&non-uniformquantization - quantization noise - Logarithmic Companding –PAM, PPM, PWM, PCM – TDM,FDM.

TOTAL: 45 PERIODS

OUTCOMES:

Atthe endofthecourse,thestudentshouldbe able to:

- DesignAMcommunicationsystems
- DesignAnglemodulated communicationsystems
- ApplytheconceptsofRandomProcessto thedesignofCommunication systems
- AnalyzethenoiseperformanceofAMandFMsystems
- Gainknowledgein samplingand quantization

TEXT BOOKS:

1. J.G.Proakis,M.Salehi,"Fundamentals ofCommunicationSystems",PearsonEducation2014.(UNIT I-IV)
2. Simon Haykin, "CommunicationSystems",4thEdition,Wiley,2014.(UNITI-V)

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REFERENCES:

1. B.P.Lathi,"ModernDigitalandAnalogCommunicationSystems",3rdEdition,OxfordUniversityPress,2007.
2. D.Roody,J.Coolen,—ElectronicCommunications,4theditionPHI2006
3. A.Papoulis,"Probability,RandomvariablesandStochasticProcesses",McGrawHill,3rd edition,1991.
4. B.Sklar,"DigitalCommunicationsFundamentalsandApplications",2ndEditionPearsonEducation2007
5. HP Hsu, SchaumOutlineSeries-"AnalogandDigitalCommunications"TMH2006
6. Couch.L.,"ModernCommunicationSystems",Pearson,2001.

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megatronics

Date: 22.09.2020

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. AFRIN SHIFANA S (920819106002)** doing Second year B.E, Electronics and Communication Engineering in NPR College of Engineering & Technology, Natham has undergone the In-plant training program offered by our organization during the period of 15.09.2020 - 22.09.2020.

We wish her every success in life.

For **Megatronics**

(C.Kabilan)

MEGATRONICS COIMBATORE

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

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Megatronics
65, R.K. Mills 'B' Colony, Peelamedu Pudur, Coimbatore - 641 004.
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Web : www.megatronicsindia.in

EC8451	ELECTROMAGNETICFIELDS	L	T	P	C
		4	0	0	4

OBJECTIVES:

- To gain conceptual and basic mathematical understanding of electric and magnetic fields infreespaceandinmaterials
- To understand the coupling between electric and magnetic fields through Faraday's law,displacementcurrentandMaxwell's equations
- To understandwavepropagation in losslessand in lossymedia
- Tobeabletosolveproblems basedontheaboveconcepts

UNITI INTRODUCTION **12**

Electromagnetic model, Units and constants, Review ofvector algebra, Rectangular, cylindricaland spherical coordinate systems, Line, surface and volume integrals, Gradient of a scalar field,Divergence of a vector field, Divergence theorem, Curl of a vector field, Stoke's theorem, Nullidentities,Helmholtz'stheorem

UNITII ELECTROSTATICS **12**

Electric field, Coulomb's law, Gauss's law and applications, Electric potential, Conductors in staticelectricfield,Dielectricsinstaticelectricfield,Electricfluxdensityanddielectricconstant,Boundaryconditions,Capacitance,Parallel,cylindricalandsphericalcapacitors,Electrostaticenergy, Poisson's and Laplace's equations, Uniqueness of electrostatic solutions, Current densityandOhm'slaw,ElectromotiveforceandKirchhoff'svoltagelaw,EquationofcontinuityandKirchhoff'scurrentlaw

UNITIII MAGNETOSTATICS **12**

Lorentz force equation, Law of no magnetic monopoles, Ampere's law, Vector magnetic potential,Biot-Savartlawandapplications,Magneticfieldintensityandideaofrelativepermeability,Magneticcircuits,Behaviourofmagneticmaterials,Boundaryconditions,Inductanceandinductors,Magneticenergy,Magneticforcesandtorques

UNITIV TIME-VARYINGFIELDSANDMAXWELL'sEQUATIONS **12**

Faraday's law, Displacement current and Maxwell-Ampere law, Maxwell's equations, Potentialfunctions, Electromagnetic boundary conditions, Wave equations and solutions, Time-harmonicfields

UNITV PLANEELECTROMAGNETIC WAVES **12**

Planewavesinlosslessmedia,Planewavesinlossymedia(low-lossdielectricsandgoodconductors), Group velocity, Electromagnetic power flow and Poynting vector, Normal incidence ataplaneconductingboundary,Normalincidenceataplanedielectric boundary

TOTAL:60PERIODS

OUTCOMES:

Bytheendofthiscourse, thestudentshouldbe able to:

- Displayanunderstandingof fundamentalelectromagneticlawsandconcepts
- WriteMaxwell's equationsinintegral,differentialandphasorformsandexplaintheirphysicalmeaning
- Explainelectromagneticwavepropagationinlossyandinlosslessmedia
- Solve simpleproblemsrequiringestimationofelectricandmagneticfieldquantitiesbasedontheseconcepts andlaws

TEXT BOOKS:

1. D.K.Cheng,Fieldandwave electromagnetics, 2nded., Pearson(India),1989(UNITI,II,IIIIV,V)
2. W.H.HaytandJ.A.Buck,Engineeringelectrmagnetics,7thed.,McGraw-Hill(India),2006(UNITI-V)

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REFERENCES

1. D.J.Griffiths,Introductiontoelectrodynamics,4thed.,Pearson (India),2013
2. B.M.Notaros,Electromagnetics,Pearson:NewJersey,2011
3. M.N.O.SadikuandS.V.Kulkarni,Principlesofelectromagnetics,6thed.,Oxford(AsianEdition),2015

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Date : 27.10.2020

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms.S.DhathVetha** (920819106014), studying in Second year Electronics and Communication Engineering of NPR College of Engineering & Technology, Natham has undergone internship in our organization from 12.10.2020 – 27.10.2020

During the period, her conduct was found to be good.

Vi Microsystems Pvt. Ltd., Plot No.75, Electronics Estate, Perungudi, Chennai - 96

With Regards

For VI Microsystems

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

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EC8453 **LINEARINTEGRATEDCIRCUITS** LTP C
300 3

OBJECTIVES:

- To introducethebasicbuildingblocksoflinearintegrated circuits
- To learnthelinearandnon-linearapplicationsof operationalamplifiers
- To introducethetheoryandapplicationsof analogmultipliersandPLL
- TolearnthetheoryofADCandDAC
- Tointroducetheconceptsofwaveformgenerationandintroducesomespecialfunction ICs

UNITI BASICSOFOPERATIONALAMPLIFIERS 9

Current mirror and current sources, Current sources as active loads, Voltage sources, VoltageReferences, BJT Differential amplifier with active loads, Basic information about op-amps – IdealOperational Amplifier - General operational amplifier stages -and internal circuit diagrams of IC741, DC and AC performance characteristics, slew rate, Open and closed loop configurations – JFETOperationalAmplifiers–LF155andTL082.

UNITII APPLICATIONSOF OPERATIONALAMPLIFIERS 9

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters,adder,subtractor,Instrumentationamplifier,Integrator,Differentiator,Logarithmicamplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipperandclamper,Low-pass,high-passandband-passButterworthfilters.

UNITIII ANALOGMULTIPLIERAND PLL 9

AnalogMultiplierusingEmitterCoupledTransistorPair-GilbertMultipliercell– Variabletransconductance technique, analog multiplier ICs and their applications, Operation of the basicPLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLLfor AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizingandclocksynchronisation.

UNITIV ANALOGTODIGITALANDDIGITAL TOANALOG CONVERTERS 9

Analog and Digital Data Conversions, D/A converter – specifications - weighted resistor type, R-2RLadder type, Voltage Mode and Current-Mode *R - 2R* Ladder types - switches for D/A converters,high speed sample-and-hold circuits, A/D Converters – specifications - Flash type - SuccessiveApproximation type - Single Slope type – Dual Slope type - A/D Converter using Voltage-to-TimeConversion-Over-samplingA/DConverters,Sigma–Deltaconverters.

UNITV WAVEFORMGENERATORSANDSPECIALFUNCTIONICS 9

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator,ICL8038 function generator, Timer IC 555, IC Voltageregulators – Three terminal fixed andadjustable voltage regulators - IC 723 general purpose regulator - Monolithic switching regulator,Low Drop – Out(LDO) Regulators - Switched capacitor filter IC MF10, Frequency to Voltage andVoltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto-couplersandfibreopticIC.

TOTAL:45PERIODS

OUTCOMES:

Uponcompletionofthe course,the studentshouldbe ableto:

- Designlinearandnonlinearapplicationsof OP–AMPS
- Designapplicationsusinganalog multiplierandPLL
- DesignADCandDACusingOP–AMPS
- Generate waveformsusingOP–AMP Circuits
- Analyze specialfunctionICs

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TEXT BOOKS:

1. D.RoyChoudhry,Shail Jain,"Linear Integrated Circuits",New AgeInternationalPvt.Ltd.,2018,FifthEdition.(UnitI–V)
2. SergioFranco,"DesignwithOperationalAmplifiersandAnalogIntegratedCircuits",4thEdition,TataMcGraw-Hill,2016(UnitI–V)

REFERENCES:

1. RamakantA.Gayakwad,"OP-AMPandLinearICs",4thEdition,PrenticeHall/PearsonEducation,2015.
2. RobertF.Coughlin,FrederickF.Driscoll,"OperationalAmplifiersandLinearIntegratedCircuits",SixthEdition,PHI,2001.
3. B.S.Sonde,"Systemdesign usingIntegratedCircuits",2ndEdition, NewAgePub,2001.
4. Gray and Meyer, "Analysis and Design of Analog Integrated Circuits", WileyInternational,5th Edition,2009.
5. WilliamD.Stanley,"OperationalAmplifierswithLinearIntegratedCircuits",PearsonEducation,4th Edition,2001.
6. S.Salivahanan&V.S.KanchanaBhaskaran,"LinearIntegratedCircuits",TMH,2nd Edition,4th Reprint,2016.

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BRIGHT

TECHNOLOGY

(Institute for technical traning)

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Mail : thebrighttechnology@gmail.com

Date:14.09.2020

To whomsoever it may concern

This is to certify that **Ms.MohanaPriya S**, Final year ECE of NPR College of Engineering & Technology, Natham has undergone In-Plant training in our organization from 07.09.2020 – 14.09.2020.

We appreciate her participation with interest towards the training program.

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

BRIGHT TECHNOLOGY DINDIGUL

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EC8501 **DIGITALCOMMUNICATION**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To studythe limitssetbyInformation Theory
- Tostudythevariouswaveformcodingschemes
- Tolearn thevariousbaseband transmissionschemes
- To understandthevariousbandpasssignalingschemes
- Toknowthefundamentalsof channelcoding

UNITI INFORMATIONTHEORY **9**

Discrete Memoryless source, Information, Entropy, Mutual Information - Discrete Memorylesschannels – Binary Symmetric Channel, Channel Capacity - Hartley - Shannon law - Source codingtheorem-Shannon-Fano&Huffmancodes.

UNITII WAVEFORMCODING&REPRESENTATION **9**

Prediction filtering and DPCM - Delta Modulation - ADPCM & ADM principles-Linear PredictiveCoding- Properties of Line codes- Power Spectral Density of Unipolar / Polar RZ & NRZ – BipolarNRZ-Manchester

UNITIII BASEBANDTRANSMISSION&RECEPTION **9**

ISI – Nyquist criterion for distortion less transmission – Pulse shaping – Correlative coding - Eyepattern–ReceivingFilters-MatchedFilter, Correlationreceiver,AdaptiveEqualization

UNITIV DIGITALMODULATIONSCHEME **9**

Geometric Representation of signals - Generation, detection, PSD & BER of Coherent BPSK,BFSK & QPSK - QAM - Carrier Synchronization - Structure of Non-coherent Receivers - PrincipleofDPSK.

UNITV ERRORCONTROL CODING **9**

Channel coding theorem - Linear Block codes - Hamming codes - Cyclic codes - Convolutionalcodes -Viterbi Decoder.

TOTAL:45PERIODS

OUTCOMES:

Uponcompletionofthecourse,thestudentshouldbeable to

- DesignPCMsystems
- Designandimplementbasebandtransmissionschemes
- Designandimplementbandpasssignalingschemes
- Analyzethespectralcharacteristicsofbandpasssignalingschemesandtheirnoiseperformance
- Designerrorcontrolcodingschemes

TEXTBOOK:

1.S. Haykin,"DigitalCommunications",JohnWiley,2005(UnitI–V)

REFERENCES

1. B.Sklar,"DigitalCommunicationFundamentalsandApplications",2ndEdition,PearsonEducation,2009
2. B.P.Lathi,"ModernDigitalandAnalogCommunicationSystems" 3rdEdition,OxfordUniversityPress2007.
3. HP Hsu, SchaumOutlineSeries-"AnalogandDigitalCommunications", TMH2006
4. J.GProakis,"DigitalCommunication",4thEdition,TataMcGrawHillCompany,2001.

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Superfect
Solutions

Date: 28.10.2020

Ref No: SUP/INT/20895

INTERNSHIP TRAINING CERTIFICATE

TO WHOM IT MAY CONCERN

This is to certify that **Mr.THARUN KUMAR.M (920819106065)** pursuing his second year ECE at NPR College of Engineering & Technology, Natham, has undergone his Internship Training in our concern **from 13.10.2020 to 28.10.2020.**

We appreciate his participation with interest towards the training program.

For SUPERFECT SOLUTIONS,

AUTHORIZED SIGNATORY

SUPERFECT SOLUTIONS SALEM.

Dr. J.SUNDARARAJAN,
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EC8553 **DISCRETE-TIMESIGNALPROCESSING** L T P C

4 0 0 4

OBJECTIVES:

- To learndiscretefouriertransform,propertiesof DFTanditsapplicationtolinearfiltering
- Tounderstandthecharacteristicsofdigitalfilters,designdigitalIIRandFIRfiltersandapply thesefilters tofilterundesirablesignals invariousfrequencybands
- Tounderstandtheeffectsóffiniteprecisionrepresentationondigitalfilters
- Tounderstandthefundamentalconceptsofmultiratesignalprocessinganditsapplications
- Tointroducetheconceptsofadaptivefiltersanditsapplicationtocommunicationengineering

UNITI DISCRETEFOURIER TRANSFORM **12**

Review ofsignals andsystems, concept of frequency in discrete-timesignals, summary ofanalysis & synthesis equations for FT & DTFT, frequency domain sampling, Discrete Fouriertransform (DFT) - deriving DFT from DTFT, properties of DFT - periodicity, symmetry, circularconvolution. Linear filtering using DFT. Filtering long data sequences - overlap save and overlapadd method. Fast computation of DFT - Radix-2 Decimation-in-time (DIT) Fast Fourier transform(FFT), Decimation-in-frequency(DIF)FastFouriertransform(FFT).LinearfilteringusingFFT.

UNITII INFINITEIMPULSERESPONSEFILTERS **12**

Characteristics of practical frequency selective filters.characteristics of commonly used analogfilters - Butterworth filters, Chebyshev filters. Design of IIR filters from analog filters (LPF, HPF,BPF, BRF) - Approximation of derivatives, Impulse invariance method, Bilinear transformation.Frequency transformation in the analog domain.Structure of IIR filter - direct form I, direct form II,Cascade,parallel realizations.

UNITIII FINITEIMPULSERESPONSEFILTERS **12**

Design of FIR filters - symmetric and Anti-symmetric FIR filters - design of linear phase FIR filtersusing Fourier series method - FIR filter design usingwindows (Rectangular, Hamming andHanning window), Frequency sampling method.FIR filter structures - linear phase structure,directformrealizations

UNITIV FINITEWORD LENGTHEFFECTS **12**

Fixed point and floating point number representation- ADC - quantization - truncation androunding - quantization noise - input / output quantization - coefficient quantization error - productquantizationerror - overflow error - limit cycle oscillations duetoproduct quantizationandsummation-scalingtopreventoverflow.

UNITV INTRODUCTIONTODIGITAL SIGNAL PROCESSORS **12**

DSP functionalities -circular buffering – DSP architecture – Fixed and Floating point architectureprinciples–Programming–Applicationexamples.

TOTAL:60PERIODS

OUTCOMES:

Attheendofthecourse, thestudentshouldbeable to

- ApplyDFTfortheanalysis ofdigitalsignalsandsystems
- DesignIIR andFIRfilters
- Characterizetheeffectsoffiniteprecisionrepresentationondigitalfilters
- Designmultiratefilters
- Applyadaptivefiltersappropriatelyincommunicationsystems

TEXTBOOK:

1.JohnG.Proakis&DimitrisG.Manolakis,"DigitalSignalProcessing– Principles,Algorithms&Applications",Fourth Edition,PearsonEducation/ PrenticeHall,2007.(UNITI–V)

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REFERENCES:

1. EmmanuelC.Ifeachor&Barrie.W.Jervis,"DigitalSignalProcessing",SecondEdition,PearsonEducation/PrenticeHall,2002.
2. A.V.Oppenheim,R.W.SchaferandJ.R.Buck,"Discrete-TimeSignalProcessing",8thIndianReprint,Pearson,2004.
3. SanjitK. Mitra,"DigitalSignalProcessing –AComputerBased Approach", TataMcGrawHill,2007.
4. AndreasAntoniou,"DigitalSignalProcessing",TataMcGrawHill,2006.

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Date: 10.09.2020

TO WHOM IT MAY CONCERN

This is to certify that **Ms.Kiruthika R (920818106013)** studying in Third year Electronics and Communication Engineering of NPR College of Engineering & Technology,Natham has undergoneIn-Plant training in our organization for 7 days from 03.09.2020 – 10.09.2020..

During the period, her conduct was found to be good.

Vi Microsystems Pvt. Ltd., Plot No.75, Electronics Estate, Perungudi, Chennai - 96

With Regards

For VI Microsystems

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EC8552 **COMPUTERARCHITECTUREANDORGANIZATION** **LTPC**
3 0 03

OBJECTIVES:

- Tomake studentsunderstand thebasicstructureandoperation ofdigitalcomputer
- Tofamiliarize withimplementationoffixedpointandfloating-pointarithmeticoperations
- Tostudythedesignofdatapathunitandcontrolunitforprocessor
- Tounderstandtheconceptofvariousmemoriesand interfacing
- Tointroducetheparallelprocessingtechnique

UNITI COMPUTERORGANIZATION&INSTRUCTIONS **9**

Basicsofacomputersystem:Evolution,Ideas,Technology,Performance,Powerwall,UniprocessorstoMultiprocessors. Addressingand addressingmodes.Instructions: OperationsandOperands,Representinginstructions,Logicaloperations,controloperations.

UNITII ARITHMETIC **9**

FixedpointAddition,Subtraction,MultiplicationandDivision.FloatingPointarithmetic,Highperformance arithmetic,Subwordparallelism

UNITIII THEPROCESSOR **9**

Introduction, Logic Design Conventions, Building a Datapath - A Simple Implementation scheme - An Overview of Pipelining - Pipelined Datapath and Control. Data Hazards: Forwarding versusStalling,Control Hazards,Exceptions,ParallelismviaInstructions.

UNITIV MEMORYAND I/OORGANIZATION **9**

Memoryhierarchy,MemoryChipOrganization,Cachememory,Virtualmemory.
Parallel Bus Architectures, Internal Communication Methodologies, Serial Bus Architectures, Massstorage,InputandOutputDevices.

UNITV ADVANCED COMPUTERARCHITECTURE **9**

Parallel processing architectures and challenges, Hardware multithreading, Multicore and sharedmemory multiprocessors, Introduction to Graphics Processing Units, Clusters and Warehousescalecomputers -IntroductiontoMultiprocessornetworktopologies.

TOTAL:45PERIODS

OUTCOMES:

Attheendofthecourse, thestudentshouldbeable to

- Describedatarepresentation, instructionformatsandtheoperationof adigitalcomputer
- Illustratethefixedpointandfloating-pointarithmetic forALUoperation
- Discussaboutimplementation schemesofcontrolunitandpipelineperformance
- Explaintheconceptofvariousmemories,interfacingandorganizationofmultipleprocessors
- Discussparallelprocessingtechniqueandunconventionalarchitectures

TEXT BOOKS:

1. DavidA.PattersonandJohnL.Hennessey,"ComputerOrganizationandDesign",Fifthedition,MorganKauffman/Elsevier,2014.(UNIT I-V)
2. MilesJ.MurdoccaandVincentP.Heuring,"ComputerArchitectureandOrganization:AnIntegratedapproach",Secondedition,WileyIndiaPvtLtd,2015(UNITIV,V)

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REFERENCES

1. V.CarlHamacher,ZvonkoG.VaranesicandSafatG.Zaky,"ComputerOrganization", Fifthedition,McGraw-HillEducationIndiaPvtLtd,2014.
2. WilliamStallings"ComputerOrganizationandArchitecture",SeventhEdition,PearsonEducation,2006.
3. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications",Secondedition,McGraw-Hill EducationIndiaPvtLtd,2014.

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Date: 10.09.2020

TO WHOM IT MAY CONCERN

This is to certify that **Ms.Kiruthika R (920818106013)** studying in Third year Electronics and Communication Engineering of NPR College of Engineering & Technology,Natham has undergoneIn-Plant training in our organization for 7 days from 03.09.2020 – 10.09.2020..

During the period, her conduct was found to be good.

Vi Microsystems Pvt. Ltd., Plot No.75, Electronics Estate, Perungudi, Chennai - 96

With Regards

For VI Microsystems

N.P.R. COLLEGE OF ENGG. & TECH. NATHAM-624 401

Dr. J.SUNDARARAJAN,
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EC8551OBJE	COMMUNICATIONNETWORKS	L	T	P	C
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CTIVES:

Thestudentshouldbemadeto:

- Understandthe divisionofnetworkfunctionalitiesintolayers.
- Befamiliarwiththecomponentsrequiredtobuilddifferenttypesof networks
- Beexposedtothe requiredfunctionalityateachlayer
- Learn theflowcontrolandcongestioncontrolalgorithms

UNITI FUNDAMENTALS& LINKLAYER **9**

Overview of Data Communications- Networks – Building Network and its types– Overview ofInternet - Protocol Layering -OSI Mode – Physical Layer – Overview of Data and Signals-introductiontoDataLinkLayer-LinklayerAddressing-ErrorDetectionandCorrection

UNITII MEDIAACCESS& INTERNETWORKING **9**

Overview of Data link Control and Media access control - Ethernet (802.3) - Wireless LANs – Available Protocols – Bluetooth – Bluetooth Low Energy – WiFi – 6LowPAN–Zigbee - Networklayerservices–PacketSwitching–IPV4 Address–Networklayerprotocols(IP,ICMP, MobileIP)

UNITIII ROUTING **9**

Routing- Unicast Routing – Algorithms – Protocols –Multicast Routing and its basics – Overviewof Intradomain and Interdomain protocols –Overview of IPv6 Addressing – Transition from IPv4 toIPv6

UNITIV TRANSPORTLAYER **9**

Introduction to Transport layer –Protocols- User Datagram Protocols (UDP) and TransmissionControl Protocols (TCP) –Services – Features – TCP Connection – State Transition Diagram –Flow, Error and Congestion Control - Congestion avoidance (DECbit, RED) – QoS – Applicationrequirements

UNITV APPLICATIONLAYER **9**

Application Layer Paradigms – Client Server Programming – World Wide Web and HTTP - DNS– Electronic Mail (SMTP, POP3, IMAP, MIME) – Introduction to Peer to Peer Networks – Need forCryptographyandNetworkSecurity –Firewalls.

TOTAL:45PERIODS

OUTCOMES:

Atthe endofthecourse,thestudentshouldbe able to:

- Identifythe componentsrequired to builddifferenttypesofnetworks
- Choosetherequiredfunctionalityateachlayerforgivenapplication
- Identifysolutionforeachfunctionalityat eachlayer
- Tracetheflowof informationfromonenodetoanothernodeinthenetwork

TEXTBOOK:

1. BehrouzA.Forouzan,"DatacommunicationandNetworking",FifthEdition,TataMcGraw–Hill,2013(UNIT I–V)

REFERENCES

1. JamesF.Kurose,KeithW.Ross,"ComputerNetworking-ATop-DownApproachFeaturingtheInternet",SeventhEdition,PearsonEducation,2016.
2. Nader.F.Mir,"ComputerandCommunicationNetworks",PearsonPrenticeHallPublishers,2nd Edition,2014.
3. Ying-DarLin,Ren-HungHwang,FredBaker,"ComputerNetworks:AnOpenSourceApproach",McGraw Hill Publisher,2011.
4. LarryL.Peterson,BruceS.Davie,"ComputerNetworks:ASystemsApproach",FifthEdition,MorganKaufmannPublishers,2011.

EFFECTIVE BRAIN SIGNAL STATE DETECTION USING COVOLUTIONAL NEURAL NETWORK

A PROJECT REPORT

Submitted by

N.ISHWARYA **(920817106026)**

G.PREETHI **(920817106048)**

C.SIVARANJANI **(920817106063)**

in partial fulfilment for the award of the degree

Of

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in

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NATHAM, DINDUGUL .

ANNA UNIVERSITY :: CHENNAI 600 025

APRIL 2021

ABSTRACT

In recent years, advanced neurocomputing and machine learning techniques have been used for Electroencephalogram (EEG) based diagnosis of various neurological disorders. EEG signals are one of the most important means of indirectly measuring the state of the brain. Depression affects large number of people across the world today and it is considered as the global problem. It is a mood disorder which can be detected using EEG signals. The existing depression algorithms have lack of efficient feature selection techniques to improve the performance of a subsequent classifier. In our proposed work, a novel computer model is presented for EEG based screening of depression using a deep neural network machine learning approach, known as Convolutional Neural Network (CNN). It learns automatically and adaptively from the input EEG signal to differentiate EEGs obtained from depressive and normal subjects. The performance of the proposed method is evaluated using the physionet, which is the publicly available EEG dataset. The results show that the method can find the optimal features and distinguish the two groups of subject. It effectively improves the classification accuracy

CHAPTER-7

CONCLUSION AND FUTURE WORK

CONCLUSION

Depression is a major health concern in millions of individuals. Thus, diagnosing depression in the early curable stages is critical for the treatment in order to save the life of a patient. However, current methods of depression detection are human-intensive, and their results are dependent on the experience of the doctor. Therefore, a pervasive and objective method of diagnosing or even screening would be useful.

The present work explores a novel method of depression detection using FIR filter and CNN based classification. Te results exhibited KNN as the best performance classification method in all datasets, with the highest accuracy of 79.27%. The MATLAB results also demonstrated the feature "absolute power of theta wave" in all the best performance features of the datasets, thereby suggesting a robust connection between the power of theta wave and depression .The overall accuracy of the proposed framework is found by 92%. This could be used as a valid characteristic feature in the detection of depression.

FUTURE WORK

It is a common problem in similar studies, a known limitation is the relatively low number of both depressed and control subjects. We anticipate on reporting on a larger dataset in the future. We can consider how to improve the various feature extraction algorithm in order to find the better features and to obtain the higher classification accuracy .Therefore, deep learning can be applied to big data sets in future work.

EC8073	MEDICALELECTRONICS	LTPC
		3003

OBJECTIVES:

The studentshouldbemade:

- To gain knowledge about the various physiological parameters both electrical and nonelectricalandthemethodsofrecordingandalsothemethodoftransmittingtheseparameters
- Tostudyaboutthevariousassistdevicesusedinthehospitals
- To gain knowledge about equipment used for physical medicine and the various recentlydevelopeddiagnosticandtherapeutictechniques.

UNITI ELECTRO-PHYSIOLOGYANDBIO-POTENTIALRECORDING **9**

Sourcesofbiomedicalsignals,Bio-potentials,Biopotentialelectrodes,biologicalamplifiers,ECG,EEG,EMG,PCG,typicalwaveformsandsignal characteristics

UNITII BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT

pH,PO2,PCO2,Colorimeter,Bloodflowmeter,Cardiacoutput,respiratory,bloodpressure,temperatureandpulsemeasurement,BloodCell Counters.

UNITIII ASSISTDEVICES **9**

Cardiacpacemakers,DCDefibrillator,Dialyser,Ventilators,MagneticResonanceImagingSystems,UltrasonicImagingSystems.

UNITIV PHYSICALMEDICINEANDBIOTELEMETRY **9**

Diathermies-Shortwave,ultrasonicandmicrowavetypeandtheirapplications,SurgicalDiathermy,Biotelemetry.

UNITV RECENT TRENDSINMEDICAL INSTRUMENTATION **9**

Telemedicine,Insulin Pumps,Radiopill,Endomicroscopy,Brainmachineinterface,Labona chip.

TOTAL:45PERIODS **9**

OUTCOMES:

Onsuccessfulcompletionofthiscourse,the studentshouldbe able to:

- Knowthehumanbodyelectro-physiologicalparametersandrecordingofbio-potentials
- Comprehend the non-electrical physiological parameters and their measurement–bodytemperature,bloodpressure,pulse,bloodcellcount,bloodflowmeteretc.
- Interpret the various assist devices used in the hospitals viz. pacemakers, defibrillators,dialyzersandventilators
- Comprehend physical medicine methods eg. ultrasonic, shortwave, microwave surgicaldiathermies,andbio-telemetryprinciplesandmethods
- Knowaboutrecenttrendsinmedicalinstrumentation

TEXTBOOK:

1.Leslie Cromwell, "Biomedical Instrumentation and Measurement", Prentice Hall of India, NewDelhi,2007.(UNIT I–V)

REFERENCES:

1. Khandpur,R.S.,"HandbookofBiomedicalInstrumentation",TATAMcGraw-Hill,NewDelhi,2003.
2. JohnG.Webster, "Medical Instrumentation Application andDesign", 3rdEdition, Wiley IndiaEdition,2007
3. JosephJ.Carr andJohnM.Brown,"IntroductiontoBiomedicalEquipmentTechnology",JohnWileyandSons,New York,2004

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DESIGNING OF IOT BASED ON COMPACT MODULAR BITE FORCE MEASUREMENT SYSTEM DENTAL APPLICATION

A PROJECT REPORT

Submitted by

DEVADARSHINI.R	**(920817106017)**
MADHUMITHA.V	**(920817106035)**
NIVETHA.K	**(920817106044)**

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APRIL 2021

ABSTRACT

The stomatognathic system is a very complex structure that includes the temporomandibular joint, masticatory muscles ,teeth, gingival, tongue , and pharynx. In this structure , maximum bite force measurement has been an important field of study in the diagnosis and treatment of diseases caused by disorders related to chewing habits. Since existing measurement system are expensive and impractical , researchers are in search of better system. In this project , a modular and low cost IOT based system has been developed to measure the bite force accurately in home . The sensor data read by the microprocessor were converted to force values by the optimum curve fitting methods and results are instantly displayed on the user to obtain the best results according to the goodness -of -fit statistics . The exponential equations was selected as the curve fitting method from the results of the goodness -of-fit statistics . The result were verified and system was calibrated by comparing the applied force values and system results.

CHAPTER 7

CONCLUSION AND FUTURE WORK

In our project we are designing an iot based on low cost compact modular system to measure the bite force accurately at home . By using flexi force pressure sensor we can measure the pressure of the teeth simply at home and also we can measure the temperature of our body and heart beat rate. Simple and efficient design of the measurement system gives opportunity to use different sensors in future studies. This makes more precise and higher force measurements possible. We believe that this study has made significant contributions and innovations in the dental field. Also, simple and efficient design of the measurement system gives opportunity to use different sensors in future studies.

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OMD551 **BASICSOFBIOMEDICALINSTRUMENTATION** LTPC 3003

OBJECTIVES:

- Tostudyaboutthedifferent biopotentialanditspropagation
- Tounderstandthedifferenttypesofelectrodesanditsplacementforvariousrecording
- Tostudythedesignof bioamplifierforvariousphysiologicalrecording
- Tolearnthedifferentmeasurementtechniquesfornon-physiologicalparameters.
- Tofamiliarizethedifferentbiochemicalmeasurements.

CO-POMAPPING:

CourseOutcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1				✓		✓					
CO2				✓		✓					
CO3	✓	✓	✓	✓	✓	✓					
CO4			✓	✓	✓	✓					
CO5			✓	✓	✓	✓					

UNITI BIO POTENTIAL GENERATIONAND ELECTRODESTYPES 9

Origin of bio potential and its propagation.Types of electrodes - surface, needle and micro electrodesandtheirequivalentcircuits.Recordingproblems-measurementwith twoelectrodes

UNITII BIOSIGNALCHARACTERISTICSANDELECTRODECONFIGURATIONS 9

Biosignals characteristics – frequency and amplitude ranges. ECG – Einthoven's triangle, standard 12lead system. EEG – 10-20 electrode system, unipolar, bipolar and average mode.EMG– unipolar andbipolarmode.

UNITIII SIGNALCONDITIONINGCIRCUITS 9

Need for bio-amplifier - differential bio-amplifier, Impedance matching circuit, isolation amplifiers,Powerline interference,Right leg driven ECGamplifier, Band passfiltering

UNITIV MEASUREMENTOFNON-ELECTRICALPARAMETERS 10

Temperature, respiration rate and pulse rate measurements. Blood Pressure: indirect methods - Auscultatory method, direct methods: electronic manometer, Systolic, diastolic pressure, Blood flowand cardiac output measurement: Indicator dilution, and dye dilution method, ultrasound blood flowmeasurement.

UNITV BIO-CHEMICALMEASUREMENT 8

BloodgasanalyzersandNon-Invasivemonitoring,colorimeter,SodiumPotassiumAnalyser,spectrophotometer,blood cellcounter,autoanalyzer(simplifiedschematic description).

TOTAL:45PERIODS

OUTCOMES:

Attheendofthecourse,thestudentshouldbeableto:

CO1:ToLearnthedifferent bio potentialanditspropagation.
CO2:TogetFamiliarizethedifferentelectrodeplacementforvariousphysiologicalrecording
CO3:Studentswillbeabledesignbioamplifierfor variousphysiologicalrecording
CO4:Studentswillunderstandvarioustechniquenonelectricalphysiologicalmeasurements

COLLEGE OF ENGG. & TECHNOLOGY NATHAM

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CO5:Understandthedifferentbiochemicalmeasurements

TEXTBOOKS:

1. LeslieCromwell,"BiomedicalInstrumentationandmeasurement",PrenticehallofIndia,NewDelhi,2007.
2. John G. Webster, "Medical Instrumentation Application and Design", John Wiley andsons,NewYork,2004.(UnitsI, II&V)

REFERENCES:

1. MyerKutz,"StandardHandbookofBiomedicalEngineeringandDesign",McGrawHillPublisher,2003.
2. KhandpurR.S,"HandbookofBiomedicalInstrumentation",TataMcGraw-Hill,NewDelhi,2003.(UnitsII&IV)
3. Joseph J. Carr and John M. Brown, "Introduction to Biomedical Equipment Technology",Pearson Education, 2004.

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WEATHER SENSIBLE SMART ADAPTABLE DEVICE WITH LOCATION AND HEALTH MONITORING SYSTEM

A PROJECT REPORT

Submitted by

DEEPIKA.D (920817106016)

SHANMUGA PRIYA.C (920817106059)

SUJITHA.M (920817106069)

in partial fulfillment for the award of the degree

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APRIL 2021

ABSTRACT

Cold-weather warfare, also known as Arctic warfare or winter warfare, encompasses military operations affected by snow, ice, thawing conditions or cold, both on land and at sea. Cold-weather conditions occur year-round at high elevation or at high latitudes, and elsewhere materialise seasonally during the winter period. Mountain warfare often takes place in cold weather or on terrain that is affected by ice and snow, such as the Alps and the Himalayas. Mountain Training recognises that climbing, hill walking and mountaineering are activities with a danger of personal injury or death. Participants in these activities should be aware of and accept these risks and be responsible for their own actions. In this project, we proposed a wearable device. for a fast-rescuing system of soldiers when they are at risks and also taking cause for their health issues. This system consists of controller, safety button, heart rate sensor, temperature sensor, GPS tracker, GSM respectively

CHAPTER 7

CONCLUSION AND FUTURE WORK

This Project proposed a smart system for disaster detection, prediction, and response for trucking people. It designed the main five building blocks of the envisioned system, as well as highlighted the main technologies to be considered in each building block. In addition, the motivation for the interaction between the components of our system was highlighted, as well as how these interactions will happen. Finally, we discussed some of the main challenges that will be addressed in the future works, towards the implementing the proposed smart system.

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EC8691 **MICROPROCESSORSAND MICROCONTROLLERS** LTPC 3003

OBJECTIVES:

- TounderstandtheArchitectureof8086 microprocessor.
- Tolearn thedesign aspectsofI/Oand MemoryInterfacing circuits.
- Tointerfacemicroprocessorswithsupportingchips.
- TostudytheArchitectureof8051microcontroller.
- To designa microcontrollerbased system

UNITI THE8086MICROPROCESSOR 9

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set andassembler directives – Assembly language programming – Modular Programming - Linking andRelocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte andStringManipulation.

UNITII 8086SYSTEMBUSSTRUCTURE 9

8086signals– Basicconfigurations – System bus timing –System design using 8086 – I/Oprogramming–IntroductiontoMultiprogramming–SystemBusStructure– Multiprocessorconfigurations–Coprocessor,CloselycoupledandlooselyCoupledconfigurations– Introductiontoadvancedprocessors.

UNITIII I/OINTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communicationinterface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller –DMA controller – Programming and applications Case studies: Traffic Light control, LED display ,LCDdisplay,Keyboarddisplay interfaceandAlarmController.

UNITIV MICROCONTROLLER 9

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instructionset-Addressingmodes -Assemblylanguageprogramming.

UNITV INTERFACINGMICROCONTROLLER 9

Programming8051Timers-SerialPortProgramming-InterruptsProgramming– LCD&KeyboardInterfacing-ADC,DAC&SensorInterfacing-ExternalMemoryInterface-StepperMotor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARMprocessors

TOTAL:45PERIODS

OUTCOMES:

Attheendofthe course,thestudentsshouldbeable to:

- Understandandexecuteprogramsbasedon8086microprocessor.
- DesignMemoryInterfacingcircuits.
- Designand interface I/Ocircuits.
- Designandimplement8051microcontrollerbasedsystems.

TEXT BOOKS:

1. Yu-ChengLiu,GlennA.Gibson,"MicrocomputerSystems:The8086/8088Family-Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007. (UNIT I-III)
2. Mohamed Ali Mazidi, Janice GillispieMazidi, RolinMcKinlay, "The 8051 Microcontroller andEmbedded Systems: Using Assembly and C", Second Edition, Pearson education, 2011. (UNITIV-V)

REFERENCES:

1. DoughlasV.Hall,"MicroprocessorsandInterfacing,ProgrammingandHardware",TMH,2012
2. A.K.Ray,K.M.Bhurchandi, "Advanced Microprocessors and Peripherals" 3rd edition, TataMcGrawHill, 2012

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LOW COST PROTECTABLE ALU DESIGN

A PROJECT REPORT

Submitted by

SAKTHIVEL M	**(920817106051)**
SOWLASH KUMAR G	**(920817106065)**
SRIRAM G	**(920817106068)**

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APRIL 2021

ABSTRACT

Today, the entire device's in electronics needs to be realized with low power and optimized Area architectures because of power consumption and Area are of main consideration along with other performance parameters. Low power consumption helps to reduce heat dissipation, increases battery life and also reliability. Arithmetic and Logic Unit (ALU) is one of the frequent and the most fundamental component in low power processor design. The use of microprocessors in space missions implies that they should be protected against the effects of cosmic radiation. Commonly this objective has been achieved by applying modular redundancy techniques which provide good results in terms of reliability but increase significantly the number of used resources. Because of that, new protection techniques have appeared, trying to establish a trade-off between reliability and resource utilization. In this work, we propose an application-based methodology, to protect a soft processor implemented in an SRAM-based FPGA, against the effect of soft errors. This is done creating a library of adaptive protection configurations, based on the profiling of the application. This hardware configuration library, combined with the reprogramming capabilities of the FPGA, helps to create an adaptive protection for each application. Propose low cost voting based partial TMR configurations for the Arithmetic Logic Unit (ALU) as an example of this methodology. The proposed scheme has been tested in a SPARTAN FPGA. A fault injection campaign has been performed to test its reliability.

CHAPTER 11

CONCLUSION & FUTURE WORKS

In this work a methodology to protect the ALU of a soft processor against the effect of SEU sin the configuration memory has been presented.The methodology is based on the construction of a catalog composed of fault tolerant designs of the ALU. Each of these designs is focused on a particular application that is going to be executed in the microprocessor.Results show that the protected circuits achieve significant fault tolerance levels while reducing the required resource overhead by tailoring the protection scheme to the application,specially compared with the full TMR.Since a microprocessor can run multiple programs, the creation of a catalog with multiple designs for each application is perfect for a programmable device. The reconfiguration capabilities of SRAM-based FPGAs, as well as the short time required to perform this operation, make them the perfect platform for our methodology. Compared to TMR, the overhead in area is reduced at the cost of slightly decreasing its fault tolerance, which makes it interesting in order to reduce the number of resources and power consumption.

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EC8095	VLSIDESIGN	L	T	P	C
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OBJECTIVES:

- StudythefundamentalsofCMOS circuitsanditscharacteristics.
- Learn thedesignandrealizationofcombinational&sequentialdigitalcircuits.
- Architectural choices and performance tradeoffs involved in designing and realizing thecircuits inCMOStechnologyarediscussed
- LearnthedifferentFPGAarchitecturesandtestabilityofVLSIcircuits.

UNITI INTRODUCTIONTOMOSTRANSISTOR **9**

MOS Transistor, CMOS logic, Inverter, Pass Transistor, Transmission gate, Layout Design Rules,Gate Layouts, Stick Diagrams, Long-Channel I-V Charters tics, C-V Charters tics, Non ideall-VEffects,DCTransfercharacteristics, RCDelayModel,ElmoreDelay,Linear DelayModel,Logicaleffort,ParasiticDelay,DelayinLogicGate,Scaling.

UNITII COMBINATIONALMOSLOGIC CIRCUITS **9**

CircuitFamilies: StaticCMOS,RatioedCircuits,CascodeVoltageSwitchLogic,DynamicCircuits, Pass Transistor Logic, Transmission Gates, Domino, Dual Rail Domino, CPL, DCVSPG,DPL,CircuitPitfalls.

Power: DynamicPower,StaticPower,LowPowerArchitecture.

UNITIII SEQUENTIAL CIRCUITDESIGN **9**

Static latches and Registers, Dynamic latches and Registers, Pulse Registers, Sense AmplifierBased Register, Pipelining, Schmitt Trigger, Monostable Sequential Circuits, Astable SequentialCircuits.

TimingIssues: TimingClassificationOfDigitalSystem,SynchronousDesign.

UNITIV DESIGNOFARITHMETICBUILDINGBLOCKSANDSUBSYSTEM **9**

Arithmetic Building Blocks: Data Paths, Adders, Multipliers, Shifters, ALUs, power and speedtradeoffs,CaseStudy:Designasatradeoff.

Designing Memory and Array structures: Memory Architectures and Building Blocks, MemoryCore,MemoryPeripheral Circuitry.

UNITV IMPLEMENTATIONSTRATEGIESAND TESTING **9**

FPGABuildingBlockArchitectures,FPGAInterconnectRoutingProcedures.DesignforTestability: *Ad Hoc* Testing, Scan Design, BIST, IDDQ Testing, Design for Manufacturability,BoundaryScan.

TOTAL:45PERIODS

OUTCOMES:

UPONCOMPLETIONOFTHE COURSE,STUDENTS SHOULDbeABLE TO

- Realizethe conceptsofdigitalbuildingblocksusingMOStransistor.
- DesigncombinationalMOS circuitsandpowerstrategies.
- DesignandconstructSequentialCircuitsand Timingsystems.
- Designarithmeticbuildingblocksandmemorysubsystems.
- Applyandimplement FPGAdesignflowandtesting.

TEXT BOOKS:

1. Neil H.E. Weste, David Money Harris "CMOS VLSI Design: A Circuits and SystemsPerspective",4th Edition,Pearson,2017(UNIT I,II,V)
2. Jan M. Rabaey ,AnanthaChandrakasan, Borivoje. Nikolic, "Digital Integrated Circuits:ADesignperspective",SecondEdition,Pearson,2016.(UNIT III,IV)

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Superfect
Solutions

Date: 28.10.2020

Ref No: SUP/INT/20895

INTERNSHIP TRAINING CERTIFICATE

TO WHOM IT MAY CONCERN

This is to certify that **Mr.THARUN KUMAR.M (920819106065)** pursuing his second year ECE at NPR College of Engineering & Technology, Natham, has undergone his Internship Training in our concern **from 13.10.2020 to 28.10.2020.**

We appreciate his participation with interest towards the training program.

For SUPERFECT SOLUTIONS,

AUTHORIZED SIGNATORY

SUPERFECT SOLUTIONS SALEM.

Dr. J.SUNDARARAJAN,
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SUPERFECT SOLUTIONS

Tel: 9025-655-523, **Mail:** info@superfectsolutions.com, **Web:** www.superfectsolutions.com

REFERENCES

1. M.J.Smith,"Application SpecificIntegratedCircuits",AddissonWesley,1997
2. Sung-Mo kang, Yusuf leblebici, Chulwoo Kim "CMOS Digital Integrated Circuits:Analysis&Design",4th editionMcGraw Hill Education,2013
3. WayneWolf,"ModernVLSIDesign:SystemOnChip",PearsonEducation,2007
4. R.JacobBaker,HarryW.LI.,David E.Boyee,"CMOSCircuitDesign,LayoutandSimulation",PrenticeHall ofIndia2005.

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EC8652 **WIRELESSCOMMUNICATION** L T P C
3 0 0 3

OBJECTIVES:

- Tostudythe characteristicofwirelesschannel
- Tounderstandthedesignofacellularsystem
- To studythe variousdigitalsignalingtechniquesand multipathmitigationtechniques
- Tounderstandtheconceptsofmultipleantennatechniques

UNITI WIRELESSCHANNELS 9

Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budgetdesign – Small scale fading- Parameters of mobile multipath channels – Time dispersionparameters-Coherencebandwidth–Dopplerspread&Coherencetime,fadingduetoMultipath time delay spread – flat fading – frequency selective fading – Fading due toDopplerspread–fastfading–slowfading.

UNITII CELLULARARCHITECTURE 9

MultipleAccesstechniques-FDMA,TDMA,CDMA–Capacitycalculations–Cellularconcept-Frequency reuse - channel assignment- hand off- interference & system capacity-trunking&gradeofservice–Coverageandcapacity improvement.

UNITIII DIGITALSIGNALINGFORFADINGCHANNELS 9

Structureofawirelesscommunicationlink,PrinciplesofOffset-QPSK,p/4-DQPSK,MinimumShiftKeying,GaussianMinimumShiftKeying,Errorperformanceinfadingchannels,OFDMprinciple–Cyclicprefix,Windowing,PAPR.

UNITIV MULTIPATH MITIGATIONTECHNIQUES 9

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing andLMSAlgorithms.Diversity– MicroandMacro diversity, Diversitycombining techniques,Errorprobability infadingchannelswithdiversityreception,Rakereceiver.

UNITV MULTIPLEANTENNATECHNIQUES 9

MIMOsystems–spatialmultiplexing-Systemmodel-Pre-coding-Beamforming-transmitter diversity, receiver diversity- Channel state information-capacity in fading andnon-fadingchannels.

TOTAL: 45 PERIODS

OUTCOMES:

Thestudentshouldbeable to:

- Characterizeawirelesschannelandevolvethe systemdesign specifications
- Designacellularsystembasedonresourceavailabilityandtrafficdemands
- Identifysuitablesignalingandmultipathmitigationtechniquesforthewirelesschannelandsystemunderconsideration.

TEXT BOOKS:

1. Rappaport,T.S.,—Wirelesscommunicationsll,PearsonEducation,SecondEdition, 2010.(UNITI,II,IV)
2. Andreas.F.Molisch,—WirelessCommunicationsll,JohnWiley–India,2006.(UNITIII,V)

REFERENCES:

1. WirelessCommunication–AndreaGoldsmith,CambridgeUniversityPress,2011
2. VanNee,R.andRamjiPrasad,—OFDMforwirelessmultimediacommunications, ArtechHouse,2000
3. DavidTseandPramodViswanath,—FundamentalsofWirelessCommunication, CambridgeUniversityPress,2005.
4. UpenaDalal,—WirelessCommunicationll,OxfordUniversityPress,2009.

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AUTOMATIC CNN BASED COVID-19 LUNG INFECTION SEGMENTATION FROM CT IMAGES USING DEEP LEARNING

A PROJECT REPORT

Submitted by

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In partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

In

ELECTRONICS AND COMMUNICATION ENGINEERING

NPR COLLEGE OF ENGINEERING AND TECHNOLOGY

NATHAM, DINDIGUL

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APRIL 2021

ABSTRACT

Our project is about automated detection of lung infections from computed tomography (CT) images. It offers a great potential to augment the traditional healthcare strategy for tackling COVID-19. However, segmenting infected regions from CT slices faces several challenges, including high variation in infection characteristics, and low intensity contrast between infections and normal tissues. And also collecting a large amount of data is impractical within a short time period, inhibiting the training of a deep model. To overcome these challenges, a novel COVID-19 Lung Infection Segmentation Deep Network (Inf-Net) is proposed to automatically identify infected regions from chest CT slices. In our project, a parallel partial decoder is used to aggregate the high-level features and generate a global map. Our semi-supervised framework can improve the learning ability and achieve a higher performance.

CHAPTER 8
CONCLUSION & FUTURE WORK

Deep learning practices are an area where high scientific achievements are obtained in different scientific fields day by day. One of these fields is medical practices and studies such as disease detection, disease classification, and location of the disease are carried out. Dataset were performed as input data to the SqueezeNet network using image processing techniques. The network, achieved higher accuracy. SqueezeNet structure, which has been used less than other popular deep learning methods in previous studies, combined with image processing methods, has shown a successful result.

In future, we planned to apply our Resnet – 50 to other related tasks such as polyp segmentation and camouflaged animal detection.

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EC8651 **TRANSMISSIONLINESAND RFSYSTEMS**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To introducethe varioustypesoftransmission linesand itscharacteristics
- Togivethoroughunderstandingabouthighfrequencyline,powerandimpedancemeasurements
- Toimparttechnicalknowledgeinimpedancematchingusingsmithchart
- Tointroducepassivefiltersandbasic knowledgeof activeRFcomponents
- To getacquaintancewithRFsystemtransceiverdesign

UNITI TRANSMISSIONLINETHEORY 9

General theory of Transmission lines - the transmission line - general solution - The infinite line - Wavelength, velocity of propagation - Waveform distortion - the distortion-less line - Loading anddifferent methods of loading - Line not terminated in Z0 - Reflection coefficient - calculation ofcurrent, voltage, power delivered and efficiency of transmission - Input and transfer impedance -Openandshortcircuitedlines-reflectionfactorandreflectionloss.

UNITII HIGHFREQUENCYTRANSMISSIONLINES 9

Transmission line equations at radio frequencies - Line of Zero dissipation - Voltage and currenton the dissipation-less line, Standing Waves, Nodes, Standing Wave Ratio - Input impedance ofthe dissipation-less line - Open and short circuited lines - Power and impedance measurementonlines-Reflectionlosses -MeasurementofVSWRandwavelength.

UNITIII IMPEDANCEMATCHINGINHIGHFREQUENCYLINES 9

Impedance matching: Quarter wave transformer - Impedance matching by stubs - Single stuband double stub matching - Smith chart - Solutions of problems using Smith chart - Single anddoublestubmatchingusingSmithchart.

UNITIV WAVEGUIDES 9

General Wave behavior along uniform guiding structures – Transverse Electromagnetic Waves,Transverse Magnetic Waves, Transverse Electric Waves – TM and TE Waves between parallelplates.FieldEquationsinrectangularwaveguides,TMandTEwavesinrectangularwaveguides ,Bessel Functions,TMandTEwavesinCircularwaveguides.

UNITV RF SYSTEMDESIGNCONCEPTS 9

Active RF components: Semiconductor basics in RF, bipolar junction transistors, RF field effecttransistors, High electron mobility transistors Basic concepts of RF design, Mixers, Low noiseamplifiers, voltagecontrol oscillators, Power amplifiers, transducer power gain andstabilityconsiderations.

TOTAL:45PERIODS

OUTCOMES:

Uponcompletionofthe course,the studentshouldbe ableto:

- Explain thecharacteristicsof transmission linesand itslosses
- Writeaboutthestandingwaveratioandinputimpedanceinhighfrequencytransmissionlines
- Analyze impedance matchingbystubsusing smith charts
- AnalyzethecharacteristicsofTE and TMwaves
- DesignaRFtransceiversystemforwireless communication

TEXTBOOKS:

1. JohnDRyder,"Networks,linesandfields",2ndEdition,PrenticeHallIndia,2015.(UNITI-IV)
2. MathewM.Radmanesh,"RadioFrequency&MicrowaveElectronics",PearsonEducationAsia,SecondEdition,2002.(UNIT V)

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REFERENCES:

1. ReinholdLudwigandPowelBretchko," RFCircuitDesign–TheoryandApplications",PearsonEducationAsia,FirstEdition,2001.
2. D.K.Misra,"RadioFrequencyandMicrowaveCommunicationCircuits-AnalysisandDesign",JohnWiley&Sons,2004.
3. E.C.JordanandK.G.Balmain,—ElectromagneticWavesandRadiatingSystemsPrentice HallofIndia,2006.
4. G.S.NRaju,"ElectromagneticFieldTheoryandTransmissionLinesPearsonEducation,

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DESIGN OF A HEXAGONAL LABYRINTH IMPLANTABLE ANTENNA FOR BIOTELEMETRY APPLICATIONS

A PROJECT REPORT

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April 2021

ABSTRACT

The health care industry is continuously revolutionizing and advancing towards developing more efficient system suitable for human body. Today implantable devices have become a more interesting topic in health care services which primarily started with the pacemakers. Since then it is continuously evolving due to its non-invasive nature, instant monitoring and diagnosis, and periodic simulation. In this work, a novel Hexagonal Labyrinth implantable antenna has been proposed for medical applications to be operated in medical band. The biocompatible polyamide substrate with 0.05 mm thickness has been used as both substrate and superstrate. The proposed antenna is featured with very good miniaturization with the dimensions of 6× 6×0.1 mm3 by employing circular maze shaped structure in radiator. The performance of the proposed antenna was evaluated by placing in a realistic human model using HFSS. The simulated results for the gain and reflection coefficient exhibited reasonable agreement. The safety of the antenna was verified according to the IEEE SAR regulation. The analysis of the link budget revealed that the antenna can perform reliable wireless communication.

CHAPTER-8

CONCLUSION AND FEATURE WORK

A miniaturized dual-band CP antenna was designed and experimentally validated for WCE applications. The optimum performance and miniaturization of the antenna were achieved via the introduction of slots in the radiating patch. The surface current distribution was visualized to confirm the circular polarization of the antenna. The impedance BW and AR BW of the antenna covered the desired frequency bands. The performance of the proposed antenna was evaluated by placing in a realistic human model using HFSS. The simulated results for the gain and reflection coefficient exhibited reasonable agreement. The safety of the antenna was verified according to the IEEE SAR regulation. The analysis of the link budget revealed that the antenna can perform reliable wireless communication.

FEATURE WORK

Reactive components are included to realize the impedance matching, as well as those requirements for the generation of CP waves. Simulations are conducted within a single-layer tissue model to evaluate the antenna's performance. The proposed antenna exhibits a low profile, which is smaller than 1 mm even including two coating layers. The antenna also behaves good robustness to different implant depths and thicknesses of biocompatible coating, due to its wide axial ratio bandwidth ranging from 2.331 to 2.582 GHz. A prototype is fabricated and experimentally demonstrated in a solid skin-mimicking phantom. A measured impedance bandwidth of 621 MHz is achieved for the 2.4-2.48-GHz Industrial Scientific Medical band. Good agreement between simulation and measurement can be observed in the far-field measurement. The link budget is also evaluated, together with an exterior CP patch antenna.

EC8004 **WIRELESSNETWORKS** LTP C

3003

OBJECTIVES:

The studentshouldbemade:

- To understandtheconceptaboutWirelessnetworks,protocolstackand standards
- To understandandanalysethenetworklayersolutionsforWirelessnetworks
- Tostudyaboutfundamentalsof 3GServices, itsprotocolsandapplications
- TohaveindepthknowledgeoninternetworkingofWLANandWWAN
- To learnaboutevolutionof 4GNetworks, itsarchitecture andapplications

UNITI WIRELESSLAN 9

Introduction-WLAN technologies: - IEEE802.11: System architecture, protocol architecture,802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, WPAN –IEEE802.15.4,WirelessUSB,Zigbee,6LoWPAN,WirelessHART

UNITII MOBILENETWORKLAYER 9

Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation,IPV6-Networklayerintheinternet-MobileIPsessioninitiationprotocol-mobilead-hocnetwork:Routing:DestinationSequencedistancevector,IoT:CoAP

UNITIII 3GOVERVIEW 9

Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3GPPArchitecture,Userequipment,CDMA2000overview-RadioandNetworkcomponents,Network structure,RadioNetwork,TD-CDMA,TD–SCDMA.

UNITIV INTERNETWORKINGBETWEENWLANSANDWWANS 9

Internetworking objectives and requirements, Schemes to connect WLANS and 3G Networks,SessionMobility,InternetworkingArchitecturefor WLANandGPRS,SystemDescription,LocalMultipointDistributionService,MultichannelMultipoint DistributionSystem.

UNITV 4G& Beyond 9

Introduction – 4G vision – 4G features and challenges - Applications of 4G – 4G Technologies:MulticarrierModulation,Smartantennatechniques,IMSArchitecture,LTE,Advanced BroadbandWirelessAccessandServices,MVNO.

TOTAL:45PERIODS

OUTCOMES:

Uponcompletionofthecourse,thestudentwouldbeable to:

- Conversantwiththelatest3G/4Gnetworksanditsarchitecture
- Designandimplementwirelessnetworkenvironmentforanyapplicationusinglatestwireless protocolsandstandards
- Abilityto selectthesuitablenetworkdependingonthe availabilityand requirement
- Implementdifferenttypeofapplicationsforsmartphonesandmobiledeviceswithlatestnetwor kstrategies

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education2012.(UnitI,II,III)
2. Vijay Garg, "Wireless Communications and networking", First Edition, Elsevier 2007.(UnitIV,V)

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REFERENCES:

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTEforMobileBroadband",SecondEdition,Academic Press,2008.
2. AnuragKumar,D.Manjunath,Joykuri,"WirelessNetworking",FirstEdition,Elsevier2011.
3. Simon Haykin , Michael Moher, David Koilpillai, "Modern Wireless Communications", FirstEdition,PearsonEducation2013

IOT BASED DATA LOGGER AND COLLISION CONTROL

A PROJECT REPORT

Submitted by

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APRIL 2021

ABSTRACT

Traffic in our country is increasing day by day. Many people are not giving a good response for the traffic rules in many places. Mainly accidents happendue to over speed and careless driving. Especially, in the school and the college zone, people are hesitating for decreasing the speed to its limit. This is embedded project to indicate the over speed and to control the vehicle in the over speed condition. This is constructed with the wireless communication. Given below is the block diagram of the project. We are using PIC16F877A which is Programmable IC microcontroller. To check the tyre temperature, we have interfaced temperature sensor indicate the occurrence of high temperature and alert the vehicle driver via alarm. The accident information system will alert vehicle owner relative or nearby hospital through IOT with the accident location using GPS. If the accident is a minor one then driver can press the reset switch and drive normally. Brake failure sensor, will indicate if the brake wire is connected properly or not and pressure sensor will check the correct air pressure of the tyre, else alert the driver. Accelerator, brake clutch and steering position sensor indicate the position of accelerator, brake clutch steering respectively. We can monitor and control all with the help of IOT module.

CHAPTER 7

CONCLUSION AND FUTURE WORK

This paper has presented a new vision for the vehicles industry, which is the Black Box system used for vehicles. A full and detailed description was made for every part of this system. This paper has also offered a user Internet of thing based data of the accident. In addition, the transmission method between the two parts has been introduced and developed. The Black Box system built can be implemented in any vehicle. As soon as the driver runs the motor, this system will begin saving the events of the corresponding vehicle. The last 21 seconds are always saved in the EEPROM of the Black Box, and in case of an accident, an additional 10 seconds of events after this accident will be saved. The data saved can be retrieved only after the accident for privacy purposes. Using serial transmission, a PIC program will read the data from the EEPROM and display it to the user in Graphical format in the cloud server. In addition, a detailed report will be given to the user containing all necessary information.

EC8701 **ANTENNAS AND MICROWAVE ENGINEERING** **L T P C**
3 0 0 3

OBJECTIVES:

- To enable the student to understand the basic principles in antenna and microwave system design
- To enhance the student knowledge in the area of various antenna designs.
- To enhance the student knowledge in the area of microwave components and antenna for practical applications.

UNIT I INTRODUCTION TO MICROWAVE SYSTEMS AND ANTENNAS 9

Microwave frequency bands, Physical concept of radiation, Near- and far-field regions, Fields and Power Radiated by an Antenna, Antenna Pattern Characteristics, Antenna Gain and Efficiency, Aperture Efficiency and Effective Area, Antenna Noise Temperature and G/T, Impedance matching, Friis transmission equation, Link budget and link margin, Noise Characterization of a microwave receiver.

UNIT II RADIATION MECHANISMS AND DESIGN ASPECTS 9

Radiation Mechanisms of Linear Wire and Loop antennas, Aperture antennas, Reflector antennas, Microstrip antennas and Frequency independent antennas, Design considerations and applications.

UNIT III ANTENNA ARRAYS AND APPLICATIONS 9

Two-element array, Array factor, Pattern multiplication, Uniformly spaced arrays with uniform and non-uniform excitation amplitudes, Smart antennas.

UNIT IV PASSIVE AND ACTIVE MICROWAVE DEVICES 9

Microwave Passive components: Directional Coupler, Power Divider, Magic Tee, attenuator, resonator, Principles of Microwave Semiconductor Devices: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes, Microwave tubes: Klystron, TWT, Magnetron.

UNIT V MICROWAVE DESIGN PRINCIPLES 9

Impedance transformation, Impedance Matching, Microwave Filter Design, RF and Microwave Amplifier Design, Microwave Power amplifier Design, Low Noise Amplifier Design, Microwave Mixer Design, Microwave Oscillator Design

TOTAL: 45 PERIODS

OUTCOMES:

The student should be able to:

- Apply the basic principles and evaluate antenna parameters and link power budgets
- Design and assess the performance of various antennas
- Design a microwave system given the application specifications

TEXTBOOKS:

1. John D Krauss, Ronald J Marhefka and Ahmad S. Khan, "Antennas and Wave Propagation: Fourth Edition, Tata McGraw-Hill, 2006. (UNIT I, II, III)
2. David M. Pozar, "Microwave Engineering", Fourth Edition, Wiley India, 2012.(UNIT I,IV,V)

REFERENCES:

1. Constantine A.Balanis, "Antenna Theory Analysis and Design", Third edition, John Wiley India Pvt Ltd., 2005.
2. R.E.Collin, "Foundations for Microwave Engineering", Second edition, IEEE Press, 2001

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BIPED ROBOT FOR BOMB DETECTION

A PROJECT REPORT

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APRIL2021

ABSTRACT

This work is mainly focused to develop a terrain War field robot which is capable of detecting bombs land mines in its path and which is wirelessly controlled throughRFmodule.In some circumstances of robot, it is mandatory to carry a heavy load, reach remote places where human access is not viable.In such cases a device can be designed with the help of electro-mechanical system which will prevail over above problem.This paper probes a six-degree of freedom bipedal robot driving by servos and introduces the walking principle, structure composition and control system of the biped robot.

Arduino is used to control the entire course of the movement. Based on the motion analysis of the biped walking robot, programming with the servo function, which is the Arduino software platform own specialized library functions to control the servo motor, control the rotation angle of the servos precisely.

Ultimately this robot is used to detect the bomb in the war field with the walking move using the metal detector sensor that may complete the gait of the robot successfully.

CHAPTER-6

RESULT AND DISCUSSION

Fig 6.1 depicts the designed wireless bomb disposal robot.User sets the input to the system. User control application process the input. It is then transmitted through a Radio Frequency (RF) link which is picked by robot for processing. The processed signal is sent to the appropriate module. Hence the robotic arm module or motor can becontrolled.

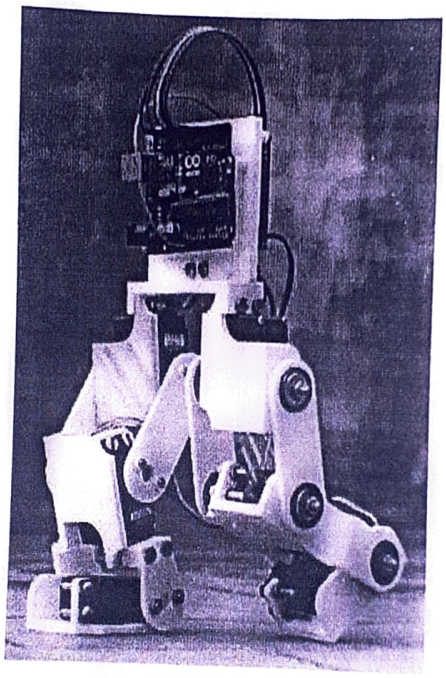

Figure 6.1 robot model

EC8751	OPTICAL COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study about the various optical fiber modes, configuration and transmission characteristics of optical fibers
- To learn about the various optical sources, detectors and transmission techniques
- To explore various idea about optical fiber measurements and various coupling techniques
- To enrich the knowledge about optical communication systems and networks

UNIT I INTRODUCTION TO OPTICAL FIBERS 9

Introduction-general optical fiber communication system- basic optical laws and definitions-optical modes and configurations -mode analysis for optical propagation through fibers-modes in planar wave guide-modes in cylindrical optical fiber-transverse electric and transverse magnetic modes- fiber materials-fiber fabrication techniques-fiber optic cables-classification of optical fiber-single mode fiber-graded index fiber.

UNIT II TRANSMISSION CHARACTERISTIC OF OPTICAL FIBER 9

Attenuation-absorption --scattering losses-bending losses-core and cladding losses-signal dispersion –inter symbol interference and bandwidth-intra model dispersion-material dispersion- waveguide dispersion-polarization mode dispersion-intermodal dispersion-dispersion optimization of single mode fiber-characteristics of single mode fiber-R-I Profile-cutoff wave length-dispersion calculation-mode field diameter.

UNIT III OPTICAL SOURCES AND DETECTORS 9

Sources: Intrinsic and extrinsic material-direct and indirect band gaps-LED-LED structures-surface emitting LED-Edge emitting LED-quantum efficiency and LED power-light source materials-modulation of LED-LASER diodes-modes and threshold conditions-Rate equations-external quantum efficiency-resonant frequencies-structures and radiation patterns-single mode laser-external modulation-temperature effort.

Detectors: PIN photo detector-Avalanche photo diodes-Photo detector noise-noise sources-SNR-detector response time-Avalanche multiplication noise-temperature effects-comparisons of photo detectors.

UNIT IV OPTICAL RECEIVER, MEASUREMENTS AND COUPLING 9

Fundamental receiver operation-preamplifiers-digital signal transmission-error sources-Front end amplifiers-digital receiver performance-probability of error-receiver sensitivity-quantum limit.

Optical power measurement-attenuation measurement-dispersion measurement- Fiber Numerical Aperture Measurements- Fiber cut- off Wave length Measurements- Fiber diameter measurements-Source to Fiber Power Launching-Lensing Schemes for Coupling Management-Fiber to Fiber Joints-LED Coupling to Single Mode Fibers-Fiber Splicing-Optical Fiber connectors.

UNIT V OPTICAL COMMUNICATION SYSTEMS AND NETWORKS 9

System design consideration Point – to –Point link design –Link power budget –rise time budget, WDM –Passive DWDM Components-Elements of optical networks-SONET/SDH-Optical Interfaces-SONET/SDH Rings and Networks-High speed light wave Links-OADM configuration-Optical ETHERNET-Soliton.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to:

- Realize basic elements in optical fibers, different modes and configurations.
- Analyze the transmission characteristics associated with dispersion and polarization techniques.
- Design optical sources and detectors with their use in optical communication system.
- Construct fiber optic receiver systems, measurements and coupling techniques.
- Design optical communication systems and its networks.

TEXT BOOKS:

1. P Chakrabarti, "Optical Fiber Communication", McGraw Hill Education (India)Private Limited, 2016 (UNIT I, II, III)
2. Gred Keiser,"Optical Fiber Communication", McGraw Hill Education (India) Private Limited. Fifth Edition, Reprint 2013. (UNIT I, IV, V)

REFERENCES:

1. John M.Senior, "Optical fiber communication", Pearson Education, second edition.2007.
2. Rajiv Ramaswami, "Optical Networks " , Second Edition, Elsevier , 2004.
3. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.
4. Govind P. Agrawal, "Fiber-optic communication systems", third edition, John Wiley & sons, 2004.

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AN EMBEDDED BASED CONTACTLESS COVID FREE SWITCHES FOR SOCIAL DISTANCING

A PROJECT REPORT

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APRIL 2021

ABSTRACT

In present situations, social distancing is the most important fact. Furthermore, the fact is COVID-19 patient's first spread is direct contact or touching. The reason why, need to touch in switches, ATM and in all public place, but needs to maintain social distancing. While traditional switches can't make sure of social distancing, where our developed contactless switches can achieve control by using Arduino as the main control device as well as the infrared (IR) sensor. As a result, it would be used everywhere because of its easy-handling.

CHAPTER 9
CONCLUSION & FUTURE WORK

The system depicts the development of contactless switches. Where we are fighting against unseen viruses which increase day by day contacting by person to person. So we need to maintain social distancing and need to ON/OFF electrical load without any contact. This system will help for making any contactless load control without contact. In addition, the contactless switch is more advantageous in the application especially in public places. The system is successfully implemented and evaluated using highly advanced ICs and with the help of growing technology.Finally,it would be used everywhere in future because of its easy handling and high security.

FUTURE WORK

The Coronavirus disease will say bye to the biometric attendance system thus contactless attendance systems will rise in future. Technology is going to touch every aspect of our being. Not only will we see faster adoption of disruptive solutions already available, but this pandemic is also going to fast track innovations that will enable a contactless world.

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EC8791 **EMBEDDED AND REAL TIME SYSTEMS** **L T P C**
3 0 0 3

OBJECTIVES:
The student should be made to:
- Understand the concepts of embedded system design and analysis
- Learn the architecture and programming of ARM processor
- Be exposed to the basic concepts of embedded programming
- Learn the real time operating systems

UNIT I INTRODUCTION TO EMBEDDEDSYSTEM DESIGN 9
Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques - Designing with computing platforms – consumer electronics architecture – platform-level performance analysis.

UNIT II ARM PROCESSOR AND PERIPHERALS 9
ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – Features of the LPC 214X Family – Peripherals – The Timer Unit – Pulse Width Modulation Unit – UART – Block Diagram of ARM9 and ARM Cortex M3 MCU.

UNIT III EMBEDDED PROGRAMMING 9
Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

UNIT IV REAL TIME SYSTEMS 9
Structure of a Real Time System — Estimating program run times – Task Assignment and Scheduling – Fault Tolerance Techniques – Reliability, Evaluation – Clock Synchronisation.

UNIT V PROCESSES AND OPERATING SYSTEMS 9
Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive real-time operating systems- Priority based scheduling- Interprocess communication mechanisms – Evaluating operating system performance- power optimization strategies for processes – Example Real time operating systems-POSIX-Windows CE. - Distributed embedded systems – MPSoCs and shared memory multiprocessors. – Design Example - Audio player, Engine control unit – Video accelerator.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Describe the architecture and programming of ARM processor
- Outline the concepts of embedded systems
- Explain the basic concepts of real time operating system design
- Model real-time applications using embedded-system concepts

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TEXT BOOKS:

1. Marilyn Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012. (UNIT I, II, III, V)
2. Jane W.S.Liu," Real Time Systems", Pearson Education, Third Indian Reprint, 2003.(UNIT IV)

REFERENCES:

1. Lyla B.Das, "Embedded Systems : An Integrated Approach" Pearson Education, 2013.
2. Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", Third Edition Cengage Learning, 2012.
3. David. E. Simon, "An Embedded Software Primer", 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.
4. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.
5. C.M. Krishna, Kang G. Shin, "Real-Time Systems", International Editions, Mc Graw Hill 1997
6. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dream Tech Press, 2005.
7. Sriram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming", Tata Mc Graw Hill, 2004.

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RECOGNITION OF FLY SPECIES BASED ON IMPROVED RESNET FOR AGRICULTURE

A PROJECT REPORT

Submitted by

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APRIL 2021

ABSTRACT

A dozen species of locusts (Orthoptera: Acrididae) are a major threat to food security worldwide. Their outbreaks occur on every continent except Antarctica,threatening the livelihood of 10% of the world's population. The locusts are infamous for their voracity, polyphagy, and capacity for long-distance migrations.For effective control, the insects need to be detected on the ground before they start to develop air borne swarms. Detection systems need to determine pest density and location with high speed and accuracy. Location of the swarms on the ground then enables their control by the application of pesticides and bio-pesticides. This work proposes a locust species recognition method based on ResNet50 -convolutional neural network (CNN).ARDUINO and GSM based hardware setup integrated with image processing unit for alerting purpose. In the event of detection of locust, an alert is sent to a fixed base station (BS). As a prototype, we have tested this hardware on real time, which shows that the proposed approach is very efficient in terms of flexibility and cost.

CHAPTER 9
CONCLUSION AND FUTURE WORK

In this project, we propose a locust recognition method based on improved ResNet, which accurately locates and recognizes flies. We designed the learning structure and introduced a bottom-up path augmentation to improve the low-level features semantic information and the high-level features location ability. The experimental results show that our proposed method have better performance compared with the state-of-the-art methods for fly species recognition. This is of great significance for the species recognition.

Future work

- Hybrid net used for segmentation and classification
- Hybrid net formed by combing two or three different architecture by modifying hidden layers

EC8702 **AD HOC AND WIRELESS SENSOR NETWORKS** **L T P C**
3 0 0 3

OBJECTIVES:
The student should be made to:

- Learn Ad hoc network and Sensor Network fundamentals
- Understand the different routing protocols
- Have an in-depth knowledge on sensor network architecture and design issues
- Understand the transport layer and security issues possible in Ad hoc and Sensor networks
- Have an exposure to mote programming platforms and tools

UNIT I AD HOC NETWORKS – INTRODUCTION AND ROUTING PROTOCOLS **9**

Elements of Ad hoc Wireless Networks, Issues in Ad hoc wireless networks, Example commercial applications of Ad hoc networking, Ad hoc wireless Internet, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Table Driven Routing Protocols - Destination Sequenced Distance Vector (DSDV), On–Demand Routing protocols –Ad hoc On–Demand Distance Vector Routing (AODV).

UNIT II SENSOR NETWORKS – INTRODUCTION & ARCHITECTURES **9**

Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN application examples, Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Network Architecture - Sensor Network Scenarios, Transceiver Design Considerations, Optimization Goals and Figures of Merit.

UNIT III WSN NETWORKING CONCEPTS AND PROTOCOLS **9**

MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC, The Mediation Device Protocol, Contention based protocols - PAMAS, Schedule based protocols – LEACH, IEEE 802.15.4 MAC protocol, Routing Protocols- Energy Efficient Routing, Challenges and Issues in Transport layer protocol.

UNIT IV SENSOR NETWORK SECURITY **9**

Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Layer wise attacks in wireless sensor networks, possible solutions for jamming, tampering, black hole attack, flooding attack. Key Distribution and Management, Secure Routing – SPINS, reliability requirements in sensor networks.

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS **9**

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms – TinyOS, nesC, CONTIKIOS, Node-level Simulators – NS2 and its extension to sensor networks, COOJA, TOSSIM, Programming beyond individual nodes – State centric programming.

TOTAL:45 PERIODS

OUTCOMES:
At the end of the course, the student would be able to:

- Know the basics of Ad hoc networks and Wireless Sensor Networks
- Apply this knowledge to identify the suitable routing algorithm based on the network and user requirement
- Apply the knowledge to identify appropriate physical and MAC layer protocols
- Understand the transport layer and security issues possible in Ad hoc and sensor networks.
- Be familiar with the OS used in Wireless Sensor Networks and build basic modules

TEXT BOOKS:

1. C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks Architectures and Protocols", Prentice Hall, PTR, 2004. (UNIT I)
2. Holger Karl , Andreas willig, "Protocol and Architecture for Wireless Sensor Networks", John wiley publication, Jan 2006.(UNIT II-V)

REFERENCES:

1. Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks: an information processing approach", Elsevier publication, 2004.
2. Charles E. Perkins, "Ad Hoc Networking", Addison Wesley, 2000.
3. I.F. Akyildiz, W. Su, Sankarasubramaniam, E. Cayirci, "Wireless sensor networks: a survey", computer networks, Elsevier, 2002, 394 - 422.

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DESIGN TECHNIQUE FOR ATM BASED ON FINGERPRINT SENSOR TECHNOLOGY

A PROJECT REPORT

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ABSTRACT

Identification and verification of a person today is a common thing; which may include door-lock system, safe box and vehicle control or even at accessing bank accounts via ATM, etc which is necessary for securing personal information. The conventional methods like ID card verification or signature does not provide perfection and reliability. The systems employed at these places must be fast enough and robust too. Use of the ATM (Automatic Teller Machine) which provides customers with the convenient banknote trading is facing a new challenge to carry on the valid identity to the customer. Since, in conventional identification methods with ATM, criminal cases are increasing making financial losses to customers. Authors design a simple fingerprint recognition system using LPC2148 as a core controller. The system uses FIM3030 fingerprint scanner to capture fingerprints with its DSP processor and optical sensor. This system can be employed at any application with enhanced security because of the uniqueness of fingerprints. It is convenient due to its low power requirement and portability.

CHAPTER-9

CONCLUSION AND FUTURE WORK

After testing the system developed, we came to know that ATM prototype can be efficiently used with fingerprint recognition. Since, password protection is not bypassed in our system, the fingerprint recognition done after it yielded fast response and is found to be of ease for use. Fingerprint images cannot be recreated from templates; hence no one can misuse the system. LPC2148 and FIM3030 provide low power consumption platform. Speed of execution can be enhanced with the use of more sophisticated microcontroller. The same hardware platform can be used with IRIS scanner to put forward another potential biometric security to the ATMs.

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EC8092	ADVANCED WIRELESS COMMUNICATION	L	T	P	C
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OBJECTIVES:

- To expose the students to the importance of improving capacity of wireless channel using MIMO
- To enable understanding of channel impairment mitigation using space-time block and Trellis codes
- To teach advanced MIMO system like layered space time codes, MU-MIMO System and MIMO-OFDM systems

UNIT I CAPACITY OF WIRELESS CHANNELS **9**

The crowded spectrum, need for high data rate, MIMO systems – Array Gain, Diversity Gain, Data Pipes, Spatial MUX, MIMO System Model. MIMO System Capacity – channel known at the TX, Channel unknown to the TX – capacity of deterministic channels, Random channels and frequency selective channels.

UNIT II RADIO WAVE PROPAGATION **9**

Radio wave propagation – Macroscopic fading- free space and out door, small scale fading Fading measurements – Direct pulse measurements, spread spectrum correlation channel sounding frequency domain channel sounding, Antenna Diversity – Diversity combining methods.

UNIT III SPACE TIME BLOCK CODES **9**

Delay Diversity scheme, Alamoti space time code – Maximum likelihood decoding maximum ratio combining. Transmit diversity space time block codes for real signal constellation and complex signal constellation - decoding of STBC.

UNIT IV SPACE TIME TRELLIS CODES **9**

Space time coded systems, space time code word design criteria, design of space time T C on slow fading channels, design of STTC on Fast Fading channels, performance analysis in slow and fast fading channels, effect of imperfect channel estimation and Antenna correlation on performance, comparison of STBC & STTC.

UNIT V LAYERED SPACE TIME CODES **9**

LST transmitter – Horizontal and Vertical LST receiver – ML Rx, Zero forcing Rx; MMSE Rx, SIC Rx, ZF V-blast Rx- MMSE V-blast Rx, Iterative Rx - capacity of MIMO – OFDM systems – capacity of MIMO multi user systems.

TOTAL : 45 PERIODS

OUTCOMES:

The student should be able to:

- Comprehend and appreciate the significance and role of this course in the present contemporary world
- Apply the knowledge about the importance of MIMO in today's communication
- Appreciate the various methods for improving the data rate of wireless communication system

REFERENCES:

1. Mohinder Jankiraman, Space-time codes and MIMO systems, Artech House, Boston, London . www.artech house.com, ISBN 1-58053-865-7-2004
2. Paulraj Rohit Nabar, Dhananjay Gore, Introduction of space time wireless communication systems, Cambridge University Press, 2003.
3. David Tse and Pramod Viswanath, —Fundamentals of Wireless Communicationll, Cambridge University Press, 2005.

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LORA BASED SECURE WIRELESS SOLDIER MONITORING SYSTEM

A PROJECT REPORT

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APRIL 2021

ABSTRACT

During wars and military search operations, soldiers gets injured and sometime becomes losses. To find soldiers and provide health monitoring, army base station and need Global Position System device for locating soldiers, wireless base station to sense health related parameters of soldiers and a wireless transceiver to transmit the data wirelessly. Upon losing in the battlefield it is necessary for the base station to guide the solider. The base station can access the current status of the soldier which is displayed on the camp. The proposed system can be mounted on the soldier's body to track their health status and current location using Global Positioning System. These information will be transmitted to the control room through LoRa wireless module. The proposed system comprise of tiny wearable physiological devices, sensors, transmission modules. Hence, with the use of the proposed system, it is possible to implement a low cost mechanism to protect the valuable human life.

CHAPTER-10

CONCLUSION AND FUTURE WORK

From the proposed system, we can conclude that we are able to transmit the data which is sensed from remote soldier to the squad leader and other soldiers using LoRa transceiver and from the squad leader to the control unit using LoRa as the transmission technology. This system helps to monitor the health parameters of soldier, track their position using various sensors. The system helps the soldier to get help from army control unit and/or from other fellow soldiers in panic situation. It will prove to be very useful to military forces during war and rescue operations as it can be used without any network restriction using LoRa. Thus, this system provides security and safety to our soldiers.

With this new approach we are implementing a technique to enhance the security level of soldiers and further to reduce the time to receive the information. In future work, we will focus on reducing the emergency condition of soldiers for a long time in rushed area and it reduces the time to find problems on the main areas. In this project we are using Arduino-1.8.13-Windows version for implementing. It is possible to implement a low cost mechanism to protect the valuable human life. In soldier security the movement view can be implements for future works it represents in the present actions like standing, sitting, etc..,

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OIC751 **TRANSDUCER ENGINEERING** L T P C
3 0 0 3

OBJECTIVES:

- To understand how physical quantities are measured and how they are converted to electrical or other forms.
- To have an adequate knowledge in resistance, transducers.
- To develop the knowledge of inductance and capacitance transducers.
- To study the characteristics of Transducers.

UNIT I SCIENCE OF MEASUREMENTS AND CLASSIFICATION OF TRANSDUCERS 9

Units and standards – Calibration methods – Static calibration – Classification of errors :- Limiting error and probable error – Error analysis :– Statistical methods – Odds and uncertainty – Classification of transducers – Selection of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS 9

Static characteristics: – Accuracy, precision, resolution, sensitivity, linearity, span and range -Dynamic characteristics: – Mathematical model of transducer – Zero, I and II order transducers - Response to impulse, step, ramp and sinusoidal inputs.

UNIT III VARIABLE RESISTANCE TRANSDUCERS 9

Principle of operation, construction details, characteristics and applications of potentiometer, strain gauge, resistance thermometer, Thermistor, hot-wire anemometer, piezoresistive sensor and humidity sensor.

UNIT IV VARIABLE INDUCTANCE AND VARIABLE CAPACITANCE TRANSDUCERS 9

Induction potentiometer – Variable reluctance transducers – EI pick up – Principle of operation, construction details, characteristics and applications of LVDT –Capacitive transducer and types – Capacitor microphone – Frequency response.

UNIT V OTHER TRANSDUCERS 9

Piezoelectric transducer - Hall Effect transducer – Magneto elastic sensor- Digital transducers – Smart sensors - Fibre optic sensors- Film sensors-Introduction to MEMS and Nano sensors.

TOTAL : 45 PERIODS

OUTCOMES:

- Ability to model and analyze transducers.

TEXT BOOKS:

1. Neubert H.K.P., Instrument Transducers – An Introduction to their Performance and Design, Oxford University Press, Cambridge, 2003.
2. Doebelin E.O. and Manik D.N., Measurement Systems – Applications and Design, Special Indian Edition, Tata McGraw Hill Education Pvt. Ltd., 2007.
3. D. Patranabis, Sensors and Transducers, 2nd edition, Prentice Hall of India, 2010. E.A.

REFERENCES:

1. John P. Bentley, Principles of Measurement Systems, III Edition, Pearson Education, 2000.
2. Murthy, D.V.S., Transducers and Instrumentation, 2nd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
3. W.Bolton, Engineering Science, Elsevier Newnes, Fifth edition, 2006.
4. Ramón Pallás-Areny, John G. Webster, Sensors and Signal Conditioning, Wiley-Interscience 2nd Edition, 1991.
5. Bela G.Liptak, Instrument Engineers' Handbook, Process Measurement and Analysis, 4th Edition, Vol. 1, ISA/CRC Press, 2003.
6. Ian Sinclair, Sensors and Transducers, 3rd Edition, Elsevier, 2012.

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DETECTION OF FACE MORPHING ATTACKS BASED ON HALFTONING FEATURE EXTRACTION

A PROJECT REPORT

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ABSTRACT

Due to the advances in computer-based communication and health services over the past decade, the need for image security becomes urgent to address the requirements of both safety and non-safety in all applications. Methods of authentication and selfrecovery of tampered information in digital images have been in constant development during the last years. Face verification is a popular way for verifying identities in access control systems. In this work, a half toning based morphing attack (MA) detection is proposed to compromise the uniqueness of face templates. Different from existing research, this work changes MA from a holistic face level to component level, and only the most effective facial components (eyes and nose) are used. Therefore, a manipulated face is more similar to a bona fide one in terms of visual quality, texture, and noise characteristics. To validate the effectiveness of the proposed attack, a novel metric called actual mated morph presentation match rate (AMPMR) is proposed to evaluate MA performance under real-world conditions. With a collected dataset containing different attack types, image qualities, and manipulation parameters, the results indicate the proposed attack has better anti-detectability compared with the existing complete, splicing, and combined MAs. Moreover, it has low visual distortion and can reach a better tradeoff among facial biometrics verification, anti-detectability, and visual differences.

CHAPTER 7

CONCLUSION AND FUTURE WORK

Watermarking is a crucial technique in the copyright identification mechanisms of digital assets. It is widely recognized as one of the key issues of data copyright protection in this work we considered the defect of traditional watermarking schemes, while dealing with the nonnumeric attributes. This project presents a LU and halftoing based tamper detection scheme using grouped block method to offer more security and provide a supplementary way to locate the attacked areas inside different medical images. Two authentication bits namely block authentication and self-recovery bits were used to survive the vector quantization attack. The usage of authendication makes it possible to recover the tampered region from the neighboring blocks, which ultimately increases the NCC and PSNR of the recovered host. In future this concept will be helpul to resolve the challenges faced by police department and medical field now this featurehelps to detect the biometric features like eyes, nose, ears in later days it will help to the entire physical features in biological features in images.

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EC8094	SATELLITE COMMUNICATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

The student should be made to:

- Understand the basics of satellite orbits
- Understand the satellite segment and earth segment
- Analyze the various methods of satellite access
- Understand the applications of satellites
- Understand the basics of satellite Networks

UNIT I SATELLITE ORBITS 9

Kepler"s Laws, Newton"s law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility – eclipse-Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion.

UNIT II SPACE SEGMENT 9

Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command-Transponders-The Antenna Subsystem.

UNIT III SATELLITE LINK DESIGN 9

Basic link analysis, Interference analysis, Rain induced attenuation and interference, Ionospheric characteristics, Link Design with and without frequency reuse.

UNIT IV SATELLITE ACCESS AND CODING METHODS 9

Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast, multiple access: FDMA, TDMA, CDMA, DAMA Assignment Methods, compression – encryption, Coding Schemes.

UNIT V SATELLITE APPLICATIONS 9

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. GPS Position Location Principles, Differential GPS, Direct Broadcast satellites (DBS/DTH).

TOTAL:45 PERIODS

OUTCOMES:

At the end of the course, the student would be able to:

- Analyze the satellite orbits
- Analyze the earth segment and space segment
- Analyze the satellite Link design
- Design various satellite applications

REFERENCES:

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

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Date : 27.10.2020

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms.M.Keerthi** (920819106024) studying in Second year Electronics and Communication Engineering of NPR College of Engineering & Technology, Natham has undergone internship in our organization from 12.10.2020 – 27.10.2020

During the period, her conduct was found to be good.

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With Regards

For VI Microsystems

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