ANNEXURE - E & F

SCHEME OF EXAMINATION FOR

III SEM BACHELOR OF ENGINEERING (ELECTRONICS & COMMUNICATION / ELECTRONICS & TELECOMMUNICATION ENGINEERING)

Sub Code	Board	SUBJECT	Work Load				Credit				Marks				
											Theory		Practical		Total Marks
			L	P	T	Total	L	P	T	Total	Internal	University	Internal	University	
BEECE301T/BEETE301T	Applied Science & Humanities	Applied Mathematics-III	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE302T/ BEETE302T	Electronics	Electronic Devices & Circuits	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE302P/BEETE302P	Electronics	Electronic Devices & Circuits	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE303T/BEETE303T	Electronics	Electronics Measurement & Instrumentation	4	0	0	4	4	0	0	4	20	80	0	0	100
BEECE303P/BEETE303P	Electronics	Electronics Measurement & Instrumentation	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE304T/BEETE304T	Electronics	Object Oriented Programming and Data Structure	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE304P/BEETE304P	Electronics	Object Oriented Programming and Data Structure	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE305T/BEETE305T	Electrical	Network Analysis & Synthesis	4	0	1	5	4	0	1	5	20	80	0	0	100
Total			**20**	**6**	**4**	**30**	**20**	**3**	**4**	**27**	**100**	**400**	**75**	**75**	**650**

IV SEM BACHELOR OF ENGINEERING IN(ELECTRONICS & COMMUNICATION / ELECTRONICS & TELECOMMUNICATION ENGINEERING)

Sub Code	Board	SUBJECT	Work Load				Credit				Marks				
											Theory		Practical		Total Marks
			L	P	T	Total	L	P	T	Total	Internal	University	Internal	University	
BEECE401T/ BEETE401T	Applied Science & Humanities	Applied Mathematics –IV	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE402T/ BEETE402T	Electrical	Power Devices & Machines	4	0	0	4	4	0	0	4	20	80	0	0	100
BEECE402P/ BEETE402P	Electrical	Power Devices & Machines	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE403T/ BEETE403T	Electronics	Electromagnetic Field	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE404T/ BEETE404T	Electronics	Digital Circuits And Fundamental Of Microprocessor	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE404P/ BEETE404P	Electronics	Digital Circuits And Fundamental Of Microprocessor	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE405T/ BEETE405T	Electronics	Signals & Systems	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE406T/ BEETE406T	Applied Science & Humanities	Environmental Studies	3	0	0	3	Audit Course			0	0	0	G	0	0
BEECE407P/ BEETE407P	Electronics	Software Workshop	0	2	0	2	0	2	0	2	0	0	25	25	50
Total			**23**	**6**	**4**	**33**	**20**	**4**	**4**	**28**	**100**	**400**	**75**	**75**	**650**

Syllabus for

Applied Mathematics- III (EN/ET/EE/Mech)

Scheme (Theory: 4 hrs, Tutorial: 1hr.)

UNIT - I: LAPLACE TRANSFORM (15Hrs)

Definition, Properties, Evaluation of integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution theorem (statement only), Laplace Transform of Periodic Functions (statement only), Unit Step Function and Unit Impulse Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations & Integro-Differential Equations.

UNIT – II: FOURIER SERIES & FOURIER TRANSFORM (08 Hrs)

Periodic functions and their Fourier Expansions, Even and Odd functions, Change of interval, Half Range Expansions.

Fourier Transform: Definition and Properties (excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equation.

UNIT – III: CALCULUS OF VARIATIONS(05 Hrs)

Functionals, Maxima and minima of functionals, Euler's equation(statement only), Functionals dependent on First & Second order derivatives, Isoperimetric Problems, Solution of Boundary Value problems by Rayleigh-Ritz method.

UNIT- IV: FUNCTIONS OF COMPLEX VARIABLE (12 Hrs)

Analytic function, Cauchy- Riemann Conditions, Harmonic Functions (excluding orthogonal system), Milne-Thomson Method, Cauchy Integral Theorem & Integral Formula (Statement only), Taylor's & Laurent's series (Statement only), Zeros and Singularities of Analytic function, Residue Theorem (Statement only), Contour integration (Evaluation of real definite integral around unit circle and semi-circle).

UNIT - V: PARTIAL DIFFERENTIAL EQUATIONS(08Hrs)

Partial Differential Equations of First Order First Degree i.e. Lagrange's form, Linear Homogeneous Equations of higher order with constant coefficients. Method of separations of variables, Simple Applications of Laplace Transform to solve Partial Differential Equations (One dimensional only).

UNIT –VI: MATRICES(12Hrs)

Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal transformation, Sylvester's theorem [without proof], Solution of Second Order Linear Differential Equation with Constant Coefficients by Matrix method.

Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
2. Advanced Engineering Mathematics by Erwin Kreysizig, 8th Edition, Wiley India
3. Applied Mathematics for Engineers & Physicist by L.R. Pipes and Harville,
4. Calculus of variation by Forrey

Reference Books

1. A Text Book of applied Mathematics, Volume II , by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

B. E. Third Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

ELECTRONIC DEVICES AND CIRCUITS

Duration : 2 Hr.
College Assessment : 25 Marks
University Assessment : 25 Marks

Subject Code : BEENE302P / BEECE302P/ BEETE302P [0 – 2 – 0 – 1]

Objectives : To study basic concepts, DC circuits, AC circuits, semiconductors, Semiconductor devices, Power supply, Bipolar and Field effect transistor amplifiers, Frequency response of amplifier.

Outcome :
After completion of the practicals:
1.The students will get the basic concepts of different semiconductor components.
2. They will be able to understand the use of semiconductor devices in different electronic circuits.
3. They will be able to calculate different performance parameters of transistors.
4. They will be able to plot and study the characteristics of semiconductor devices.

List of Experiments :

1. To Plot V-I Characteristics of Si/Ge Diode.
2. To study Half Wave and Full Wave rectifier with and without Capacitor filter.
3. To study Input-output characteristics of Common Emitter Configuration.
4. To Determine the h-parameter of CE amplifiers.
5. To find Bandwidth of RC coupled Amplifier.
6. To Study RC Oscillator (RC-Phase Shift and Wien Bridge Oscillator).
7. To Study LC Oscillators (Colpitt's and Hartley Oscillator).
8. To study transistorized Astable Multivibrator.
9. To study Cross-over distortion in Class-B power amplifier.
10. To find the operating point of transistor.
11. To study transistor as an amplifier.
12. To study FET characteristics.

Note : Minimum 8 Practicals to be conducted.

B. E. Third Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

ELECTRONIC DEVICES AND CIRCUITS

Duration : 3 Hr.
College Assessment : 20 Marks
University Assessment : 80 Marks

Subject Code : BEENE302T / BEECE302T/ BEETE302T [4 – 0 – 1 – 5]

Objectives :

(1) To present a clear consistent picture of the internal physical behavior of many electronic devices so that their studies of electronic circuits and system will be meaningful.

(2) To develop the basic tools with which they can later learn about newly developed devices and applications.

Outcome :

1. This subject will give an overview of various semiconductor devices.

2. At the end of this course, the students will be able to analyze and design amplifier circuits, oscillators and filter circuits employing BJT, FET devices.

Unit I : Diodes and it's applications (08)

PN junction diode, Volt-amp characteristics, Temperature dependence, Transition and Diffusion capacitance of PN junction , Zener and Avalanche Breakdown, **Diode Rectifiers**: Half wave, Full wave and Bridge rectifiers, Types of Filters, Ripple factor , Voltage Doublers.

Unit II : BJT Biasing:
(10)

Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point, Necessity of BJT biasing, Transistor biasing methods, Stability factor, Thermal stabilization, Thermal runaway and Compensation circuits, Transistor as an Amplifier

Unit III : Transistor Small Signal Analysis & Negative feedback amplifier
((12)

h-parameter model, Analysis of Transistor Amplifier circuits using h-parameters, CB,CE and CC Amplifier configurations and performance factors.

Principle of Negative feedback in electronic circuits, Voltage series, Voltage shunt, Current series, Current shunt types of Negative feedback, Typical transistor circuits effects of Negative feedback on Input and Output impedance, Voltage and Current gains, Bandwidth, Noise and Distortion.

Unit IV :

(10)

Principle of Positive feedback, Concept of Stability in electronics circuits, Barkhausen criteria for oscillation, Principle of operation of RC Phase Shift, Wien Bridge, Colpitt's, Hartley, Crystal oscillators.

Principle of operation of Transistorized Astable, Bistable and Monostable multivibrator.

Unit V : Power Amplifiers:

(10)

Power dissipations in transistors, Harmonic distortion, Amplifiers Classification,(Class-A, Class-B, Class-C, Class-AB) Efficiency, Push-pull and complementary Push-pull amplifiers, Cross-over distortion.

Unit VI : Field Effect Transistor and MOSFET:

(10)

JFET and its characteristics, Pinch off voltage, Drain saturation current, JFET amplifiers, CS,CD,CG amplifiers ,their analysis using small signal JFET model ,Biasing the FET, The FET as VVR Overview of D-MOSFET, E-MOSFET, n MOSFET, pMOSFET .

Text Books

1. J. Millman and Halkias : "Electronic devices and circuits" , TMH Publications
2. Boylestad & Nashelsky : "Electronic Devices & Circuit Theory" , PHI publications.
3. Salivahanan, Suresh Kumar, Vallavaraj:"Electronic devices and circuits" , TMH Publications.

Reference Book

1. J. Millman and Halkias: "Integrated Electronics, Analog & Digital Circuits & Systems" TM– 2000.
2. Sedra & Smith: "Micro Electronic Circuits" Oxford University Press, 2000
3. Albert Malvino : " Electronics Principles", TMH Publications.
4. Floyd : "Electronic Devices", Pearson Publications.
5. Schilling & Beloove : " Electronics Circuits Discrete and Integrated", Mc.Graw Hill Publications.

B. E. Third Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

ELECTRONICS MEASUREMENT AND INSTRUMENTATION

Duration : 2 Hr.

College Assessment : 25 Marks

University Assessment : 25 Marks

Subject Code : BEENE303P/ BEECE303P/ BEETE303P **[0 – 2 – 0 – 1]**

Objectives : To learn basic measurement concepts and related instrumentation requirement as a vital ingredients of electronics Engineering.

Outcome :

After completion the practicals :

1. The students will be able to measure the resistance by various methods.
2. They will be able to use the various measuring instruments such as CRO, Function generator, Spectrum analyzer etc in effective manner.
3. They will be able to measure various physical parameters by using different techniques.

List of Experiments :

1- Measurement of Medium Resistance by using voltmeter ammeter method and Wheatstone bridge method.
2- Measurement of Low Resistance by using Kelvin Bridge Method.
3- Measurement of Unknown inductance by using Hay's Bridge / Maxwell Bridge Method
4- Measurement of Unknown Capacitance by using Schering Bridge Method.
5- To determine the frequency of unknown signal using Lissagious Pattern Method
6- To Determine DC Voltage, AC voltage and phase by using CRO.
7- Temp. Measurement & control using RTD / Thermocouple / Thermistor.
8- Displacement measurement using LVDT.
9- Level measurement using capacitive / resistive transducer

10- Flow measurement using optical transducer
11- Measurement of signal parameters using Digital Storage Oscilloscope.
12- Study of Data Acquisition system.
13- Feature extraction of Some standard signal using Spectrum Analyzer.

Note : Minimum 8 Practicals to be conducted.

B. E. Third Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

ELECTRONICS MEASUREMENT AND INSTRUMENTATION

Duration : 3 Hr.

College Assessment : 20 Marks

University Assessment : 80 Marks

Subject Code : BEENE303T/ BEECE303T/ BEETE303T **[4 – 0 – 0 – 4]**

Objectives The primary aim of this subject is to acquaint the students with the basic principles of measuring instruments and show how each of them can be exploited for the measurement of large number of variables.

Outcome : At the end of this course, students will be able to:

1. Explain basic concepts and definitions in measurement.
2. Explain the operation and design of electronic instruments for parameter measurement and operation of different Transducers
3. Explain the operation of oscilloscopes and the basic circuit blocks in the design of an oscilloscope.
4. Explain the circuitry and design of various function generators.

Unit I : Fundamentals of Electronic Measurement and Instrumentation : **(06)**

Necessity of electronic Measurement , Block diagram of electronic measurement system, Types of Measurements, Function of instruments and measurement systems, Applications of measurement system, Elements of measurement system, Types of instruments, Theory of errors, Accuracy and Precision, Types of errors, Statistical analysis , probability of errors, Limiting errors, Standards of measurement.

Unit II : Electromechanical Instruments :
(08)

Construction of Galvanometer, Suspension Galvanometer, Torque and deflection Galvanometer, PMMC mechanism, DC voltmeter; AC voltmeters; Peak, average and true rms

voltmeters; Digital Multimeters; Ammeters, Ohm-meters and their design' AC indicating instruments, Watt-hour meter; Power factor meter.

Unit III : AC and DC Bridges : **(10)**

DC Bridges : Wheatstone Bridge, Kelvin Bridge

AC Bridges and their applications : Maxwell's Bridge, Hay's Bridge, Schering Bridge, Desauty's Bridge, Wein Bridge, Detectors for AC bridges.

Unit IV : Transducers : **(08)**

Static and dynamic characteristics, Classification of transducers, Capacitive transducer, Inductive transducer, Resistive transducer, RVDT, Strain Gauge, RTD, Optical Transducers, Hall effect transducer, Piezoelectric transducers, Transducers for measurement of Pressure, Temperature, Level, Displacement, Flow.

Unit V : **Oscilloscope and Signal Generators** : **(08)**

CRO : Types, Dual trace, High frequency, sampling and storage oscilloscopes, Applications of CRO.

Signal Generators : Introduction, Sine-wave generator, standard signal generators, Audio frequency signal generation, RF generator, Pulse generator, Function generator.

Unit VI : Signal Analyzer and Data Acquisition System: **(08)**

Construction and operation of Signal analyzer, Wave analyzer, Harmonic Distortion analyzer, Spectrum analyzer and Logic analyzer; Signal conditioning and its necessity, process adopted in signal conditioning, Functions of Signal conditioning, AC/DC Conditioning systems, Data conversion: ADC, DAC, Generalized data acquisition system: single channel and multi-channel DAS.

Text Books:

1. A.D. Helfrick and W.D. Cooper : “Modern Electronic Instrumentation and Measurement Techniques”, PHI Publications.
2. A.K. Sawhney : “Electrical and Electronic Measurement and Instrumentation”, Dhanpat Rai & Sons Publications.
3. S.S. Kalsi : “Electronics Measurements”, Mc Graw Hill Publications.
4. B.H. Oliver and J.M Cage : “Electronics Measurement and Instrumentation”, Mc Graw Hill Publications

Reference Book :

1. Joseph J. Carr : “Elements of Electronic Instrumentation and Measurement”, Pearson Education Publications.
2. R.K. Rajput : “ Electrical And Electronic Measurement”, PHI Publications.
3. DVS Murthy : “ Transducers and Instrumentation”, PHI Publications.

B. E. Third Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

ELECTRONICS MEASUREMENT AND INSTRUMENTATION

Duration : 2 Hr.

College Assessment : 25 Marks

University Assessment : 25 Marks

Subject Code : BEENE303P/ BEECE303P/ BEETE303P **[0 – 2 – 0 – 1]**

Objectives : To learn basic measurement concepts and related instrumentation requirement as a vital ingredients of electronics Engineering.

Outcome :

After completion the practicals :

4. The students will be able to measure the resistance by various methods.
5. They will be able to use the various measuring instruments such as CRO, Function generator, Spectrum analyzer etc in effective manner.
6. They will be able to measure various physical parameters by using different techniques.

List of Experiments :

14- Measurement of Medium Resistance by using voltmeter ammeter method and Wheatstone bridge method.
15- Measurement of Low Resistance by using Kelvin Bridge Method.
16- Measurement of Unknown inductance by using Hay's Bridge / Maxwell Bridge Method
17- Measurement of Unknown Capacitance by using Schering Bridge Method.
18- To determine the frequency of unknown signal using Lissagious Pattern Method
19- To Determine DC Voltage, AC voltage and phase by using CRO.
20- Temp. Measurement & control using RTD / Thermocouple / Thermistor.
21- Displacement measurement using LVDT.
22- Level measurement using capacitive / resistive transducer

23- Flow measurement using optical transducer
24- Measurement of signal parameters using Digital Storage Oscilloscope.
25- Study of Data Acquisition system.
26- Feature extraction of Some standard signal using Spectrum Analyzer.

Note : Minimum 8 Practicals to be conducted.

B. E. Third Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

OBJECT ORIENTED PROGRAMMING & DATA STRUCTURE

Duration : 2 Hr.
College Assessment : 25 Marks
University Assessment : 25 Marks

Subject Code : BEENE304P/ BEECE304P/ BEETE304P [0 – 2 – 0 – 1]

Objectives :

1. To understand the concept of object oriented programming and develop skills in C++ Language.
2. Access how the choice of data structures and algorithm design methods impacts the performance of programs.
3. To Choose the appropriate data structure and algorithm design method for a specified application.
4. Write programs using 'C++ Language'.

Outcome :

On successful completion of practicals of this subject the student will be able to:
1.Implement the concept of object oriented programming in any programming language.
2.Explain the basic data structures and algorithms for manipulating them.
3. Implement these data structures and algorithms in the C++ language.
4. Integrate these data structures and algorithms in larger programs.
5. Code and test well-structured programs of moderate size using the C++ language.
6. Apply principles of good program design to the C++ language.

List of Experiments :

1) Write a C++ program to implement the concept of class and object.
   Given Data: - class student:-roll number, name and address
2) Write a C++ program to find the area of circle and rectangle by using default and parameterized constructer.
3) Write a C++ program using following inheritance path: Student -> Marks-> Result & to produce result of each student.
4) Write a C++ program, to implement operator overloading. Overload "+" operator so that two string can be concatenated.
5) Write a C++ program to implement a following sorting tech. to arrange elements in ascending order.
   1) Bubble sort 2) Insertion sort
6) Write a C++ program to implement a stack in which push, pop and display can be performed.
7) Write a C++ program to implement a queue in which insertions, deletions and display can be performed.

8) Write an interactive C++ program to create a singly linked list and perform following operation.

1) Create 2) Insert 3) Delete

9) Write a C++ program to construct a binary tree and perform following traversing techniques.

1) Preorder 2) Inorder 3) Postorder

10) Write a C++ program to construct a binary search Tree and perform following Operation.

1) Insert 2) Delete 3) Print leaf node

11) Write a C++ Program to implement quick sort.

12) Write a C++ Program to implement “this” keyword.

Note : Minimum 8 Practicals to be conducted

B. E. Third Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg.)

OBJECT ORIENTED PROGRAMMING & DATA STRUCTURE

Duration : 3 Hr.
College Assessment : 20 Marks
University Assessment : 80 Marks

Subject Code : BEENE304T/ BEECE304T/ BEETE304T [4 – 0 – 1 – 5]

Objectives :

1. To understand the concept of object oriented programming and develop skills in C++ Language.
2. Access how the choice of data structures and algorithm design methods impacts the performance of programs.
3. To Choose the appropriate data structure and algorithm design method for a specified application.
4. Write programs using 'C++ Language'.

Outcomes :

On successful completion of this subject the student will be able to:

1. Be able to implement the concept of object oriented programming in any programming language.
2. Explain the basic data structures and algorithms for manipulating them.
3. Implement these data structures and algorithms in the C++ language.
4. Integrate these data structures and algorithms in larger programs.
5. Code and test well-structured programs of moderate size using the C++ language.
6. Apply principles of good program design to the C++ language.

Unit I: Introduction to Object Oriented Programming (12)

Basic concepts of object oriented programming-Benefits of OOP's-Application OOP-Structure of C++ program-Basic Data type-Derived Data type-User defined data type-Operators in C++, Class Members, Access Control, Class Scope, Control Statements, Constructor and Destructor, parameter passing method, inline function, static class members, this pointer, friend function, Dynamic memory allocation and de allocation (new and delete), exception handling.

Unit II: Features of Object Oriented Programming (06)

Function Overloading, Generic Programming- Function and class templates, Defining operator overloading-overloading unary operator, overloading binary operator-rules for operator overloading.

Unit III: Inheritance

(10)

Inheritance- Inheritance basics, base and derived classes, inheritance types:-single inheritance, multilevel inheritance, multiple inheritance, hierarchal inheritance, hybrid inheritance, and virtual base class –run time polymorphism using virtual function, pure virtual function, and abstract classes.

Unit IV: Introduction to Data structure

(10)

Arrays-Introduction-Linear arrays-representation of linear arrays in memory, Sorting-selection sort, Insertion Sort, Bubble Sorting, Quick Sort, Merge Sort, radix sort, linear Search-Binary Search

Unit V: Introduction of Stack and Queue

(10)

Introduction of Stack and Queue, Dynamic memory allocation, Linked list-Introduction-Representation of singly Linked List in memory, Traversing a linked list, Searching a linked list, insertion and deletion in linked list, implementation of stack using linked representation, implementation of queue using linked representation

Unit VI: Trees and Terminology

(12)

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary trees, Binary search Tree Implementation ,Operations – Searching, Insertion and deletion in binary search trees., Threaded Binary trees, Traversing Threaded Binary trees.

Text Book:

1. E.Balagurusamy , "Object Oriented Programming with C++" , Tata McGraw Hill Publications.
2. Y.Langsam : "Data Strcture using C and C++ ", Pearson Education Publications
3. Horowitz and Sahani : "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., New Delhi.
4. A. M. Tenenbaum : "Data Structures using C & C++", PHI Publications.

Reference Books:

1. K.R.Venugopal,B.RajKumar,T.RaviShankar : " Mastering C++" , Tata McGraw Hill publication.
2. W.Savitch : "Problem solving with C++ The OOP", , Pearson education.
3. Herbert Scheldt : " C++, the Complete Reference" Tata McGraw Hill Publications.
4. Robert L. Kruse, Alexander J. Ryba : "Data Structures and Program Design in C++", PHI Publications.
5. Robert Lafore : "Object Oriented Programming in Microsoft C++", Galgotia Publications.

B. E. Third Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg.)

NETWORK ANALYSIS AND SYNTHESIS

Duration : 3 Hr.

College Assessment : 20 Marks

University Assessment : 80 Marks

Subject Code : BEENE305T/ BEECE305T / BEETE305T [4 – 0 – 1 – 5]

Objectives :

- To make the students capable of analyzing any given electrical network.
- To make the students learn how to synthesize an electrical network from a given impedance /admittance function.

Outcomes

- Students will be able to analyze the various electrical and electronic networks using the techniques they learn.
- Students will be able to construct a circuit to suit the need.

Unit I: Basic Circuit Analysis and Simplification Techniques (10)

Source transformation and source shifting, Nodal and mesh analysis, Mutual inductances, Basic equilibrium equations, Matrix approach for complicated networks, Super mesh and super mode analysis, Duality.

Unit II: Network Theorems (12)

Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems, Reciprocity Theorem , Compensation Theorem, Millers Theorem and its dual, Tellegen's Theorem as applied to ac circuits.

Unit III: Frequency Selective Networks (08)

Significance of Quality factor. **Series Resonance**: Impedance, Phase angle variations with frequency, Voltage and current variation with frequency, Bandwidth, Selectivity. Effect of Rg on BW & Selectivity. Magnification factor.

Parallel resonance: Resonant frequency and admittance variation with frequency, Bandwidth and selectivity. General case: Resistance present in both branches. Comparison and applications of series and parallel resonant circuits.

Unit IV: Filters and Attenuators (12)

Filters & Attenuators: Filter fundamentals, pass and stop band, constant k prototype, LPF, HPF, BPF, Band stop filter, m-derived filters, composite filter design. Attenuators: Definition and Units of attenuation, Bartlett's bisection theorem, lattice attenuator, symmetrical T, π and bridged attenuator, asymmetrical L-section attenuator, Ladder attenuator

Types of Transmission lines, Transmission Line Equation, Equivalent circuits, Primary and Secondary line constants

Unit V: Laplace Transform and Its Applications (08)

Introduction to complex frequency, Definition of Laplace Transform, Basic Properties of Laplace Transform, Inverse Laplace Transform Techniques, Laplace Transform of Basic R, L and C components, Synthesis of Few typical waveforms & their Laplace Transform, Transient response of simple electrical circuits such as RL & RC to standard inputs and evaluation of initial and final conditions.

Unit VI: Two Port Network Parameters and Functions (10)

Terminal characteristics of network: Z, Y, h, ABCD Parameters; Reciprocity and Symmetry conditions, Applications of the parameters. Network functions for one port and two port networks, Pole-zeros of network functions and network stability,

Text Books :

1. M.E. Van Valkenburg : Network Analysis, PHI
2. D. Roy Choudhary : Network and systems, New Age Publication
3. Linear Network Theory : Kelkar and Pandit, Pratibha Publications.

Reference Books:

1. Circuit Theory : Chakraborti , Dhanpat Rai
2. Engineering Circuit Analysis : Hayt W.H. & J.E. Kemmerly , TMH
3. Network analysis with Applications : William D Stanley, Pearson Education
4. Network analysis : G.K. Mittal, Khanna Publications

Applied Mathematics- IV (EN/ET)

Scheme (Theory: 4 hrs, Tutorial :1 hr)

UNIT – I: NUMERICAL METHODS (12 Hrs)

Error Analysis, Solution of Algebraic and Transcendental Equations: Method of False position Newton–Raphson method and their convergence, Solution of system of simultaneous linear equations: Gauss elimination method, Crout's method and Gauss Seidel method, Numerical solution of ordinary differential equation: Taylor's series method, Runge- Kutta 4^{th} order method. Euler's modified method. Milne's Predictor- Corrector method, Runge- Kutta method to solve Simultaneous first order differential equations, Largest Eigen value and Eigen vector by Iteration method.

UNIT – II: Z-TRANSFORM (08Hrs)

Definition , Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Residue Method (Inversion Integral Method) and Power Series Expansion, Convolution of two sequences. Solutions of Difference Equations with Constant Coefficients by Z- transform.

UNIT - III: SPECIAL FUNCTIONS AND SERIES SOLUTION(12 Hrs)

Series Solution of Differential Equation by Frobanius method, Bessel's equation and Bessel's functions, Legendre's polynomials, Recurrence relations, Rodrigue's formula , Generating functions, Orthogonal properties of $J_n(x)$ and $P_n(x)$.

UNIT – IV: THEORY OF PROBABILITY (10 Hrs)

Axioms of Probability, Conditional Probability, Baye's Rule, Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions, Independent Random Variables, Conditional Distributions.

UNIT – V: MATHEMATICAL EXPECTATIONS (10 Hrs)

Definition Mathematical Expectation, Functions of Random Variables, Variance and Standard Deviation, Moments, Moment generating function, Covariance, Correlation Coefficient, Conditional Expectations, Other measures of central tendency and dispersion, Skewness and Kurtosis.

UNIT – VI: PROBABILITY DISTRIBUTIONS (08 Hrs)

Binomial distribution, Poisson distribution, Normal distribution, Relation between Binomial, Poisson and Normal distribution, Central Limit theorem, Exponential Distribution.

Text Books:

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication
2. Theory & Problems of Probability and Statistics by Murray R. Spiegel , Schaum Series, McGraw Hills
3. Advanced Engineering Mathematics by Erwin Kreysizig, 8th Edition, Wiley India

Reference Books

1. Introductory methods of Numerical Analysis by S.S. Sastry, PHI
2. A Text Book of applied Mathematics, Volume I & II by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
3. Advanced Mathematics for Engineers by Chandrika Prasad,
4. Digital Signal Processing, by John Proakis and D.G. Manolakis, Pearson (for Z-Transform)
5. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

B. E. Fourth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg.)

POWER DEVICES AND MACHINES

Duration : 3 Hr.

College Assessment : 20 Marks

University Assessment : 80 Marks

Subject Code : BEENE402T/ BEECE402T/ BEETE402T [4 – 0 – 1 – 5]

Objectives : To teach the basic concepts of power electronics. Also to study the important power devices and machines in detail along with basic applications of SCR as controlled rectifier. To get skill of developing and design related to power electronic circuits.

Outcomes :

After learning this subject, the students will

1. Understand the basics of different components used in Power Electronics.
2. Understand the working and characteristics of different power devices along with their applications in Electronic circuits.
3. Understand the concept of AC-DC converters, Choppers, Inverters which are widely used in industries.
4. Understand the different AC/DC machines and their speed control methods.

Unit I : Thyristors (12)

SCR : Construction, Operation, Transistor analogy, Static & dynamic Characteristics, Switching characteristics, SCR Ratings, Gate characteristics, Triggering requirements, Triggering techniques, Isolation Techniques, Pulse triggering, Burst triggering

TRIAC : Construction, Operation, steady stage characteristics, Triggering modes, Principle of DIAC, Phase control using TRIAC

Unit II : **Power Devices (10)**

IGBT : Construction, operation, Steady stage characteristics, Switching characteristics, Safe operating area, Need for gate/base drive circuits, Isolation techniques, Base drive circuits for Power BJT

Power MOSFET : Construction, operation, Static characteristics , Switching characteristics , forward and reverse bias operation, Gate drive circuits for Power MOSFET and IGBT.

GTO : Construction, Operation, Turn-off mechanism, Applications.

Unit III : **(10)**

Phase controlled Rectifiers (AC-DC Converters) : Single phase half Wave controlled, full wave controlled rectifiers with R and RL load, Bridge Configurations with R and RL load, Effect of Free-wheeling diode, Three phase full wave and half wave controlled with resistive load.

AC-AC Converters : Basic Principle, Operation , Single phase AC voltage controller for R and RL loads, Working of Three phase AC-AC controller with R Load.

Unit IV : Power Converters **(10)**

DC-DC converters (Chopper) : Working principle of chopper, Types of chopper : Step-Up & Step-Down chopper for RL Load, Class-A, class-B, Class-C, Class-D and Class-E chopper, Control Strategies

DC-AC Converters (Inverter) : Classification of inverter, Working Principle of single phase Half Bridge and Single Phase Full Bridge inverter for R and RL load, Three phase Bridge inverter for Resistive (Star) load.

Unit V : **(10)**

Three Phase Transformers : Construction, Different Connections : Star-Star, Delta-Delta, Star-Delta, Delta-Star, Open Delta Connection, Scott Connection, Parallel operation.

Three Phase Induction Motor : Principle of operation, Necessity of starters , DOL starter, Autotransformer starter, Star-Delta Starter, Speed control techniques of three-phase induction motor.

Unit VI : **(08)**

DC Motors : Principle of Operation, Types of Motor, Speed Control of Shunt Motor : Flux Control, Armature Control and voltage control method, Speed Control of Series : Flux Control, Rheostatic Control method

Universal Motor : Construction, Working ,characteristics and applications.

Text Books :

1. M.H. Rashid : “Power Electronic circuits devices and applications”, PHI Publications.
2. M.D. Singh & Khanchandani : “Power Electronics”, TMH Publications, New Delhi.
3. B.L. Theraja : “Electrical Technology” , Volume-2, S.Chand Publications

Reference:

1. P.C. Sen : “Modern Power Electronics”, S. Chand & Co, New Delhi.
2. P. Bhimra ,” Power Electronics”, Khanna publications
3. Nagrath Kothari : “Electrical Machines”, TMH Publications.

B. E. Fourth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg.)

POWER DEVICES AND MACHINES

Duration : 2 Hr.

College Assessment : 25 Marks

University Assessment : 25 Marks

Subject Code : BEENE402P/ BEECE402P/ BEETE402P **[0 – 2 – 0 – 1]**

Objectives : To teach the basic concepts of power electronics. Also to study the important power devices and machines in detail along with basic applications of SCR as controlled rectifier. To get skill of developing and design related to power electronic circuits.

Outcome :

After completion of practicals, the students will

1. Understand the working and nature of characteristics of different power components used in Power Devices.
2. Be able to calculate performance parameters for different devices.
3. Be able to perform different tests on Transformers and motors for calculating the losses, efficiency, regulation etc.
4. Understand the concept of starters used for starting AC/DC motors.
5. Understand different speed control methods for motors.

List of Experiments :

1. To study and plot V-I Characteristics of SCR.
2. To study and plot V-I Characteristics of TRIAC.
3. To study UJT as a relaxation oscillator.
4. To study and plot IGBT characteristics.
5. To study and plot characteristics of DC Chopper.
6. To study and plot characteristics of Single phase converter.
7. To study Series Inverter.
8. To perform O.C. and S.C. Test on Three Phase Transformer.
9. To study Load test on DC motor.
10. To study speed control of DC shunt motor.
11. To perform No-Load and Block Rotor test on Three Phase Induction Motor.
12. To study Starters of AC and DC motor.
13. To find slip of Three Phase Induction Motor.

Note : Minimum 8 practicals to be conducted.

B. E. Fourth Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

ELECTROMAGNETIC FIELDS

Duration : 3 Hr.

College Assessment : 20 Marks

University Assessment : 80 Marks

Subject Code : BEENE403T/ BEECE403T/ BEETE403T [4 – 0 – 1 – 5]

Objectives : To provide the students of Engineering with a clear and logical presentation of basic concepts and principles of electromagnetic.

Outcomes :

After the completion of this subjects, the students will

1. Understand the concepts of Electric, Magnetic and Electromagnetic fields required to understand the concepts of Electronic Communication.
2. Understand the different coordinate system for mathematical analysis of Electromagnetic Engineering.
3. Understand the different theorems and their use in Electromagnetic field.
4. Understand the use of waveguides for the transmission of electromagnetic waves at higher frequencies.
5. Understand the basic concepts of Radiation and Elements used for radiation along with the basic terminologies.

UNIT I : ELECTROSTATICS (12)

Introduction to Cartesian, Cylindrical and Spherical coordinate systems, Electric field intensity, flux density, Gauss's law, Divergence, Divergence Theorem, Electric potential and

potential gradient.

UNIT II: MAGNETOSTATICS: (10)

Current density and continuity equation, Biot-Savert's law, Ampere's circuital law and applications, Magnetic flux and Flux density, Scalar and Vector magnetic potentials.

UNIT III: MAXWELL S EQUATIONS AND BOUNDARY CONDITIONS: (08)

Maxwell's equations for steady fields. Maxwell's equations for time varying fields. Electric and magnetic boundary conditions.

UNIT IV :ELECTROMAGNETIC WAVES (10)

Electromagnetic wave equation, wave propagation in free space, in a perfect dielectric, and perfect conductor, skin effect, Poynting vector and Poynting theorem, reflection and refraction of uniform plane wave at normal incidence plane, reflection at oblique incident angle

UNIT V: WAVEGUIDES (10)

Introduction, wave equation in Cartesian coordinates, Rectangular waveguide, TE, TM, TEM waves in rectangular guides, wave impedance, losses in wave guide, introduction to circular waveguide.

UNIT VI: RADIATION (10)

Retarded potential, Electric and magnetic fields due to oscillating dipole (alternating current element), power radiated and radiation resistance, application to short monopole and dipole. Antenna Efficiency, Beam-width, Radiation Intensity, Directive Gain Power Gain & Front To Back Ratio. Advance topics on the subject

TEXT BOOKS:

1. W.H Hayt. and J.A. Buck : " Engineering Electromagnetics", McGraw Hill Publications.

2. Antenna & wave propogation, by K. D. Prasad, PHI Publication.

3. E.C. Jordan and K.C.Balamin : "Electromagnetic Waves and Radiating System", PHI Publications.

REFERENCE BOOKS:

1. Rao : "Elements of Engineering Electromagnetics", Pearson education

2. E J.D Krauss : "Electromagnetics" , Mc-Graw Hill Publications.

3. Fields and Waves in Communication Electronics (3rd edition), by S. Ramo and R. Whinnery, John Wiley and Sons.
4. R.S. Kshetrimayum: “Electromagnetic Field Theory”, CENGAGE Learning Publications.
5. John Reitz, F. Milford, R.W. Christy : “Foundations of Electromagnetic Theory”, Pearson Publications.

B. E. Fourth Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

DIGITAL CIRCUITS AND FUNDAMENTAL OF MICROPROCESSOR

Duration : 3 Hr.

College Assessment : 20 Marks

University Assessment : 80 Marks

Subject Code : BEENE404T / BEECE404T/ BEETE404T [4 – 0 – 1 – 5]

Objectives : To acquaint students with various basic digital gates used in digital system and develop logical circuits using Boolean gates, construction of various logic circuits using basic gates.

Outcomes : At the end of the course the student will be able to analyze, design, and evaluate digital circuits of medium complexity, that are based on SSIs, MSIs, and programmable logic devices.

Unit I: Combinational Circuits (08)

Standard representations for logic functions, k map representation of logic functions (SOP & POS forms), minimization of logical functions for min-terms and max-terms (upto 4 variables), don't care conditions, Design Examples: Arithmetic Circuits, BCD - to – 7 segment decoder, Code converters.

Unit II :Logic Circuit Design (12)

Adders and their use as substractor, look ahead carry, ALU, Digital Comparator, Parity generators/checkers, Static and dynamic hazards for combinational logic.

Multiplexers and their use in combinational logic designs, multiplexer trees, Demultiplexers, Encoders & Decoders .

Unit III: Sequential Logic Design (10)

1 Bit Memory Cell, Clocked SR, JK, MS J-K flip flop ,D and T flip-flops. Use of preset and clear terminals, Excitation Table for flip flops. Conversion of flip flops.

Unit IV : Application of Flip flops: (10)

Registers, Shift registers, Counters (ring counters, twisted ring counters),Sequence Generators, ripple counters, up/down counters, synchronous counters, lock out, Clock

Skew

Unit V: Digital Logic Families (08)

Classification of logic families , Characteristics of digital ICs-Speed of operation , power dissipation, figure of merit, fan in, fan out, Comparison table of Characteristics of TTL, CMOS, ECL, RTL, I^2L, DCTL.

Classification and characteristics of memories: RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM, expanding memory size, Synchronous DRAM (SDRAM), Double Data Rate SDRAM, Synchronous SRAM, DDR and QDR SRAM, Content Addressable Memory

Programmable logic devices: Detail architecture, Study of PROM, PAL, PLA, Designing combinational circuits using PLDs.

Unit VI: Fundamental of Microprocessor (12)

Introduction to microprocessor, Architecture of 8085 microprocessor, Addressing modes, 8085 instruction set, Concept of assembly language programming, Interrupts.

Text Books:

1. Morris Mano : " An approach to digital Design", Pearson Publications.

2. Ramesh Gaonkar : " Microprocessor Architecture, Programming and Applications with the 8085", Penram International Publications.

3. W. Fletcher : "Engg. Approach to Digital Design", PHI Publications.

Reference Books

1. Wakerly Pearon : "Digital Design: Principles and Practices", Pearon Education Publications.

2. Mark Bach : "Complete Digital Design", Tata MCGraw Hill Publications

3. R.P. Jain : "Modern digital electronics" , TMH Publications.

B. E. Fourth Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

DIGITAL CIRCUITS AND FUNDAMENTAL OF MICROPROCESSOR

Duration : 2 Hr.

College Assessment : 25 Marks

University Assessment : 25 Marks

Subject Code : BEENE404P / BEECE404P/ BEETE404P [0 – 2 – 0 – 1]

Objectives : To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

Outcome :

After the completion of practicals, the students will

1. Understand the fundamental of basic gates and their use in combinational and sequential circuits.
2. Understand the use of digital components as a switching elements.
3. Be able to generate basic arithmetic and logical circuits required in microcomputer systems.

List of Experiments :

1. To verify the truth table of different Logic Gates.
2. To study and verify the NAND and NOR gates as a universal gates.
3. To implement any logic function using basic gates.
4. To study and verify truth table of Multiplexer and Demultiplexer.
5. To study and verify the truth table of Half adder and Full Adder.
6. To study and verify the truth table of different types of Flip-flops.
7. To study and verify truth table of Encoder and Decoder.
8. To study and implement ALU.
9. To study the functioning of Shift Register.
10. To study the functioning of Up/Down counter .
11. To study the architecture of 8085 microprocessor.
12. Write and execute an ALP for multiplication of two 8 bit numbers.
13. Write and execute an ALP to count number of 1’s in 8 bit number.

Note : Minimum 8 Practicals to be conducted.

B. E. Fourth Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

SIGNALS AND SYSTEMS

Duration : 3 Hr.

College Assessment : 20 Marks

University Assessment : 80 Marks

Subject Code : BEENE405T/ BEECE405T/ BEETE405T [4 – 0 – 1 – 5]

Objectives :

The concept of this subject enable you to understand how signals, systems and inference combine in prototypical tasks of communication, control and signal processing.

Outcomes :

After completion of this subject, the students will

1. Get knowledge about different types of signals and systems used in communication Electronics.
2. Understand the concept of probability and its use in communication system.
3. Be able to embed the use of fourier series and fourier transform for feature extraction of different electronic signals.
4. Understand different coding schemes and able to apply selective coding scheme for the application needed.
5. Understand the different analog and digital modulation schemes

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UNIT-I: SIGNAL ANALYSIS (12)

Analysis of Signals, Representation of signals using a set of orthogonal signals, Fourier series representation of periodic signals. Fourier transform of periodic and non-periodic signals, Properties of Fourier Transform, convolution in time & frequency domain. Sampling theory for band limited signals.

UNIT-II: PROBABILITY & RANDOM PROCESS (12)

Probability, random variables and stochastic processes. Review of probability theory, random variables, probability density and distribution function, Random processes, periodic processes,

stationary processes. Auto correlation, cross correlation, applications to signal analysis,. Power density and spectral density function.

UNIT-III: LINE CODING (08)

Bandwidth and rate of pulse transmission, Inter symbol Interference, PSD of Digital signals, Line coding, RZ, NRZ, Polar, Manchester coding Schemes. Nyquists's first & second Criterion for zero ISI, Pulse shaping, tapped delay line filters and adaptive equalization.

UNIT-IV: MODULATION TECHNIQUES (10)

Introduction of Amplitude Modulation and Frequency modulation in brief, Elementary theory of SSB, DSB and noise calculation, noise calculation in SSBSC, DSB with carrier, Square law Demodulation, Envelope Demodulator, Noise in FM reception, Effect of Transmitter noise, FM threshold Effect

Quantization noise, types of Quantization –Uniform and Non-Uniform, A-Law and μ Law, Pulse Code Modulation , Delta modulation, Adaptive Delta modulation,

UNIT-V: DIGITAL CARRIER SYSTEM (08)

Digital Carrier Systems: Matched filter detection of binary signals, decision, threshold, error probability, Salient features of ASK, FSK & PSK system DPSK systems including M-ary Communication Systems.

UNIT-VI: INFORMATION THEORY AND CODING (10)

Information theory, channel capacity of discrete & continuous channels, Error control coding Hamming distance, Linear block codes, CRC, Convolution Codes.

Text Books:

1. B.P.Lathi : " Modern Digital & Analog Communication Systems" :.
2. Simon Haykin, Barry Wan Veen : "Signals and Systems", John Wiley and Sons Publications.
3. Oppenheim, Wilsky, Nawab : "Signals and Systems", Person Education Publications
4. A.B. Carlson : " Communication systems",

Reference Books:

1. Communication Systems: B.P. Lathi.
2. R.P. Singh, S.D. Sapre : "Communication Systems: Analog and Digital", McGraw Hill Publications.
3. Nagrath I.J., Sharan S.N., Ranjan R., Kumar S. : "Signals and Systems", Tata McGraw Hill Publications.

B.E. Fourth Semester

(Electronics/Electronics & Communication/ Electronics & Telecommunication Engg)

ENVIRONMENTAL STUDIES

Duration : 3 Hr.

College Assessment : Grade

University Assessment : 00 Marks

Subject Code : BEENE406T/ BEECE406T/ BEETE406T [3 – 0 – 0 – 0]

Objectives :

The goals of the Environmental Studies subject are to:

1) Increase understanding of how the world as a bio-physical system works, foster awareness of the earth's vital signs, and sharpen the ability of students to understand the nature and results of science.

2) Encourage a critical understanding of the various historical, political, economic, ethical, and religious forces that have shaped and continue to shape our world.

3) Nurture an ecological frame of mind which is willing and able to see things whole and thus resist the narrow specialization that can blind us to the connections between disciplines and bodies of knowledge.

4) Cultivate people who have sufficient knowledge, care, and practical competence to live in an ecologically responsible way.

5) Provide opportunities for students to explore the connections between environmental issues and different religious and philosophical traditions, and to encourage students who are Christian to reflect on their faith and its vision of shalom.

Outcome :

Through the course sequence in ESS, students will be able to:

1. Recognize major concepts in environmental sciences and demonstrate in-depth understanding of the environment.
2. Develop analytical skills, critical thinking, and demonstrate problem-solving skills using scientific techniques.

Unit I : Introduction **(2)**

Definition, Scope and importance, Need for public awareness – institutions in environment, people in environment.

Unit II : Natural Resources **(2)**

Renewable and non-renewable and associated problems; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

Unit III : Ecosystems **(8)**

Concept of an ecosystem- Understanding ecosystems, ecosystem degradation, resource utilization. **Structure and functions of an ecosystem** – producers, consumers and decomposers.

Energy flow in the ecosystem- water, carbon, oxygen, nitrogen and energy cycles, integration of cycles in nature. **Ecological succession**; food chains, food webs and ecological pyramids; ecosystem types – characteristic features, structure and functions of forest, grassland, desert and aquatic ecosystems.

Unit IV : Bio-diversity
(10)

Introduction – Biodiversity at genetic, species and ecosystem levels
Bio-geographic classification of India
Value of biodiversity – Consumptive use value, productive use value, social, ethical, moral, aesthetic and optional value of biodiversity , Threats to bio-diversity nation; hotspots of biodiversity. **Threats to bio-diversity** – habitat loss, poaching of wildlife, man-wild life conflicts. Common endangered and endemic plant and animal species of India.
Insitu and Exsitu conservation of biodiversity.

Unit V : Pollution **(6)**

Definition; causes, effects and control measures of air, water, soil, marine, noise and thermal pollutions and nuclear hazards. **Solid waste management** – Causes, effects and control measures of urban and industrial waste. Role of individual and institutions in prevention of pollution.

Disaster management – Foods, earthquake, cyclone, landslides

Unit VI : Social Issues and the Environment
(12)

Unsustainable to sustainable development; Urban problems related to energy; water conservation, rainwater, harvesting, watershed management; problems and concerns of resettlement and rehabilitation of affected people.

Environmental ethics – issues and possible solutions – Resource consumption patterns and need for equitable utilization; equity disparity in Western and Eastern countries; Urban and rural equity issues; need for gender equity.

Preserving resources for future generations. The rights of animals; Ethical basis of environment education and awareness; conservation ethics and traditional value systems of India.

Climate change, global warming, acid rain, Ozone layer depletion, nuclear accidents and holocausts.

Wasteland Reclamation; Consumerism and Waste products.

Environment legislations – The Environment (Protection) Act; The water (Prevention and Control of pollution) Act; The Wildlife protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislations – environment impact assessment 9EIA), Citizens actions and action groups.

Public Awareness – Using an environmental calendar of activities, self initiation.

Unit VII : Human Population and the Environment
(10)

Global population grown, variation among nations, population explosion; Family Welfare programmes – methods of sterilization; Urbanization.

Environment and human health – Climate and health, infectious diseases, water related diseases, risk due to chemicals in food, cancer and environment.

Human rights – Equity, Nutrition and health rights, Intellectual property rights (IPRS), Community Biodiversity registers (CBRs)

Value education – environmental values, valuing nature, valuing cultures, social justice, human heritage, equitable use of resources, common property resources, ecological degradation.

HIF/AIDS; Woman and Child Welfare; Information technology in environment and human health

Text Books :

1. Erach Bharucha : “A Text Book of Environmental Studies”
2. M. N. Rao and HVN Rao : “ Air Pollution”
3. S.S. Dara : “Environmental Chemistry and Pollution Control”
4. Mahesh Rangarajan : “Environmental Issues in India”
5. D.L. Manjunath : “Environmental Studies”.

B. E. Fourth Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

SOFTWARE WORKSHOP

Duration : 2 Hr.
College Assessment : 25 Marks
University Assessment : 25 Marks

Subject Code : BEENE407P / BEECE407P/ BEETE407P [0 – 2 – 0 – 1]

Objectives :

1. To instill in students the ability to formulate and solve engineering problems in electric and electronic circuits involving both steady state and transient conditions using MATLAB and pSpice.
2. Learn to use the pSpice simulation software tool for the analysis of Electrical and Electronic
   Circuits.
3. Learn to insert simple instructions to MATLAB, to find the solution of a system of linear
   algebraic equations, with constant (real and complex) coefficients.

Outcome :

After the completion of the Practicals , the students will be able to:

1) Write MATLAB program for any given problem.
2) Plot various functions using different graphical techniques.
3) Make mathematical analysis for the given problem.
4) Get the complete expert hand on pSpice Software.
5) To draw, analyze and plot the electronic circuits using pSpice Software.

Practical based on following topics should be conducted

SECTION - A

1.Introduction to MATLAB

MATLAB environment, different windows in matlab, getting help, important commands, matlab
as scratchpad, different types of files in matlab, complex variables and operations, plot commands

2. Matrices & vectors

Matrix manipulation, matrix and array operations, arithmetic operators, relational operators, logical operators, solution of matrix equation Ax= B, Gauss elimination, inverse of matrix Eigen values and Eigen vectors, Determinant, least square solutions.

3. Branching statements, loops and programming design

If statements, for loops, while, switch, Break and continue, nesting loops, if else with logical arrays, function programming.

4. Symbolic manipulation
Calculus – limit, continuity, differential calculus, differential equation, integration, integral transforms & Taylor series.

SECTION – B

5. Signals manipulations
Plotting standard signals, continuous and discrete such as step, ramp, sine, Generating signals from combination of different, signals and manipulation of signals.

6. Introduction to PSpice
Introduction to PSpice, different windows in PSpice, tools, libraries, component properties, circuit designing in PSpice.

7. Device characteristics
Plotting characteristics of semiconductor devices – diode, bipolar junction transistor, field effect transistor, UJT and SCR

8. Circuit Simulation & Introduction to PCB designing
Simulation of following circuits: half wave & full wave rectifier, Zener shunt regulator, transistorized RC coupled amplifier, clipper and clamper Introduction to PCB design

TERM WORK: Minimum five experiments each from MATLAB & PSpice are conducted based on the following list.

LIST OF EXPERIMENTS
MATLAB
1. Introduction to MATLAB Environment
2. To study simple matrix and array manipulations using Matlab
3. Programming using MATLAB
4. Calculus using MATLAB
5. To plot signals: discrete and continuous using MATLAB
6. Function programming and MATLAB
7. Signal Manipulation using MATLAB

PSpice
1. Design and simulation of resistive circuit
2. Plotting of VI characteristics of diode
3. Plotting of VI characteristics of BJT/FET
4. Plotting of VI characteristics of UJT/SCR
5. Design and simulation of half wave & full wave rectifier
6. Design and simulation of clipper and clamper circuits
7. Simulation of frequency response of a transistorized RC coupled amplifier

References:-

1. Stephen Chapman : “Matlab programming for Engineers” Thomson Learning Publication
2. Rudra Pratap : “Getting started with MATLAB” Oxford University press Publications.
3. Robert Strum and Donald Kirk : “Contemporary linear systems using MATLAB” Thomson
Learning Publications.
4. Duane Hanselman & Bruce Little field : “Mastering MATLAB” Pearson Publications
5. Brain R. Hunt, Ronald L. Lipsman & Jonathan M. Rosenberg : “A guide to MATLAB”
Cambridge University Press
6. Martin Golubitsky, Michael Dellnitz : “Linear Algebra and differential Equations using MATLAB” , International Thomson Publications.
7. Muhammad Rashid : “SPICE for Circuits and Electronics using PSpice”, PHI Edition
8. Robert Boylestad & Nashelsky : “Electronic Devices & Circuit theory” PHI publications

PROPOSED SCHEME OF EXAMINATION FOR

FIFTH SEMESTER BACHELOR OF ENGINEERING

(ELECTRONICS & COMMUNICATION/ELECTRONICS & TELECOMMUNICATION ENGINEERING)

Sub Code	Board	SUBJECT	Work Load				Credit				Marks				
											Theory		Practical		Total Marks
			L	P	T	Total	L	P	T	Total	Internal	University	Internal	University	
BEECE501T/ BEETE501T	Electronics	Antenna & Wave Propagation	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE502T/ BEETE502T	Electronics	Microprocessor & Microcontroller	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE502P/ BEETE502P	Electronics	Microprocessor & Microcontroller	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE503T/ BEETE503T	Electronics	Analog Circuits & Design	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE503P/ BEETE503P	Electronics	Analog Circuits & Design	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE504T/ BEETE504T	Electronics	Communication Electronics	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE504P/ BEETE504P	Electronics	Communication Electronics	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE505T/ BEETE505T	Applied Science & Humanities	Industrial Economics & Enterpreneurship Development	4	0	0	4	4	0	0	4	20	80	0	0	100
Total			**20**	**6**	**4**	**30**	**20**	**3**	**4**	**27**	**100**	**400**	**75**	**75**	**650**

Rashtrasant Tukadoji Maharaj Nagpur University

Formerly Known as Nagpur University

PROPOSED SCHEME OF EXAMINATION FOR

SIXTH SEMESTER BACHELOR OF ENGINEERING

(ELECTRONICS & COMMUNICATION/ELECTRONICS & TELECOMMUNICATION ENGINEERING)

Sub Code	Board	SUBJECT	Work Load				Credit				Marks				
											Theory		Practical		Total Marks
			L	P	T	Total	L	P	T	Total	Internal	University	Internal	University	
BEECE601T/ BEETE601T	Electronics	Telecommunication Switching Systems	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE602T/ BEETE602T	Electronics	Digital Signal processing	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE602P/ BEETE602P	Electronics	Digital Signal processing	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE603T/ BEETE603T	Electrical	Control System Engg.	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE604T/ BEETE604T	Electronics	Digital Communication	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE604P/ BEETE604P	Electronics	Digital Communication	0	2	0	2	0	2	0	2	0	0	25	25	50
BEECE605T/ BEETE605T	Applied Science & Humanities	Functional English	2	0	1	3	2	0	1	3	10	40	0	0	50
BEECE606P/ BEETE606P	Electronics	Electronics Workshop Practice	0	2	0	2	0	2	0	2	0	0	25	25	50
BEECE607P/ BEETE607P	Electronics	Industrial Visit	0	2	0	2	Audit Course			0	0	0	G	0	0
Total			**18**	**8**	**5**	**31**	**18**	**5**	**5**	**28**	**90**	**360**	**75**	**75**	**600**

B. E. Fifth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg.)

Antenna & Wave Propagation

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE501T/BEETE501T **[4 – 0 – 1 – 5]**

Objectives:

1. To study transmission line characteristics.
2. To study the basics of radiating elements and effect of propagation of radio waves in actual environment.
3. To study the antennas, their principle of operation, analysis and their applications.
4. To study the features of Antenna array, Microstrip antenna and reflector antenna.
5. To study designing aspects of Antenna.

Outcome:

At the end of the course the students shall be able to:

1. Describe transmission line characteristics.
2. calculate antenna parameters (radiation pattern, beam width, lobes, directivity, gain, impedance, efficiency, polarization)
3. Analyze wire antennas (monopoles, dipoles, and loops).
4. Analyze and design antenna arrays.
5. Describe the operation of broadband and traveling wave antennas.
6. Describe the operation of aperture and reflector antennas.
7. Analyze and design Microstrip antennas.

Unit I: Transmission Lines **(12)**

Transmission line equations and their solution , transmission line parameters, characteristics impedance, propagation constant, attenuation constant and phase constant, waveform distorion , distortionless transmission lines, loading of transmission lines, reflection coefficent and VSWR, Equivalent circuits of transmission lines, transmission lines at radio frequency, open and short circuited lines,smith chart, stub matching.

Unit II: Linear wire antennas **(12)**

Infinitesimal dipole, its radiation field, radiation resistance, radiation sphere, near field, far field directivity, small dipole, finite length dipole, half wave length dipole, linear elements near or on infinite perfect conductors, ground effects and their application, folded dipole

Loop Antenna:

Small loop, comparisons of small loop with magnetic dipole, radiation pattern its parameters and their application

Unit III: Arrays **(10)**

Linear arrays, planer arrays and circular arrays. Array of two isotropic point sources, non – isotropic sources, principle of pattern multiplication, linear arrays of n elements, broadside, End fire, radiation

Pattern, directivity, Beam width and null directions, array factor, Antenna analysis using Dolph-Tschebyscheff, the Log-periodic antenna, the composite Yagi-Uda-Corner-Log-Periodic array

Unit IV: Microstrip antennas **(08)**

Radiation Mechanism of Microstrip antenna, feeding methods, methods of analysis, Multiband Microstrip antenna for Mobile Communication, Circularly Polarized Patch antenna, Rectangular & circular patch, Circular polarization and feed network.

Unit V: Reflector antennas **(06)**

Simple reflectors, the design of a shaped Cylindrical reflector, Radiation patterns of Reflector Antennas, Dual shaped Reflector Systems Plane reflector, Corner reflector, horn antenna, aperture antenna.

Unit VI: Antenna Measurements **(12)**

Reciprocity in antenna Measurements, Near-Field & Far-Field, Co-ordinate System, Sources of Error in antenna measurements, measurement ranges, measurement of different antenna Parameters, antenna ranges, radiation pattern, Gain and directivity, Polarization

Radio Wave Propagation: Atmosphere of Earth, Terrestrial Propagation of Electromagnetic waves, Fading, Noise and interference, Ground wave propagation, Ionospheric propagation

Books:

Text Books:

1. Antenna Theory analysis and design – Costantine A. Balanis, John Wiley publication
2. Antenna and Wave propagation, - K.D. Prasad, Satya Prakashan
3. Electromagnetic – Jordan Balmann, Prentice Hall of India publication
4. Antenna Theory and Design , Robert S. Elliott , Wiley Student Edition
5. Electromagnetic Waves- R. K. Shevgaonkar

Reference Books:

1. Antenna & Wave Propagation , Sisir K Das, Mc Graw Hill
2. Harish A. R., Antenna and wave Propagation, Oxford University Press
3. Antennas and Radio Propagation, R.E. Collins, Mc Graw -Hill

B. E. Fifth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

MICROPROCESSOR AND MICROCONTROLLERS

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEENE502T/ BEECE502T/ BEETE502T **[4 – 0 – 1 – 5]**

Objectives:

The course objectives are:

1. To study fundamentals of microprocessor and microcontroller systems.
2. To study architecture of microprocessor & to understand the concept of memory organization, stack memory, Assembly language programming.
3. To study different interrupt techniques.
4. To study interfacing of microprocessor & microcontroller with different peripheral devices.

Outcome:

After completing this course students shall be able to:

1. Describe internal organization of 8086/8088 microprocessors & 8051microcontrollers.
2. Describe the concept of addressing modes and timing diagram of Microprocessor.
3. Interface 8086 & 8051 with Keyboard/ Display, ADC/DAC, Stepper motor etc.
4. Demonstrate the concept of interrupts and its use.
5. Demonstrate the concept of Serial & parallel data communication
6. Describe Handshaking concept and interfacing with peripheral devices.
7. Describe the concept of DMA & Pentium.
8. Describe 8087 Numeric coprocessor & its use in practical application.
9. Interface various hardware with microprocessor.

Unit I: Intel 8086/8088 microprocessor & Programming: **(09)**

8086/8088 microprocessor, Pin diagram, Architecture, features and operating modes, Clock generator 8284, memory organization & interfacing, Addressing modes, complete instruction set.

Unit II: 8086 & Peripheral Interfacing I: **(11)**

Assembly language programming of 8086,Interrupt structure, I/O interfacing, Interfacing of peripherals like 8255 PPI, multiplexed 7-seg display & matrix keyboard interface using 8255. Programmable Keyboard/Display controller 8279, Organization, Working modes, command words & interfacing.

Unit III: 8086 & Peripheral Interfacing II: **(10)**

Programmable interval timer/counter 8254; Architecture, working modes, interfacing 8259 PIC,

Organization, control words, interfacing, cascading of 8259's. Serial communication, Classification & transmission formats. USART 8251, Pins & block diagram, interfacing with 8086 & programming.

Unit – IV: Numeric Co-processor & DMA Controller: (10)

8086 maximum mode pin diagram, Closely coupled & loosely coupled multiprocessor system, 8087 Numeric coprocessor, architecture, interfacing with 8086, instruction set.DMAC 8237, Architecture, interfacing & programming, Introduction to Pentium.

Unit – V: 8051 microcontroller & programming: (10)

Introduction to 8051 microcontroller; Pin diagram, architecture, features & operation, Ports, memory organization, SFR's, Flags, Counters/Timers, Serial ports. Interfacing of external RAM & ROM with 8051. 8051 Interrupt structure, Interrupt vector table with priorities, enabling & disabling of interrupts

Unit – VI: 8051 microcontroller interfacing: (10)

Instruction set of 8051; data transfer, logical, arithmetic & branching instructions, Addressing modes, Assembly language programming examples, counter/timer programming in various modes. Serial communication, Operating modes, serial port control register, Baud rates. I/O expansion using 8255, Interfacing keyboard, LED display, ADC & DAC interface, stepper motor interface

Books:

Text Books:

1. Programming & Interfacing of 8086/8088, D.V. Hall, TMH.
2. Microprocessor 8086/8088 Family Programme Interfacing: Liu & Gibson
3. M.A. Mazidi & J.G. Mazidi, the 8051 Microcontroller and Embedded system, 3rd Indian reprint, Pearson Eduction
4. The Intel Microprocessor 8086 & 80486 Pentium and Pentium Pro. Architecture Programming and Interfacing – Brey.

Reference Books:

1. Intel Reference Manuals, Microprocessors & Microcontrollers: Intel
2. Microcontrollers – Peatman, Mc Graw Hill.
3. Microprocessors & Microcomputers based system design by Md. Rafiquzzaman.
4. 8086/8088 Microprocessors, Walter Triebel & Avtar Singh
5. Introduction to Microprocessors for Engineers and Scientists, P. K. Ghosh, P. R. Sridhar, PHI Publication.
6. The 8051 Microcontroller & Embeded Systems, Kenneth J. Ayala, Dhanvijay V. Gadre, CENGAGE Learning.

B. E. Fifth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

MICROPROCESSOR AND MICROCONTROLLERS

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25 Marks

Subject Code: BEENE502P/ BEECE502P/ BEETE502P **[0 – 2 – 0 – 2]**

Objectives:

1. To perform a practical based on microprocessor and microcontroller based system.
2. To study assembly language programming skills.
3. Interface different peripherals with microprocessor and microcontroller with its use.

Outcome:

At the end of the course the students shall be able to:

1. Demonstrate the concept of Assembly languages structure and programming. 2. Interface various peripherals with 8086 and 8051.
3. Simulate the programs on different software platforms.

Any TEN practicals are to be conducted.

List of Experiments:

1. Study of 8086 microprocessor.
2. Write and execute 8086 assembly Language Programs to multiply two 16 bit numbers.
3. Write and execute 8086 assembly Language Programs to divide 16 bit number by 8 bit number.
4. Write and execute 8086 assembly Language Programs to search a look-up table for a byte (make use of XLAT)
5. Write and execute 8086 assembly Language Programs to compare two strings (use String instructions)
6. Write and execute 8086 assembly Language Programs to arrange the data bytes in ascending/descending order.
7. Write and execute 8086 assembly Language Programs to generate Fibonacci series and store it from memory location 0050H.
8. Write and execute 8051 assembly language program to find smallest byte in a string of bytes.
9. Write and execute 8051 assembly language program to exchange two data strings.
10. Write and execute 8051 assembly language program to generate square wave of 1 KHz (and any other frequency) on one of the pin of output port.
11. Interface 8255 with 8086 microprocessor and write a program to glow the alternate LED's.
12. Interface 8255 with 8086 microprocessor and write a program to rotate the stepper motor.

13. Interface 8253 with 8086 microprocessor and write a program to generate square waveform.

14. Interface 8279 with 8086 microprocessor and write a 8086 instructions to initialize 8279 (for a task as per the user's requirement).

15. Interface of ADC using 8255 with 8086 and write a program to convert analog signal input into its equivalent digital value and store it in memory locations.

Note: Few programs should be based on MASM / Simulator. Minimum 4 interfacing experiments should be conducted.

B. E. Fifth Semester

(Electronics /Electronics & Communication/ Electronics & Telecommunication Engg)

ANALOG CIRCUIT AND DESIGN

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEENE503T/ BEECE503T/BEETE503T [4 – 0 – 1 – 5]

Objectives:

The course objectives are:

1. To study the basic characteristic, construction, open loop & close loop operations of Op-Amp.
2. To study linear and non linear applications of Op-Amp.
3. To study the design of Electronic Circuits for Oscillator, Multivibrator and Active Filters
4. To enable students to design regulated power supply using regulated ICs

Outcome:

After completing this course students shall be able to:

1. Describe the basic differential Amplifier using transistor and its operation & characteristic.
2. Design linear Op-Amp circuits such as Voltage follower, Summing amplifier, scaling and averaging amplifier, Instrumentation amplifier circuits for various practical applications.
3. Design non-linear Op-Amp such as Comparators, Comparator IC such as LM 339, Schmitt trigger, multivibrator circuits for various practical applications using IC555.
4. Analyze and design amplifier circuits, oscillators, Filter, regulated power supply

Unit I: OP-Amp Fundamentals: **(8)**

Block diagram of OP-Amp (Basic Building Blocks), Basic differential Amplifier using transistor and its operation, OP-Amp parameters, characteristic and Definition, Ideal OP-Amp, Equivalent circuit, Voltage Transfer curve, Inverting and Non-inverting configurations and design, concepts of virtual short and ground.

Unit II: OP-Amp Linear Applications: **(10)**

Voltage follower, Summing amplifier, scaling and averaging amplifier, Instrumentation amplifier and applications, Integrator and differentiators (Practical considerations and design), Peak detector, Log and antilog amplifiers using OP-Amp & Transistor and analog multipliers.

Unit III: OP-Amp Non-Linear Applications: **(12)**

Comparators, Schmitt trigger, Comparator IC such as LM 339, Clipper and Clamper, Precision Rectifier, PLL Multivibrators: Bistable, Monostable, Astable multivibrator circuits using IC 555, Sample/Hold circuits, D/A (R/R) & A/D conversion circuits (Successive Approximation Method), design of ADC using 0804 ICs.

Unit IV: Design of Power supply system: (09)

Unregulated D.C. power supply system with rectifiers and filters, Design of series voltage regulators, Design of regulators using IC 78×× and 79××, protection circuits for regulators, Design of SMPS (Buck & Boost)

Unit V: Design of sinusoidal oscillators & Function generator: (09)

OPAMP based Wein Bridge and Phase Shift oscillators, Transistorized Hartley, Colpitts oscillator, and Crystal oscillators, Evaluation of figure of merit for all above oscillator circuits. Design of function generators.

Unit VI: Design of Filters & Drivers: (12)

Advantages of active filters, Design of Butterworth Active Filter, Design of Active filter of LPF, HPF, BPF of 1^{st} order, 2^{nd} and higher order (up to 6^{th} order) Butterworth filter.

Design of Relay driver circuit, Design of stepper motor control circuit, Design of Dc servo motor control circuit

Books:

Text Books:

1. Operational Amplifier and Applications: R. Gayakwad.
2. Monograph on Electronic circuit Design: Goyal & Khetan.
3. Franco: Designing with Op-Amps (McGraw Hill).

Reference Books:

1. Linear Integrated Circuits Mannal I, II, and III: National Semiconductor.
2. Linear Applications Handbook National Semiconductors.
3. Dailey: Operational Amplifier (Tata McGraw Hill).
4. Regulated Power supply Handbook. Texas Instruments.
5. Electronics: BJT's, FETS and Microcircuits – Anielo.
6. Operational Amplifier Design and Applications Tobey, Graham, Huelsman McGraw Hill.

B. E. Fifth Semester

(Electronics /Electronics & Communication/ Electronics & Telecommunication Engg)

ANALOG CIRCUIT AND DESIGN

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25Marks

Subject Code: BEENE503P/ BEECE503P/BEETE503P **[0 – 2 – 0– 2]**

Objectives:

1. To learn about various types of analog systems.
2. To study the practical aspects of linear and non-linear applications of OP-AMP.
3. To design the oscillators using OP-AMP and Transistors.
4. To study frequency response of different circuits based on operational amplifier.

Outcome:

At the end of the course the students shall be able to:

1. Gain a sound understanding of the operation, analysis and design of analog electronic circuits and systems
2. Design linear and nonlinear applications of operational amplifier.
3. Design the oscillators and other complex circuits using op amp ICs.
4. Demonstrate the gain-bandwidth concept and frequency response of basic amplifiers.

Any TEN practicals are to be conducted

LIST OF EXPERIMENTS

1. (A)Design Non-Inverting OP-AMP and measure the gain and plot the input/output waveforms.

   (B)Design Inverting OP-AMP and measure the gain and plot the input/output waveforms.
2. Plot the Frequency response of Inverting and Non-inverting amplifiers.
3. Implementation of Op-Amp as adder & subtractor.
4. To design OP-AMP as Integrator and Differentiator and plot its input/output waveforms.
5. To design OP-AMP as Schmitt trigger for generating a waveform of specific pulse width.
6. To design OP-AMP as peak detector.
7. To design OP-AMP as Precision rectifier and plot the waveforms.
8. To Verify Op-amp parameters (1) CMRR (2) Slew Rate.
9. To Verify and simulate Clipper circuit using IC 741.
10. Design and verify Multivibrator circuits using IC 555.

11. To study Phase Lock Loop using IC 565.
12. To study OP-AMP as Clippers & Clampers.
13. Design RC oscillator using OP-AMP and calculate its frequency.
14. Design transistorized LC oscillator and calculate its frequency.
15. Design first & second order low pass Butterworth filer.
16. Design first & second order high pass Butterworth filer.
17. Design of series voltage regulators.
18. Design of Driver Circuit for DC servomotor/Relays.
19. Design of control circuit for stepper motor.

Note: Simulate results using simulation software for at least four experiments.

B. E. Fifth Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

COMMUNICATION ELECTRONICS

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEENE504T/ BEECE504T/BEETE504T [4 – 0 – 1 – 5]

Objectives:

The course objectives are:

1. To study the basic concept of communication and different modulation system based on basic parameters.
2. To study the concept of noise, properties & its effects.
3. To study the AM, FM, PM process & compute modulation Index.
4. To study the fundamentals of AM and FM Receivers.
5. To develop knowledge about fundamentals of Broadband Communication Systems.

Outcome:

At the end of the course the students shall be able to:

1. Demonstrate a basic understanding of the term bandwidth and its application in communications.
2. Describe quantizing and PCM signals, bandwidth and bit rate calculations, study amplitude and angle modulation and demodulation of analog signals etc.
3. Solve the problems involving bandwidth calculation, representation & Generation of an AM sine wave
4. Compare different modulation techniques of Generation of FM (Direct & Indirect Method)
5. Identify, formulate & solve communication engineering problems.

Unit I: Amplitude (Linear) Modulation (08)

Base band & Carrier communication, Introduction of amplitude modulation, Equation of AM, Generation of AM (DSBFC) and its spectrum, Modulation Index , Power relations applied to sinusoidal signals, DSBSC – multiplier modulator, Non linear generation, switching modulator, Ring modulator & its spectrum, SSBSC, ISB & VSB, their generation methods & Comparison, AM Broadcast technical standards.

Unit II: Angle Modulation (12)

Concept of Angle modulation, Types of Angle Modulation, frequency spectrum, Narrow band & wide band FM, Modulation index, Bandwidth, Phase Modulation, Bessel's Function and its mathematical analysis, Generation of FM (Direct & Indirect Method), Comparison of FM and PM.

Unit III: Pulse Modulation (10)

Band limited & time limited signals, Narrowband signals and systems, Sampling theorem in time domain, Nyquist criteria, Types of sampling- ideal, natural, flat top, Aliasing & Aperture effect.

Pulse Analog modulation: PAM PWM & PPM.

PCM – Generation & reconstruction, Bandwidth requirement of PCM.Differential PCM, Delta Modulation & Adaptive DM. (Only Block diagram treatment).

Unit IV: Noise **(10)**

Sources of Noise, Types of Noise, White Noise, Thermal noise, shot noise, partition noise, Low frequency or flicker noise, burst noise, avalanche noise, Signal to Noise Ratio, SNR of tandem Connection, Noise Figure, Noise Temperature, Friss formula for Noise Figure, Noise Bandwidth.

Unit V: AM and FM Receivers **(10)**

Communication Receiver, Block Diagram & special Features

Block diagram of AM and FM Receivers, Super heterodyne Receiver, Performance characteristics: Sensitivity, Selectivity, Fidelity, Image Frequency Rejection, Pre-emphasis, De-emphasis

AM Detection: Rectifier detection, Envelope detection, Demodulation of DSBSC: Synchronous detection, Demodulation of SSBSC.

FM Detection: Foster Seelay FM Detector & FM detection using PLL

Unit VI: Broadband Communication Links & Multiplexing: **(10)**

Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing.

Short and Medium Haul Systems: Coaxial Cables, Fiber optic links, Microwave Links, Tropospheric scatter Links.
Long Haul Systems: Submarine cables.

Books:

Text Books:

1. Kennedy & Devis : Electronic Communication Systems , Tata McGraw Hills Publication(Fourth Edition)

2. Dennis Roddy & Coolen - Electronic Communication, PHI (Fourth Edition)

3. B. P. Lathi: Modern Digital and Analog. Communication Systems: Oxford Press Publication (Third Edition)

Reference Books:

1. Simon Haykin: Communication Systems, John Wiley & Sons (Fourth Edition)

2. Taub & Schilling: Principles of Communication Systems, Tata McGraw-Hill

3. Leon W.Couch, II: Digital and Analog Communication Systems, Pearson Education (Seventh Edition) 4. Electronic Communication Systems, Roy Blake, CENGAGE Learning.

B. E. Fifth Semester

(Electronics / Electronics & Communication / Electronics & Telecommunication Engg)

COMMUNICATION ELECTRONICS

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25 Marks

Subject Code: BEENE504P/ BEECE504P/BEETE504P **[0 – 2 – 0 – 2]**

Objectives:

1. To perform practical based on analog and digital modulation techniques.
2. To study the analysis of AM and FM receivers.
3. To study ASK, FSK and PSK techniques.
4. To perform Matlab based practical for different modulation techniques.

Outcome:

At the end of the course the students shall be able to:

1. Demonstrate different modulation techniques used in electronic communication system.
2. Use the modulation techniques and modern communication tools necessary for various engineering applications.
3. Evaluate fundamental communication system parameters, such as bandwidth power, signal to quantization noise ratio, data rate etc.

Any TEN practicals are to be conducted

List of Experiments:

1. To generate Amplitude Modulated wave using different techniques and plot its waveform.
2. To study different AM detection techniques.
3. To measure Noise Figure.
4. To generate Frequency Modulated wave using different techniques and plot its waveform.
5. To study different FM Detection Techniques.
6. To generate Pulse Amplitude Modulation (PAM) and plot the waveforms. Observe the demodulated output.
7. To generate Pulse Width modulated signal and study PWM demodulation.
8. To generate Pulse Position modulated signal and study Pulse Position Demodulation.
9. To study Single side band (SSB) Transmission & Reception
10. To study Double Side Band (DSB) Transmission & Reception
11. To study generation of SSB-SC using balanced modulator
12. To study generation of DSB-SC signal.
13. To study DTMF Encoder Decoder

14. To perform Spectrum Analysis of AM & FM signals
15. To perform Time Division Multiplexing (TDM).
16. To study Pre-Emphasis and De-Emphasis
17. To study Super heterodyne Receiver
18. To study FM radio receiver circuit.
19. Simulation of Analog modulation techniques using MATLAB.
20. Simulation of Frequency modulation techniques using MATLAB.
21. To perform Pulse Code Modulation (PCM) using Simulation in MATLAB.

B. E. Sixth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

TELECOMMUNICATION SWITCHING SYSTEMS

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE601T/ BEETE601T **[4 – 0 – 1 – 5]**

Objectives:
The course objectives are:
1. To study the latest development of Telecommunication systems.
2. To study the architecture and major design issues related to switching systems.

Outcome:

After completing this course students shall able to:
1. Describe the need for switching systems and their evolution from analogue to digital.
2. Describe the Public Switched Telephone Network.
3. Describe private networks.
4. Describe integrated networks.

Unit 1: Telecommunication Switching Systems **(10)**

Principles of manual switching system, electronic telephone, local and central battery system, trunk exchange, junction working. Automatic telephony: strowger exchange, line switches and selectors, ringing and tone circuit, subscriber uniselector circuit, trunking diagram, cross bar switching system

Message switching, Circuit switching, manual switching and Electronic Switching. Digital switching: Switching functions, space division switching, time division switching, two dimensional switching, digital cross connect systems, digital switching in an analog environment.

Unit 2: Telecommunication Traffic **(10)**

Unit of Traffic, Traffic measurement, a mathematical model, Lost- call systems: Theory, traffic performance, loss systems in tandem. Queuing systems: Erlang Distribution, probability of delay, Finite queue capacity, systems with a single server, Queues in tandem, delay tables and application of Delay formulae. Analysis: Traffic Characteristics: Arrival Distributions, Holding time Distribution. Loss Systems: Lost calls cleared, lost calls returning, lost calls Held, lost calls cleared.

Unit 3: Switching Networks **(12)**

Single Stage Networks, Gradings: Principle, Design of progressive grading, other gradings, Traffic capacity of gradings, Applications of gradings. Link Systems: General, Two stage networks, three stage networks.Grades of service of link systems: General, Two stage networks, three stage networks, Call packing, Rearrangeable networks, Strict sense non blocking networks, Sectionalized switching networks Control of Switching Systems: Call processing Functions: Sequence f operations, Signal exchanges, State transition diagrams. Common Control, Reliability, Availability and Security.

Unit 4: Network Synchronization and Management **(08)**

Timing: Timing Recovery, Clock Instability, Elastic Stores, Jitter measurements, systematic jitter. Timing Inaccuracy: Slips, Asynchronous Multiplexing, Waiting time jitter. Network Synchronization: Plesiochronous, pulse stuffing, mutual synchronization, Network master, Master – Slave synchronization, Hierarchical synchronization Processes. Network management: Routing control, Flow control.

Unit 5: Networks **(10)**

Data Networks: Data Transmission in PSTN, Data Communication Architecture, Link to link layers, End to End layers, Satellite based Data networks, LANs, MANs, Fiber optic networks, Data network Standards, Protocol stacks, Interworking. Integrated Services Digital Networks: ISDN, Network and protocol Architecture, Transmission Channels, User network interfaces, signaling, Numbering and Addressing, ISDN Standards, Broadband ISDN, Voice Data Integration

Unit 6: Cellular Telephone Concepts **(10)**

Mobile telephone services, cellular telephone, Frequency reuse, Interference, Cellular

System topology, Roaming and handoffs, Cellular telephone network components, Cellular telephone calls processing. Cellular Telephone systems: Digital cellular telephone

Books:

Textbooks:

1. J. E. Flood, “Telecommunications Switching, Traffic and Networks”, Pearson
Education 2. John C. Bellamy, “Digital Telephony”, Third Edition; Wiley Publications

3. Thiagarajan Vishwanathan, “Telecommunication Switching Systems and Networks”; PHI Publications 4.
Wayne Tomasi, “Electronic Communications Systems”; 5th Edition; Pearson Education

Reference Books:

1. P.Gnanasivam,”Telecommunication Switching and Networks.

2. Rappaport,”Wireless communication”

3. Tannenbaum”Data communication and networks” 4th Edition,TMH

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

DIGITAL SIGNAL PROCESSING

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEENE602T/ BEECE602T/ BEETE602T [4 – 0 – 1 – 5]

Objectives:

1. To study the basic concepts of digital signal processing.
2. To study analysis and processing of signals for different kind of applications and retrieval of information from signals.
3. To understand the physical significance of circular convolution and its relation with linear convolution.
4. To study designing of digital filters and its realization.
5. To study analysis of signals using the discrete Fourier transform (DFT) and Z-Transform.
6. To study behavior of discrete time systems using Z-Transform.

Outcome:

By the end of the course the students shall be able to:

1. Represent discrete-time signals analytically and visualize them in the time domain.
2. Meet the requirement of theoretical and practical aspects of DSP with regard to sampling and reconstruction.
3. Design and implement digital filter for various applications.
4. Describe the various transforms for analysis of signals and systems.
5. Describe the concept of multi rate signal processing and how to apply it for the wavelet transform.

Unit I: Introduction (08)

Basic elements of DSP and its requirement, Advantages of Digital over analog signal processing, sampling theorem, sampling process and reconstruction of sampling data.

Discrete time signals & systems: Discrete time signals & systems, classification of discrete time signals and systems, LTI systems, linear convolution, Cross Correlation, Autocorrelation.

Unit II: Z- Transforms (08)

The Z-transform: Definition, properties of the region of convergence for the Z-transform, Z-transform properties, Inverse Z-transform, Parseval's theorem, unilateral Z-transform.

Unit III: Discrete and Fast Fourier Transforms (12)

Definition and properties of DFT, IDFT**, R**elation between DFT and Z–Transform, Radix- 2 FFT algorithms, Linear filtering methods based on DFT, circular convolution, Frequency analysis of discrete time signals using DFT, Gortzel algorithm.

Unit IV: IIR Filter Design & Realization (12)

Filter design methods – Approximation of derivatives, Impulse invariance, bilinear transformation, characteristics & designing of Butterworth, Chebyshev filters, frequency transformations, IIR filter structures- Direct form I-II, transpose form, parallel form, cascade, Lattice and Lattice-ladder structures.

Unit V: FIR Filter Design & Realization (12)

Symmetric and antisymmetric FIR filters, Linear phase FIR filter, design of FIR filters using windows (Rectangular, Bartlett, Hanning, Hamming & Blakman), frequency sampling method, FIR differentiators, FIR filter structures.

Unit VI: Multirate DSP (08)

Introduction, Decimation by factor D, Interpolation by factor I, Sampling rate conversion by rational factor I/D, Sub band coding of speech signals and its applications, introduction to wavelet & wavelet transform, Introduction to DSP architecture TMS 320.

Books:

Text Books:

1. J.G. Proakis, D.G. Manolakis “Digital Signal Processing: Principles, algorithms and applications, Pearson Education.
2. A.V. Oppenheim, R.W. Schafer, “Discrete Time Signal Processing”, Pearson Education.
3. Rabiner Gold “ Theory and Application of DSP”, PHI
4. Texas Instruments and Analog Devices DSP Chip Manuals.

Reference books:

1. Digital signal processing- A practical approach Second Edition, 2002.**E**. C. Ifeachar, B. W. Jarvis Pearson Education

2. Sanjit K. Mitra , ‘Digital Signal Processing – A Computer based approach’

3. S. salivahanan, A Vallavaraj, C. Gnanapriya , ‘Digital Signal Processing’, 2nd Edition McGraw Hill.

4. A. Nagoor Kani, ‘Digital Signal Processing’, 2nd Edition McGraw Hill.

5. P. Ramesh Babu, ‘Digital Signal Processing’ Scitech

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

DIGITAL SIGNAL PROCESSING

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25 Marks

Subject Code: BEENE602P/ BEECE602P/ BEETE602P **[0 – 2 – 0 – 2]**

Objectives:

1. To understand principle & working of digital signal processing for various applications.
2. To understand Z transforms and discrete time Fourier transforms for the analysis of digital signals and systems.
3. To design and implement FIR & IIR filter and analysis of their frequency response.

Outcome:

At the end of the course the students shall be able to:

1. Analyze and process the signals in the discrete domain.
2. Design the filters to suit requirements of specific applications.
3. Apply the techniques, skills, and modern engineering tools like MATLAB and digital processors.

Any TEN practicals are to be conducted

LIST OF EXPERIMENTS

1. To plot and represent following basic discrete time signals using MATLAB functions. :

   Unit impulse, unit step, ramp, real and complex exponential and its representations

2. To plot linear convolution of discrete signals using MATLAB functions.

3. Write a program to compute cross-correlation and auto-correlation of the given sequences with corresponding plot.

4. Write a program to test stability of given discrete- time system.

5. To find Z transform of discrete time signal and its ROC with corresponding plot.

6. To find inverse Z transform of given discrete time signal.

7. Write a program to find frequency response of given system.

8. To compute DFT and IDFT of discrete time signals.

9. Write a program to find FFT and IFFT of given sequences.
10. Compute linear and circular convolution using DFT / IDFT method
11. Designing of Digital IIR filter using MATLAB functions.
12. Designing of Digital FIR filter using window.
13. Designing of Digital FIR filter using GUI tool box.
14. To Study DSP Processor using TMS 5416 and TMS 6713 starter kits.
15. To perform linear convolution and circular convolution on Processor kit.
16. To designing and implementation of High pass filter on DSP processor.

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

CONTROL SYSTEM ENGINEERING

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEENE603T/ BEECE603T/ BEETE603T [4 – 0 – 1 – 5]

Objectives:

The Course Objectives are:

1. To study the fundamental concepts of Control systems and mathematical modeling of the system. 2. To study the concept of time response and frequency response of the system.
3. To study controllers & compensators.
4. To study the basics of stability analysis of the system.

Outcome:

At the end of the course the students shall be able to:

1. Analyze various control systems.
2. Represent the mathematical model of a system.
3. Determine the response of different order systems for various step inputs.
4. Analyze the stability of the system using Root locus. Bode plot, Nyquist plot.
5. Obtain transfer function of systems using signal flow graph.
6. Apply the state variable approach in design.

Unit I: Introduction and Modeling of control system (11)

Introduction to need for automation and automatic control, use of feedback, Broad spectrum of system application. Mathematical modeling, Differential equations, transfer functions, block diagram, signal flow graphs, Effect of feedback on parameter variation, disturbance signal, servomechanisms. Control system components, Electrical, Electromechanical. Their functional analysis and input, output representation.

UNIT-II: Time Domain analysis (09)

Time response of the system, first order & second order system, (standard inputs) concept of gain & time constant, steady state error, type of control system, approximate method for higher order system. Principles of P,PI,PD,PID controllers.

UNIT-III: Stability & Root Locus method (11)

Stability: Stability of control systems, conditions of stability, characteristic equation, Routh Hurwitz criterion, special cases for determining relative stability.

Root Locus method: Root location and its effect on time response, elementary idea of Root Locus, effect of adding pole and zero and proximity of imaginary axis.

UNIT-IV: Frequency response analysis **(11)**

Frequency response method of analysing linear system, Nyquist & Bode Plot, stability & accuracy analysis from frequency response, open loop & closed loop frequency response.

Nyquist criteria, effect of variation of gain & addition of poles & zeros on response plot, stability margin in frequency response.

UNIT-V: Compensators **(08)**

Needs of compensations, lead compensations, Lag compensations, Lead-Lag compensations (theoretical concepts)

Overview of various transducers with their signal conditioning systems.

UNIT-VI: State variable approach **(10)**

State variable method of analysis, state choice of state representation of vector matrix differential equation, standard form, relation between transfer function and state variable.

Books:

Text Books:

1. Control Systems Engineering, I.J. Nagrath, M. Gopal
2. Modern Control system (II Edition) – Katsuhiko Ogata
3. Control systems by Smarajit Ghosh (second Edition, Pearson Education)

Reference Book:

1. Automatic Control system (II Edition) – Benjamin C, Kuo, PHI
2. Modern Control System, Drof, Bishop, Wesly Publication
3. Control system Engineering, S.K. Bhattacharya, Pearson Education.

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

DIGITAL COMMUNICATION

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEENE604T/ BEECE604T/ BEETE604T [4 – 0 – 1 – 5]

Objectives:

The Course Objectives are:

1. To study basic components of digital communication systems.
2. To understand the designing aspects of optimum receivers for digital modulation techniques.
3. To study the analysis of error performance of digital modulation techniques.
4. To study the designing of digital communication systems under given power, spectral and error performance constraint

Outcome:

After completing this course students shall be able to:

1. Explain the working principles of basic building blocks of a digital communication system.
2. Describe a random process in terms of its mean and correlation functions and characterize special Gaussian and Rayleigh distributions.
3. Explain receiver techniques for detection of a signal in AWGN channel
4. Describe digital modulation techniques.
5. Demonstrate the concept of coding and decoding techniques.
6. Model digital communication systems using appropriate mathematical techniques.
7. Describe spread spectrum analysis.

UNIT-I:-Digital Communication Concept (10)

Review of Random variables, PDFs & CDFs, Central limit Theorem. Model of digital communication system, Gram Schmitt Orthogonalization procedure, signal space concept, Geometric interpretation of signals, probability of error, correlation receiver, matched filter receiver.

UNIT-II: - Source & Waveform Coding Methods (10)

Source coding Theorem, Huffman coding-Z encoding algorithm, rate distortion theory for optimum quantization, scalar & vector quantization.

Waveform coding methods: ADPCM, Adaptive Sub-Band & Transform coding, LP & CELP coding.

UNIT-III:-Digital Modulation Techniques **(10)**

Coherent Binary: QPSK, MSK, Gaussian MSK, DPSK, Memory less modulation methods, linear modulation with memory, nonlinear modulation methods with memory: CPFSK, CPM.

UNIT-IV:-Channel Coding (PART-1) **(10)**

Introduction to Galois field, Construction of Galois field GF (2 m) & its basic properties. Types of error control: Forward error correction (FEC), Automatic repeat request system (ARQ). Convolution encoding and decoding distance properties, Viterbi algorithm and Fano algorithm.

UNIT-V: - Channel Coding (PART-II) **(10)**

Trellis coded modulation, Introduction to Turbo coding, & Reed Solomon Codes: encoding & decoding, Low density parity check coding (LDPC)

UNIT-VI: **(10)**

Spread - Spectrum methods: - Study of PN sequences, direct sequence methods, Frequency hop methods, slow and fast frequency hop, performance analysis, synchronization methods for spread spectrum. Application of spread spectrum, CDMA, Introduction to OFDM

Books:

Text Books:

1. Digital communication: John G Prokis (TMG)
2. Digital communication: Simon Haykin (WEP)

Reference Books:

1. Lathi B.P. - Modern Digital and Analog communications systems - PRISM Indian Ed.
2. Digital Communication: J.S.Chitode
3. Digital Communication (Fundamentals & applications): Bernard Scalr
4. Introduction to Error Control Codes: Salvatore Gravano
5. OFDM For wireless communication systems: Ramjee Prasad
6. Modern Communication systems (Principles and application): Leon W. Couch II (PHI)
7. Error Control Coding: Shu Lin & Daniel J.Costello

B. E. Sixth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

DIGITAL COMMUNICATION

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25 Marks

Subject Code: BEECE604P/ BEETE604P **[0 – 2 – 0 – 2]**

Objectives:

1. To study the concept of communication based on RF-AF in digital domain.
2. To study the role of sampling factor for analyzes the digital communication systems.
3. To study & Design the digital communication systems.
4. To study line coding and its application.

Outcome:

At the end of the course the students shall be able to:

1. Describe the concept of the digital communication based design for testing and analyze the circuits.
2. Design and conduct experiments for testing digital communication circuits and systems.
3. Analyze the different coding technique for design and modeling of digital communication Identify, formulate and solve digital communication circuits and systems problems.

Any TEN practicals are to be conducted

LIST OF EXPERIMENTS

1. To Study and perform Error Detection and Correction codes.
2. To study the performance of adaptive Delta modulator/De-modulator circuits.
3. To Study and observe the effect of signal Distortion using EYE-Diagram.
4. To study generation & reception of BPSK & perform its spectral analysis.
5. To study generation & reception of FSK & perform its spectral analysis.
6. To study generation & reception of QPSK & perform its spectral analysis.
7. To study generation & reception of MSK & perform its spectral analysis.
8. To study generation & reception of DPSK & perform its spectral analysis.
9. To study Detection of digital baseband signal using matched filter in the presence of noise.

10. To study Frequency Hop spread spectrum Transmission & Reception.

11. To write and execute Matlab code for Convolutional Encoder and Decoder.

12. Write and execute Matlab code for generation of BPSK / Prepare Simulink Model for BPSK.

13. Write and execute Matlab code for generation of FSK / Prepare Simulink Model for FSK.

14. Write and execute Matlab code for generation of QPSK / Prepare Simulink Model for QPSK.

Note: Use DSO, Spectrum Analyzer, Logic Analyzer wherever necessary.

R.T.M.N.U Nagpur
(Electronics & Communication/ Electronics & Telecommunication Engineering)

BEECE605T/
BEETE605T

Functional English

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	*Practical*	*Tutorial*	*Total Hrs/Week*	*Lecture*	*Practical*	*Tutorial*	Total	*Sessional*	*University*	*Sessional*	*University*	Total Marks
1	BEECE605T/ BEETE605T	Functional English	2	-	1	3	2	-	1	3	10	40	-	-	50

Syllabus:

Unit 1. Functional Grammar: (4 Hours) **(3+3+4=10)**

Common errors , Transformation of Sentences, Phrases, Idioms & Proverbs. [50 sentences of common errors, 50 examples of Transformation of Sentences, (5 each type), 50 noun/prepositional phrases, 50 idioms/proverbs)

Unit II. English for Competitive Exams & Interview Techniques: (6 Hours) (3+3+4=10)

IPA (vowel & consonant phonemes), Word building [English words /phrases derived from other languages), Technical Jargons, Synonyms/Antonyms, Analogies, Give one word for, Types & Techniques of Interview Assignment :[25 Words for teaching IPA, 25 words/phrases of foreign origin, 25 technical jargons, 25 words for Synonyms/ Antonyms, 25 words for Analogies, 50 examples of give one word for]

Unit III
(A) Formal Correspondence (4 Hours) **(5X2=10)**

Business Letters, Technical Report Writing, Writing Resumes, e-mail etiquettes
[Orders, Complaints, Enquiries, Job applications & Resume Writing, Writing Memoranda]

(B) Analytical comprehension: (4 Hours)

[Four fictional & four non-fictional unseen texts]

Unit 1V. Technical & Scientific Writing: **(4 Hours)** **(5X2=10)**

Writing Reviews, Features of Technical Writing, Writing Scientific Projects, Writing Research papers. Assignment: (Any one project/review as assignment)

Total number of periods required = 22 for each Branch of Engineering

Reference Books:

1. Effective technical Communication by Barun K. Mitra, Oxford University Press,
2. *Technical Communication-Principles and Practice* by Meenakshi Raman & Sharma, Oxford University Press, 2011, ISBN-13-978-0-19-806529-
3. *The Cambridge Encyclopedia of the English Language* by David Crystal , Cambridge University Press
4. *Contemporary Business Communication* by Scot Ober , Published by Biztantra,
5. *BCOM- A South-Asian Perspective* by C.Lehman, D. DuFrene & M. Sinha, Cenage Learning Pvt. Ltd.2012
6. *Business English*, by Dept of English, University of Delhi, Published by Dorling Kindersley (India), Pvt .Ltd.,2009, ISBN 978 81 317 2077 6
7. *How to Prepare a Research Proposal*: Guidelines for Funding and Dissertations in the Social and Behavioral Sciences by Krathwohl & R David
8. *Technical Writing- Process and Product* by Sharon J. Gerson & Steven M. Gerson, 3rd edition, Pearson Education Asia, 2000
9. *Developing Communication* skills by Krishna Mohan & Meera Banerjee

EVALUATION PATTERN:

Internal Examination: Weightage = 10 marks

Written Examination: 05 marks

Project Seminar : 05 marks

External Examination: Weightage = 40 marks

Question pattern for end semester examination

Unit No	Q. No	Question type	No. of Questions	Weightage
Unit 1	1(A) 1(B) 1(C)	objective objective objective	3 out of 5 3 out of 5 4 out of 6	3+3+4=10
Unit 2	2 (A) 2(B) 2(C)	objective objective subjective	3 out of 5 3 out of 5 1 (no choice)	3+3+4=10
Unit 3 & Unit4	3 (A) 3(B)	Subjective subjective	1 set (out of 2 sets) 1(no choice)	5 5
Unit 5	4(A) 4(B)	subjective subjective	1 out of 2 1 out of 2	5 5

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

Electronics Workshop Practice

Duration: 2 Hrs.
College Assessment: 25Marks
University Assessment: 25 Marks

Subject Code: BEECE606P/ BEETE606P/ BEENE606P [0 – 2 – 0 – 2]

Objectives:

1. To make students familiar with measuring instruments like CRO, DSO, signal Generator.
2. To make students familiar with Interfacing Peripheral with computer.
3. To understand PCB Designing process
4. To enable students to design & fabricate their own Hardware.

Outcome:

At the end of the course the students shall be able to:
1. Use DSO and Spectrum Analyzer.
2. Interface peripherals with computer.
3. Design PCB using PCB designing software.
4. Design & fabricate mini project.

Practical 1: Study of Functioning of Spectrum Analyzer and Digital Storage oscilloscope. (2 Hrs.)

Practical 2: Study of different Electronic components. (2 Hrs.)

Practical 3: Printed Circuit Boards (PCB): (4 Hrs.)

Types, Layout procedure, artwork, Fabrication (In this, fabrications of small circuit Using discrete component on single side PCB is expected).

Practical 4: Interfacing of displays (LCD, LED, 7 Segment) with PCs (2 Hrs.)

Practical 5: Hardware Mini Project (14 Hrs.)

- Hardware Mini project should consist of Circuit design, PCB fabrication, assembling & testing of small digital or analog **application circuit**.
- Mini Project work should be carried out by a group of maximum **three** students.
- Student should use standard software available for drawing circuit schematic, simulating the design and PCB (**single/double sided**) layout of circuit.
- Project report should consist of details of work carried out including **layouts, circuits, datasheets, list of components, cost** .

Reference Books:

1 Electronic Instruments and Instrumentation Technology

2. A course in Electrical and Electronics Measurements and Instrumentation - A.K. Sawhney - Dhanpat Rai & Co.

3. Electronic Components and Materials - Dr. Madhuri A. Joshi - Shroff Publications Third Edition
4. Electrical and Electronic Measurements –Banerjee,PHI

5. Introduction to Measurements and Instrumentation, 4th edition- Ghosh PHI 6.
Electronic Instrumentation and Measurement Techniques, W.D. Copper,PHI

Web Resources: Refer online datasheets

B. E. Sixth Semester

(Electronics / Electronics & Communication/ Electronics & Telecommunication Engg)

Industrial Visit

Duration: 2 Hrs.
College Assessment: G(Grade)

Subject Code: BEENE607P /BEECE607P/ BEETE607P **[0 – 2 – 0 – 2]**

Objectives:
To provide industry exposure to students.

Outcome:
The students shall be able to apply this knowledge during their project and may be useful in future.

In industrial visit it is expected that

1. Student should visit the industry
2. Based on their interaction, experience during this Industrial visit they should prepare technical report with photograph and certificate from industry.

Rashtrasant Tukadoji Maharaj Nagpur University

Formerly Known as Nagpur University

SCHEME OF EXAMINATION FOR

B.E. SEVENTH SEMESTER (ELECTRONICS & COMMUNICATION / ELECTRONICS & TELECOMMUNICATION ENGINEERING)

Sub Code	Board	SUBJECT	Work Load				Credit				Marks				
											Theory		Practical		Total Marks
			L	P	T	Total	L	P	T	Total	Internal	University	Internal	University	
BEECE701T/ BEETE701T	Electronics	DSP Processor & Architecture	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE701P/ BEETE701P	Electronics	DSP Processor & Architecture	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE702T/ BEETE702T	Electronics	Television & Video Engineering	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE702P/ BEETE702P	Electronics	Television & Video Engineering	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE703T/ BEETE703T	Electronics	Optical Communication	4	0	0	4	4	0	0	4	20	80	0	0	100
BEECE704T/ BEETE704T	Electronics	Advanced Digital System Design	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE704P/ BEETE704P	Electronics	Advanced Digital System Design	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE705T/ BEETE705T	Electronics	Elective-I	3	0	1	4	3	0	1	4	20	80	0	0	100
BEECE706P/ BEETE706P	Electronics	Project Seminar	0	2	0	2	0	2	0	2	0	0	50	0	50
Total			**19**	**8**	**4**	**31**	**19**	**5**	**4**	**28**	**100**	**400**	**125**	**75**	**700**

Elective-I – 1. Fuzzy Logic & Neural Network 2. Microelectromechanical Systems and System On Chip 3. Data Compression & Encryption 4. VLSI Signnal Processing

B. E. Seventh Semester

(Electronics /Electronics & Communication/ Electronics & Telecommunication Engg)

DSP PROCESSOR & ARCHITECTURE

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE701T/ BEETE701T/ BEENE701T **[4 – 0 – 1 – 5]**

Objectives:

1. **To study Programmable DSP Processors.**
2. **To provide an understanding of the fundamentals of DSP techniques.**
3. **To study implementation & applications of DSP techniques.**
4. **To study multi-rate filters.**
5. **To understand architecture of DSP processor..**

Outcome: By the end of the course, the students shall be able

1. **to describe the detailed architecture, addressing mode, instruction sets of TMS320C5X**
2. **to write program of DSP processor.**
3. **to design & implement DSP algorithm using code composer studio**
4. **to design decimation filter and interpolation filter.**

UNIT 1 : FUNDAMENTALS OF PROGRAMMABLE DSPs **(10)**

Multiplier and Multiplier accumulator, Modified Bus Structures and Memory access in P-DSPs, Multiple access memory , Multi-ported memory , VLIW architecture, Pipelining , Special Addressing modes in P- DSPs , On chip Peripherals, Computational accuracy in DSP processor, Von Neumann and Harvard Architecture, MAC

UNIT 2 : ARCHITECTURE OF TMS320C5X **(08)**

Architecture, Bus Structure & memory, CPU, addressing modes, AL syntax.

UNIT 3 : Programming TMS320C5X **(10)**

Assembly language Instructions , Simple ALP – Pipeline structure, Operation Block Diagram of DSP starter kit , Application Programs for processing real time signals.

UNIT 4 : PROGRAMMABLE DIGITAL SIGNAL PROCESSORS: **(12)**

Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of S320C54XX Processors, Program Control, On-chip peripheral, Interrupts ofTMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors , Block diagrams of internal Hardware, buses , internal memory organization.

UNIT 5: ADVANCED PROCESSORS (07)

Code Composer studio - Architecture of TMS320C6X - architecture of Motorola DSP563XX – Comparison of the features of DSP family processors.

UNIT 6: IMPLEMENTATION OF BASIC DSP ALGORITHMS: (08)

Study of time complexity of DFT and FFT algorithm, Use of FFT for filtering long data sequence, Interpolation filter, Decimation filter , wavelet filter .

Text- Books:

1. B. Venkata Ramani and M. Bhaskar, Digital Signal Processors, Architecture, Programming and TMH, 2004.
2. Avtar Singh, S.Srinivasan DSP Implementation using DSP microprocessor with Examples from TMS32C54XX -Thamson 2004.
3. E.C.Ifeachor and B.W Jervis, Digital Signal Processing - A Practical approach, Pearson Publication
4. Salivahanan. Ganapriya, Digital signal processing, TMH , Second Edition

Reference Books:

1. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. , S. Chand & Co, 2000.
2. Digital signal processing-Jonathen Stein John Wiley 2005.
3. S.K. Mitra, Digital Signal Processing, Tata McGraw-Hill Publication, 2001.
4. B. Venkataramani, M. Bhaskar, Digital Signal Processors, McGraw Hill

B. E. Seventh Semester

(Electronics /Electronics & Communication/ Electronics & Telecommunication Engg)

DSP PROCESSOR AND ARCHITECTURE

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25Marks

Subject Code: BEENE701P/ BEECE701P/ BEETE701P [0 – 2 – 0– 2]

Objectives:

1. The DSP algorithms are better implemented on DSP processors having specially tailored architectures.

2. It enables the designers to understand different processors and apply them in system design

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Outcome: The students shall be able to

1. **Understand the architecture of TMS and Motorola Processors.**
2. **Implement different processing algorithms on DSP processors.**
3. **Design different types of filters and study their characteristics.**

Any Eight practicals are to be conducted

LIST OF EXPERIMENTS

1. To study architecture of *TMS320C54XX* & Motorola DSP563XX
2. To generate basic signals using *TMS320C54XX* .
3. Write an ALP using instruction of TMS processors to add two numbers.
4. Write ALP to subtract two numbers.
5. Write an ALP to multiply two numbers of unsigned 32 bit data.
6. Write an ALP to divide 16 –bit data by an eight bit data.
7. Implementation of FFT using code Composer studio.
8. To implement Interpolation filter by Matlab.
9. To implement Decimation filter by Matlab.
10. To design FIR filter using MATLAB and find finite word length effect & cross verify using DSP processor.
11. To design IIR filter using MATLAB and find finite word length effect & cross verify using DSP Processor.

B. E. Seventh Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

TELEVISION AND VIDEO ENGINEERING

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE702T/ BEETE702T **[4 – 0 – 1 – 5]**

Objectives:

1. To make students understand /explain the analysis and synthesis of T.V. system
2. To study various colour TV system with greater emphasis on PAL T.V.system.
3. To study Advance Technology of TV Engineering –Digital T.V., HDTV.
4. To study various video recording system, display system and its application.

Outcome: **By the end of the course, the students shall be able to**

1. analyze and understand colour T.V. System
2. understand fundamental techniques of Different T.V. standards.
3. understand Advanced T.V. Technology.
4. understand different video recording, display and its consumer application.

Unit 1: Fundamentals of Television and Display **(10)**

Television basics: Elements of TV system, low level TV transmission, TV receiver block diagram , Production of luminance & colour difference signal , Composite video signal, and channel bandwidth etc.., Color TV systems, colour fundamentals, mixing of colors , color perception, chromaticity diagram.

Unit 2: TV Standards **(08)**

NTSC, PAL, SECAM systems, colour TV transmitter, colour TV receivers, remote control, antennas for transmission and TV pattern generation.

Unit 3: Digital TV **(10)**

Introduction to Digital TV, Principle of Digital TV, Digital TV signals and parameters, Digital TV Transmitters, MAC signals, advanced MAC signal transmission, Digital TV receivers, Basic principles of Digital Video compression techniques, MPEG1, MPEG2, MPEG4.

Unit 4: HDTV **(10)**

HDTV standards and systems, HDTV transmitter and receiver/encoder, Digital TV satellite Systems, CCTV, CATV, direct to home TV, set top box with recording facility, 3D TV systems.

Unit 5: Video Recorders **(10)**

IP Audio and Video, IPTV systems, Mobile TV, Video transmission in 3G mobile System, Digital Video Recorders, Video Projectors, HD Video projectors, Video Intercom systems.

Unit 6: Consumer Applications **(07)**

Colour TV Digital cameras, Camcorders, Handycams, and Digicams, Display devices: LED, LCD, CD/ DVD player, Blue Ray DVD Player, Dish TV.

Text Books

1. Television and video Engineering, A. M. Dhake, Tata McGraw Hill Publication.
2. Video Demisified, Kelth jack, Penram International Publication.
3. Audio Video Systems, R.G. Gupta, Technical Education.

Reference Books

1. S. P. Bali, “Color TV Theory and Practice”, McGraw Hill Publications.
2. Bernard Grob, Charles E, “Basic TV and Video Systems” McGraw Hill Publications.
3. Gulathi, “Monochrome & Color TV”, New Age International Publications .

4. R.G. Gupta, “Television Engineering & Video Systems”, McGraw Hill Publications

B. E. Seventh Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

TELEVISION AND VIDEO ENGINEERING

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25Marks

Subject Code: BEECE702P/ BEETE702P [0 – 2 – 0– 2]

Objectives:

1. **To perform practical at a comprehensive coverage of Television Systems with all the new developments in Television Engineering**
2. **To study and observe the RF based Transmission and Receptions in Audio and Video Mode**
3. **To develop necessary expertise in handling hardware projects related television subject.**
4. **To train students in operating and maintenance of all the sophisticated and latest equipment and machinery related to this subject.**

Outcome: By the end of the course, the students shall be able to

1. **Study and classify the concept of troubleshoot and repair**
2. **Develop an understanding of electronics, mechanical and environmental factors involved in maintaining television equipment.**
3. **Analyze and synthesize TV Pictures, Composite Video Signal, TV Receiver Picture Tubes**

Any EIGHT practicals are to be conducted

LIST OF EXPERIMENTS

1. To study & understand TV Receiver block diagram & analyze and synthesize TV Pictures.
2. To study & understand the color composite video signal.
3. To study & understand the RF tuner section & measure the voltage at different test points.
4. To study & understand the VIF & SIF section & measure the voltage at different test points.
5. To study & understand the chroma section & measure the voltage at different test points.
6. To study & understand the vertical & horizontal section & measure the voltage at different test points.
7. To study & understand the EHT section.
8. To study & understand power supply section of colour TV system.
9. To study & understand the different patterns with the help of pattern generator.
10. Case study of live broadcasting (e.g. Cricket match/football match).
11. To study & understand HDTV standards.
12. To study & understand various faults and trouble shooting of colour T.V.
13. To study & understand different TV receiver picture tube.
14. To study & understand Digital TV satellite System.

B. E. Seventh Semester

(Electronics /Electronics & Communication/ Electronics & Telecommunication Engg)

OPTICAL COMMUNICATION

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE703T/ BEETE703T/ BEENE703T **[4 – 0 – 0 – 4]**

Objectives:

1. To understand optical fiber technology to sophisticated modern telecommunication systems.
2. To understand the fundamental behavior of the individual optical components, describes their interactions with other devices in an optical fiber.
3. To measure & analyze different measurements, parameters & properties of optical fiber.

Outcome: **By the end of the course, the students shall be able to**

1. learn the basic elements of optical fiber.
2. understand the different kinds of losses, signal distortion in optical wave guides & other signal degradation factors.
3. classify various optical source materials, LED structures, LASER diodes.
4. learn the fiber optic receivers such as PIN, APD diodes, receiver operation & performance.
5. understand the operational principal of WDM, SONET, measurement of attenuation, dispersion, refractive index profile in optical fibers.

UNIT I : OVERVIEW OF OPTICAL FIBER COMMUNICATION (05)

Introduction, advantages, disadvantages and applications of optical fiber communication, Ray theory, classification of Optical Fibers

UNIT II: TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS (10)

Fiber manufacturing & Fiber materials, manufacturing methods, *Attenuation, Absorption, scattering losses, bending loss, dispersion, Intra modal dispersion, Inter modal dispersion.*

UNIT III: OPTICAL SOURCES AND COUPLERS & CONNECTORS OF FIBER (08)

Introduction, fiber alignment and joint loss, single mode fiber joints, fiber splices, fiber connectors and fiber couplers.

Optical sources: LED's, LASER diodes.

UNIT IV: OPTICAL DETECTORS AND RECEIVER (06)

Photo detectors, Photo detector noise, Response time, comparison of photo detectors

Optical Receiver Operation, receiver sensitivity, quantum limit, coherent detection, burst mode receiver operation, Analog receivers

UNIT V: ANALOG AND DIGITAL LINKS (08)

Analog links – overview of analog links, CNR, multichannel transmission techniques, Digital links – point–to–point links, System considerations, link power budget, rise time budget, transmission distance for single mode links.

UNIT VI : WDM CONCEPTS AND COMPONENTS (08)

Operational Principles of WDM, basic applications and types of optical amplifiers, semiconductor optical amplifiers, EDFA. Measurement of Attenuation and dispersion. Study of various application of optical fiber communication.

TEXT BOOKS:

1. "Optical Fiber Communication", Gerd Keiser, 3rd Ed., McGraw Hill,
2. "Optical Fiber Communications", John M. Senior, Pearson Education. 3rd Impression, 2007.

REFERENCE BOOK:

1. Fiber Optic Communication - Joseph C Palais: 4th Edition, Pearson Education.
2. "TextBook on Optical Fiber Communication & its Application", S.C. Gupta, PHI Publications
3. "Optical Communication & Networks", M.N. Bandopadhyay, PHI Publications

B. E. Seventh Semester

(Electronics /Electronics & Communication/ Electronics & Telecommunication Engg)

Advanced Digital System Design

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code BEECE704T/ BEETE704T/BEENE704T **[4 – 0 – 1 – 5]**

Objectives:

1. To motivate the students to learn basic foundation course in VHDL.

2. To address the challenges in Hardware design by discussing the role of digital components in system design

3. To concentrate on HDL based digital design ,HDL terminology, architecture and design of combinational and sequential circuit.

4. To learn about modeling of system tested with test benches & synthesis also implementation on FPGA/CPLD.

Outcome: By the end of the course, the students shall be able to

1. Design of combinational & sequential circuit.

2. Develop skilled VLSI front end designers

3. Implementation of digital system.

4. Experimentation on Hardware /Software co-design.

UNIT I **(08)**

INTRODUCTION TO DIGITAL SYSTEM DESIGN: Device technologies, System representation, Levels of abstraction, Development tasks and EDA software, Development flow, Hardware description language, VHDL in development flow, Basic VHDL concepts.

UNIT II **(10)**

BASIC LANGUAGE CONSTRUCTS OF VHDL: Skeleton/syntax of VHDL program, elements and program format, Objects, Data type and operators, Concurrent Signal Assignment, Combinational versus sequential circuits, Signal assignment statements, conditional signal assignment, Selected signal assignment, Conditional versus selected signal assignment statements.

UNIT III: **(08)**

SUBPROGRAM:

Functions, Procedures, attributes, generic, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration.

UNIT IV: **(10)**

FINITE STATE MACHINE: Overview of FSM, FSM representation, Moore machine versus Mealy machine, VHDL representation of an FSM, State assignment, Some FSM design examples – sequence detector, FSM based binary counter.

Analysis of asynchronous sequential circuit – flow table reduction-races-state assignment-transition table and problems in transition table.

UNIT V: **(09)**

HDL SYNTHESIS: The Synthesis Concept, Timing Analysis of Logic Circuits, Efficient Coding Styles, Combinatorial Logic Synthesis, Partitioning for Synthesis, Pipelining Resource sharing, Optimizing arithmetic expressions. Power Analysis of FPGA based system.

UNIT VI: **(10)**

Programmable Logic Devices:-Introduction to place & route process, Architecture of CPLD (Xilinx / Altera), FPGA XILINX 4000 Series ,Overview of PLDs, CPLD, FPGA,

Design Examples: ALU, barrel shifter, 4*4 Keyboard Scanner, multiplier.

TEXT BOOKS:

1. VHDL, 4rd Edition Douglas Perry –TMH
2. Fundamentals of Digital Logic with VHDL design –Stephen Brown, Zvonko Vranesic–TMH.
3. Digital Design Principles – Fletcher.
4. VHDL Synthesis –J Bhasker.
5. VHDL Primer–J Bhasker –Pearson Education.

REFERENCE BOOKS:

1. Digital System Design Using VHDL –Charles H. Roth, McGraw Hill Publications.
2. Digital System Design–John Wakerley, McGraw Hill Publications.
3. VHDL –Zainalabedin Navabbi, McGraw Hill publication
4. VHDL– D. Smith,
5. Digital Design with VHDL - Dr.S.S.Limaye, McGraw Hill Publications .

B. E. Seventh Semester

(Electronics /Electronics & Communication/ Electronics & Telecommunication Engg)

Advanced Digital System Design

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25Marks

Subject Code: BEENE704P/ BEECE704P/ BEETE704P [0 – 2 – 0– 2]

Objectives:

1. **To acquire knowledge of computer-aided design tools for design of complex digital logic circuits.**
2. **To analyze the results of logic and timing simulations and to use these simulation results to debug digital systems**

Outcome:

The student shall be able

1. **to model, simulate, verify the digital model with hardware description language.**
2. **to design and prototype with programmable logic devices**
3. **to learn the modular design style to create large digital logic circuits.**
4. **to create and simulate basic circuit modules (or macros) using VHDL.**

Any EIGHT practicals are to be conducted

LIST OF EXPERIMENTS

12. Design of basic logic gates using VHDL.
13. Design of full adder/substractor using VHDL.
14. Design of Multiplexer/ Demultipelxer using VHDL.
15. Design of Priority encoder using VHDL.
16. Design of BCD-to-Seven segment encoder.
17. Design of n-bit up-down counter.
18. Design of n-bit shift register using VHDL.
19. Design of sequence detector using Mealy FSM.
20. Design of sequence detector using Moore FSM.
21. Design of 4-bit ALU using VHDL.
22. Design & Implementation of 4-bit barrel shifter using FPGA / CPLD.
23. Design & Implementation of 4-bit multiplier using FPGA / CPLD.
24. Design & Implementation of 4 X 4 keyboard scanner using FPGA / CPLD.
25. Design of Asynchronous sequential circuit using VHDL.
26. Design & implement Mini project on FPGA/CPLD.

All above practicals needs to perform test Bench verification & Synthesis Report.

B. E. Seventh Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

ELECTIVE 1 - FUZZY LOGIC & NEURAL NETWORK

Duration: 3 Hr.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE705T/ BEETE705T **[3 – 0 – 1 – 4]**

Objectives:

1. **To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals , Program the related algorithms and design the required and related systems**
2. **To make the students well acquainted with Soft computing techniques, especially Fuzzy logic, Neural networks and Genetic algorithm**
3. **To make the students able to identify the complex problems in conventional structures, obtain intelligent acceptable solutions for these problems using soft computing techniques and take the necessary corrective action in the light of ongoing events**

Outcome: By the end of the course ,the students shall be able to

1. **Understand the adequate knowledge about feedback neural networks.**
2. **Understand the concept fuzzy logic control to real time systems.**
3. **provide adequate knowledge about fuzzy set theory.**
4. **provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic**
5. **study and understand defuzzification techniques.**
6. **Understand and design genetic fuzzy controller.**
7. **gain comprehensive knowledge of adaptive fuzzy system.**

UNIT I : INTRODUCTION: **(10)**

Fundamentals and Models of Artificial Neural Systems, Neural computation: Examples and applications, Biological neurons and their artificial models, Models of artificial networks, Neural processing, Learning and adaptation, Neural network learning rules, Overview of neural networks, Single Layer Perception , multilayer perception & its limitation.

UNIT II: MULTILAYER FEED FORWARD NETWORKS **(08)**

Linearly non separable pattern classification, Delta learning rule for multi-perceptron layer, generalized delta learning rule, feed forward recall and error back propagation training, learning factors.

UNIT III: SINGLE LAYER FEEDBACK NETWORKS: (07)

Basic concepts and dynamical systems, Mathematical foundations of discrete-time and gradient-type Hopfield networks

Application of Neural Networks: *control system application like washing machine, refrigerator, signal processing application like ECG, EMG, EEG.*

UNIT IV : INTRODUCTION TO FUZZY LOGIC (08)

Uncertainty and imprecision, Classical sets and Fuzzy sets, Classical relation and fuzzy relations, Operations on crisp and fuzzy relations. Fuzzy tolerance and equivalence

UNIT V: FUZZYFICATION AND DEFUZZIFICATION (07)

Membership functions, Membership assignment, lambda cuts, Defuzzification methods, ***Fuzzy Arithmetic:*** *Fuzzy numbers, vectors, extension principle, crisp functions, mapping, fuzzy transforms, interval analysis, fuzzy logic controller design.*

UNIT VI: APPLICATIONS OF FUZZY LOGIC (05)

Specific application in the field of control system and Image processing and signal processing, Design of genetic fuzzy controller.

TEXT BOOKS:

1. J. M. Zurada, Introduction to Artificial Neural Networks, Jaico Publishing house.

2 T. M. Ross, Fuzzy logic, Mc-Graw Hill Inc.

3. Kosoko, Neural Networks and Fuzzy Systems, PHI Publications

REFERENCE BOOKS:

1. Artificial Neural Network – Simon Haykin, Pearson Education, 2nd Ed.

2. Fundamental of Neural Networks – Laurene Fausett, Pearson, 1st Ed.

3. Neural Fuzzy Systems, C.T Lin & C S George Lee, Prentice Hall.

4. Fuzzy Logic with Engineering Applications, Timothy J. Ross, 2nd edition, McGraw Hill.

5. Fuzzy Sets & Fuzzy Logic- Theory & Applications, George J. Klir, Bo Yuan , Prentice Hall Publications

6. Neural Network, Fuzzy Logic & Genetic Algorithm, S. Rajasekaran, G.A. Vijayalakshmi Pai, PHI Publications.

7. Neural Networks – A classroom approach, Satish Kumar, McGraw Hill

8. Neural Network Design - Martin T. Hagan, Cenage Learning

B. E. Seventh Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

ELECTIVE 1 - MICROELECTROMECHANICAL SYSTEMS AND SYSTEM ON CHIP

Duration: 3 Hr.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE705T/ BEETE705T **[3 – 0 – 1 – 4]**

Objectives:

1. To understand Standard microfabrication techniques and the issues surrounding them.
2. To understand Major classes, components, and applications of MEMS devices/systems and to demonstrate an understanding of the fundamental principles behind the operation of these devices/systems
3. To understand microfabrication techniques and applications to the design and Manufacturing of an MEMS device or a microsystem

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Outcome: **By the end of the course, the students shall be able to**

1. Understand working principles of currently available microsensors, actuators used in Microsystems.
2. Apply scaling laws that are used extensively in the conceptual design of micro devices and systems.
3. Understand the basic principles and applications of micro-fabrication processes, such as photolithography, ion implantation, diffusion, oxidation, CVD, PVD, and etching.
4. Choose a micromachining technique, such as bulk micromachining and surface micromachining for a specific MEMS fabrication process
5. Consider recent advancements in the field of MEMS and devices

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UNIT 1: Introduction to MEMS **(06)**

Benefits of Miniaturization, Types of MEMS: Optical MEMS, Bio- MEMS, RF- MEMS, Microfludics, Success Stories, Pressure sensor, Accelerometer, Micro-mirror TV Projector

UNIT 2 : **Microfabrication and Micromachining** **(08)**

Integrated Circuit Processes, Bulk Micromachining, Surface LIGA process , *wet & dry etching processes* , Device fabrication using Surface Micromachining example, Microcantilever fabrication

Unit 3: Transducers **(10)**

Chemical and Biological Transducers: basic concepts of cellular biology, chemical sensors, molecule-based biosensors, cell-based biosensors, chemical actuators, biological transducers and electrophoresis: optical transducers, thermal transducers, magnetic transducers, RF transducers.

UNIT 4: RF MEMS Devices **(08)**

Capacitor, Inductor, Switches, and antennas, RF MEMS components in communications, space and defense applications

UNIT 5: Micro System Packaging **(06)**

Overview of mechanical packaging of microelectronics micro-system packaging.

UNIT 6: Introduction to system-on-chip **(07)**

Design of system on chip, Microsystems technology and applications, core architecture for digital media and the associated compilation techniques

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TEXT BOOKS:

1." Micro and Smart Systems", Ananthasuresh, G. K., Vinoy, K. J., Gopalakrishnan, S., Bhat, K. N., and Aatre V.K., Wiley-India, NewDelhi, 2010.
2. . "Micromachined Transducers Sourcebook" , Kovacs, Gregory T. A, McGraw-Hill Publications

REFERENCE BOOKS:

1. VLSI Technology, Sze S.M. (ed), McGraw Hill Publications
2. RFMEMS and Their Applications: Vijay Varadan, K. J. Vinoy, K. A. Jose, Wiley, 2002.
3. "MEMS Practical Guide to Design, analysis and Applications", Jan G Korvinik and Oliver Paul William Andrew, Inc Springer.
4. "MEMs & Microsystem Design and Manufacture", Tai-Ran Hsu, McGraw Hill Publication
5. "MEMs", Nitaigour Premchand Mahalik, McGraw Hill Publications

B.E. Seventh Semester
(Electronics & Communication/ Electronics & Telecommunication Engg)

ELECTIVE 1 - DATA COMPRESSION & ENCRYPTION

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE705T/ BEETE705T **[3– 0 – 1 – 4]**

Objectives:

1. To understand the different text compression technique.
2. To study the various audio compression scheme.
3. To verify different video compression & image compression methods.
4. To have the knowledge of various encryption technique.
5. To acquire the information about different authentication technique.

Outcome: By the end of the course, the students shall be able to

1. implement various text, audio, video, compression technique.
2. provide various authentication using digital communication.
3. gain the knowledge of encryption techniques application to digital communication.

Unit 1 : TEXT COMPRESSION **(08)**

Shannon Fano Coding, Huffmann coding, Arithmetic coding and dictionary techniques- LZW, family algorithms, Entropy measures of performance and Quality measures.

Unit 2 : AUDIO COMPRESSION **(08)**

Digital Audio, Lossy sound compression, μ-law and A-law companding, DPCM and ADPCM audio compression, MPEG audio standard, frequency domain coding, format of compressed data.

Unit 3 : IMAGE AND VIDEO COMPRESSION **(08)**

Lossless techniques of image compression, gray codes, Two dimensional image transforms, JPEG, JPEG 2000, Predictive Techniques PCM and DPCM. Video compression and MPEG industry standard.

Unit 4 : CONVENTIONAL ENCRYPTION **(08)**

Introduction, Types of attacks, Steganography, Data Encryption Standards, Block Cipher Principle, S-box design, triple DES with two three keys.

Unit 5: PUBLIC KEY ENCRYPTION AND NUMBER THEORY (08)

Euler's theorems, Chinese remainder theorem, Principles of public key cryptography, RSA algorithm, Diffie-Hellman Key Exchange. Elliptic curve cryptology, message authentification and Hash functions, Hash and Mac algorithms, Digital signatures.

Unit 6: SYSTEM SECURITY & CASE STUDIES (05)

Intruders, Viruses, Worms, firewall design, antivirus techniques, digital Immune systems, Certificate based & Biometric authentication, Secure Electronic Payment System.

Text Books

1. Data Compression – David Salomon, Springer Publication, 4th Edition.
2. Introduction to Data Compression – Khalid Sayood, Morgan Kaufmann Series, 3rd Edition
3. Cryptography and Network Security – William Stallings, Pearson Education Asia Publication,
4. Cryptography and Network Security – Behrouz Forouzan, McGraw-Hill, 1st Edition.

Reference Books:

1. The Data Compression Book – Mark Nelson, BPB publication, 2nd Edition
2. Applied Cryptography – Bruce Schnerer, John Willey & Sons Inc. Publication, 2nd Edition
3. Cryptography & Network Security – Atul Kahate, Tata McGraw Hill, 2nd Edition
4. Cryptography and Network Security – Behrouz A. Forouzan , Special Indian Addition, SIE
5. Network Security & Cryptography – Bernard Menezes, Cenage Learning

B. E. Seventh Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

ELECTIVE 1 - VLSI SIGNAL PROCESSING

Duration: 3 Hr.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE705T/ BEETE705T **[3 – 0 – 1 – 4]**

Objectives:
1. To learn pipelining & parallel processing techniques.
2. To understand folding & unfolding techniques in multirate system
3. To address folding techniques used to design time multiplexed architecture.

Outcome: By the end of the course, the students shall be able to
1. **Learn various methodologies to optimize power delay and area of VLSI design.**
2. **Build Real Time processing system.**
3. **Design of algorithm structure for DSP algorithms based on algorithm transformation.**

Unit I: **Pipeling and Parallel Processing** **(08)**
Introduction, pipeling of FIR Digital filters Parallel processing, Pipelining and parallel processing for low power.

Unit II: Retiming **(06)**
Introduction, Definition and properties, solving system of inequalities, retiming techniques.

Unit III: Unfolding **(08)**
Introduction, algorithms for unfolding, Properties of unfolding, Critical path, unfolding and retiming Application of unfolding.

Unit IV: Folding **(08)**
Introduction Folding Transformation, Register minimization in folded architectures, Folding in Multirate systems.

Unit V: Fast Convolution **(08)**
Introduction, Cook- Toom algorithm, Winogard algorithm.

Unit VI: **(07)**
Iterated convolution, Cyclic Convolution, Design of Fast Convolution Algorithm by Inspection.

Text Books:

1. Keshab K. Parhi. “VLSI Digital Signal Processing Systems” Wiley-Inter Sciences. 1999
2. Mohammed Ismail, Terri, Fiez, “Analog VLSI signal and information processing”, McGraw Hill ,1994.
3. Keshab. Parthi, “VLSI Digital signal processing system Design and implementation” Wiley-Inter science, 1999.
4. kung. S.Y., H.J. While house T.Kailath “VLSI and Modern singal processing”, prentice hall, 1985.
5. Jose E. France, Yannis Tsividls “Design of Analog Digital VLSI circuits for telecommunications and signal processing‟ prentice Hall, 19994.

Rashtrasant Tukadoji Maharaj Nagpur University

Formerly Known as Nagpur University

SCHEME OF EXAMINATION FOR

B.E. EIGHTH SEMESTER (ELECTRONICS & COMMUNICATION / ELECTRONICS & TELECOMMUNICATION ENGINEERING)

Sub Code	Board	SUBJECT	Work Load				Credit				Marks				
											Theory		Practical		Total Marks
			L	P	T	Total	L	P	T	Total	Internal	University	Internal	University	
BEECE801T/ BEETE801T	Electronics	Microwave & Radar Engineering	4	0	0	4	4	0	0	4	20	80	0	0	100
BEECE801P/ BEETE801P	Electronics	Microwave & Radar Engineering	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE802T/ BEETE802T	Electronics	Computer Communication Network	4	0	1	5	4	0	1	5	20	80	0	0	100
BEECE802P/ BEETE802P	Electronics	Computer Communication Network	0	2	0	2	0	1	0	1	0	0	25	25	50
BEECE803T/ BEETE803T	Electronics	Wireless & Mobile Communication	4	0	0	4	4	0	0	4	20	80	0	0	100
BEECE804T/ BEETE804T	Electronics	Elective-II	3	0	1	4	3	0	1	4	20	80	0	0	100
BEECE805T/ BEETE805T	Electronics	Elective-III	3	0	1	4	3	0	1	4	20	80	0	0	100
BEECE806P/ BEETE806P	Electronics	Project	0	6	0	6	0	6	0	6	0	0	75	75	150
Total			**18**	**10**	**3**	**31**	**18**	**8**	**3**	**29**	**100**	**400**	**125**	**125**	**750**

Elective-II – 1. Wireless Sensor Network 2. Embedded System 3.Digital Image Processing 4. Artificial Intelligence

Elective-III – 1.Random Signal Theory 2.Robotics & Automation 3. Satellite Communication 4.CMOS VLSI Design

B. E. Eighth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

MICROWAVE & RADAR ENGINEERING

Duration: 3 Hr.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE801T/ BEETE801T [4 – 0 – 0 – 4]

Objectives

1. To understand the principles of the advanced microwave engineering
2. To design of passive and active microwave components and microwave circuits including: micro strip line, guided wave device
3. To study Klystron amplifier and oscillator.
4. To learn working principle of Radar system.
5. To understand the radio wave propagation and interference in mobile communications..
6. To get knowledge and relate different components in Radar and use them in projects.

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

1. Understand the use of active and passive microwave devices
2. Analyze Different UHF components with the help of scattering parameter.
3. Understand micro strip lines MIC design
4. Understand the use of different Klystrons.
5. Analyze the different power distribution Tees.
6. Analyze Scattering Matrix of different UHF components.
7. Do research with capabilities in the design, development and manufacture of radar systems used in a wide spectrum of applications.
3. Able for Acquisition of technical competence in specialized areas of Radar engineering.
4. Able to identify, formulate and model problems and find Radar engineering solutions based on a system approach

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Unit 1: Microwave Tubes (08)

High frequency limitations of conventional tubes, Two Cavity and multi cavity Klystrons, Reflex Klystrons, slow-wave structure: TWT, BWO, Magnetron oscillator and its types.

Unit 2: Microwave Components (10)

Introduction to rectangular waveguide & waveguide excitation ,Principles of S-parameters, S-parameters for multi-ports (2-port, 3-port, 4-port etc.) properties of S-matrix, waveguide Tees (E, H, E-H planes), Directional Couplers, matched terminations, Microwave attenuators, Slotted line, Ferrite devices, Circulators, Isolators, gyrators.

Unit 3: Solid State Microwave Devices (06)

Parametric amplifiers, PIN diodes, Transferred Electron devices: Gunn diode, Avalanche diode, Transit Time devices like IMPATT, TRAPATT diodes.

Unit 4: Microwave measurement **(08)**

Introduction to microwave measurements, definition and measurement methods of frequency, power, attenuation, VSWR, impedance, insertion loss, dielectric constant, Q of a cavity resonator, phase shift.

Unit 5: Radar Fundamentals **(06)**

Basic principles and fundamentals of Radar , block diagram of basic radar, classification, radar performance factors, radar range equation, factors influencing maximum range, effects of noise, Pulsed radar systems.

Unit 6: **(07)**

Antennas and scanning, display methods, moving target indication, radar beacons, CW Doppler radar, FM CW phased array radars, applications of radar

Text Books

1. S.Y. Liao, "Microwave Devices and Circuits", Prentice Hall India.
2. Skolnik, "Principles of Radar Engineering", McGraw Hill Publications
3. David M. Pozar, "Microwave Engineering", John Willey & Sons.

Reference Book

1. G.S.Raghuwanshi "Microwave Engineering**",**Cengage India Publications **.**
2. R.S. Rao, "Microwave Engineering", PHI Publications
3. Annapurna Das, Sisir Das, "Microwave Engineering", McGraw Hill Publications

B. E. Eighth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

MICROWAVE AND RADAR ENGINEERING

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25Marks

Subject Code: BEECE801P/ BEETE801P **[0 – 2 – 0– 2]**

Objectives: The objective of this course is to understand the practical concept of microwave engineering

2. To Understand different Power distribution Waveguide and Scattering Matrix.
3. To know about Microwave and its Application.
4. To Study different Microwave Filters.

Outcome:

At the end of the course the students shall be able to:

1. Describe working of microwave bench.

2. Measure power & VSWR of microwave component.

3. Analyze the S-parameter of microwave component.

Any EIGHT practicals are to be conducted

LIST OF EXPERIMENTS

1. Study the characteristics of Klystron Tube and to determine its electronic tuning range.
2. To study the V-I characteristics of Gunn Diode.
3. To study the following characteristics of Gunn Diode.
   (a) Output power and frequency as a function of voltage.
   (b) Square wave modulation through PIN diode.
4. Study the function of Magic Tee by measuring the following parameters.
   (a) Measurement of VSWR at different ports and
   (b) Measurement of isolation and coupling coefficient.
5. Study the function of Isolator / Circulator by measuring the following parameters.
   (a) Input VSWR measurement of Isolator / Circulator.
   (b) Measurement of insertion loss and isolation.
6. Study the function of Attenuator (Fixed and Variable type) by measuring the following parameters.
   (a) Input VSWR measurement.
   (b) Measurement of insertion loss and attenuation.
7. Study the function of Multi Hole Directional Coupler by measuring the following parameters.
   (a) To measure main line and auxiliary line VSWR.
   (b) To measure the coupling factor and directivity.
8. Study of a network analyzer and measurements using it.
9. Verification of port characteristics of Microwave Tees (E, H, E-H planes)

10. Verification of port characteristics of Directional Coupler, study of Coupling factor, Insertion loss and Directivity.
11. To plot the radiation pattern of Horn Antenna and calculate its Antenna Gain and Beam width.
12. To plot the radiation pattern of Dish Antenna and calculate its Antenna Gain and Beam width.
13. Simulation of detection of target (i.e.to find distance and position of the target)
14. Simulation of Doppler effect (for moving target).
15. Study of different tracking Radar System (Mono pulse / conical scan / pulse swapping Radar)
16. Study of different types of Antenna (cassegain antenna /Parabolic Antenna)
17. Study of Servo-mechanism for Antennas of Radar Syatem.
18. Study of Pulse Radar System.
19. Study of FMCW Radar System.
20. Study of MTI Radar System.

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B. E. Eighth Semester

(Electronics /Electronics & Communication/ Electronics & Telecommunication Engg)

COMPUTER COMMUNICATION NETWORK

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE802T/ BEETE802T/ BEENE802T [4 – 0 – 1 – 5]

Objectives:

1. To explain the basic concept of computer communication network.
2. To explain the computer network layer.
3 To explain IP addressing scheme.
4. To explain network process.
5. To study Hardware aspect of network communication.
6. To make selection of IEEE lAN standards.
7. To explain network security & administration.

Outcome: **By the end of course, the students shall be able to**

1. Understand the requirement of theoretical & practical aspect of computer network.
2. Understand the network traffic in computer network.
3. Describe various protocols used in network.
4. Describe the concept of computer network security.
5. Understand the different wired &wireless LAN stds.& Routers.

Unit 1: Introduction to Computer Networks (06)

Uses of computer Network, Network Software-design Issues for layers, Service primitives and relationship of services to Protocols, Reference models-OSI &TCP/IP, network architectures introduction, Example of networks-X.25, Frame Relay & ATM, Protocols and Standards.

Unit 2: Physical Layer (10)

Physical layer-Data rate limits, Transmission media-guided and Unguided, Switching systems-Circuit switching, Datagram Switching & Virtual circuit switching, Structure of circuit and packet switch, cable modem and DSL technologies, SONET basics, selection of IEEE std 802.11 ,a,b,c,g.

Unit 3: Data link layer (10)

Data link layer: Framing, Flow & Error control Protocols, HDLC, PPP, Multiple access techniques-random access, controlled access & Channelization, Ethernet types-bridged, Switched, Full duplex, Fast & gigabit Ethernet, Introduction to Data link layer in 802.11 LAN, Connecting devices like passive hubs, repeaters, Active hubs, Bridges, Two-layer Switches, Routers, three layer switches, Gateway etc., Backbone networks, Virtual LANs, Simple Router architecture, Sliding window protocol.

Unit 4: Transport Layer and Network Layer **(10)**

Transport layer*-Process to process delivery, Connection oriented & Connectionless Transport, UDP, TCP, congestion control and Quality of Service.*

Network Layer*: IPv4 address, IPv6 address, Address mapping-ARP, RARP & DHCP, IPv4 datagram detail format, IPv6 datagram detail format, ICMP, IGMP, Network layer issues like Delivery, forwarding, intra-domain and Inter-domain routing, Routing algorithms like Shortest path routing, Flooding, Distance Vector Routing, Link State Routing, Path vector routing etc., Addressing types-Physical, Logical & port address.*

Unit 5: Application Layer **(10)**

Application layer protocols and applications like Ping, FTP, telnet, http (www), SMTP, SNMP, Trace route, TFTP, BOOTP, DNS, NFS, RPC, X-server, E-mail, Introduction to streaming Audio/Video,P2P file sharing, Introduction to socket programming.

Unit 6: Basics of Network Security and Network administration. **(09)**

Network security*: Introduction to Cryptography, Secret key algorithm, public key algorithm, Hash Functions, basic ITU-T Recommendation - X.805 Security Architecture, Basics of Security Requirements/Services/Dimensions, Basics of Security attacks, Basics of Security mechanisms / solutions****.*

Network Administration*: UTP Cabling for PC to PC communication, Network tester, network monitoring, Protocol Analyzer, Network Simulation, internet access through Dialup/DSL/Leased Line/Mobile handset.*

Text Books

1. Behrouz A. Forouzan," Data Communications and Networking", 4th Edition, Tata McGraw Hill
2. Andrew Tenenbaum, "Computer Networks", 4th Edition, Pearson Education.
3. Kurose & Ross, "Computer Networking- A top Down Approach featuring the Internet", 3rd edition, Pearson Education.
4. William Stallings, "computer Networks and Cryptography", 3rd edition, Pearson Education

Reference Books

1. Behrouz A. Forouzan, "TCP/IP protocol Suit", 3rd edition, Tata McGraw Hill Publications
2. Stevens,"TCP/IP illustrated Volume - I & II", Pearson education.
3. Feibel Werner, "Encyclopaedia of networking", Pearson education.
4. Frank J. Derfler, "Practical Networking", 2nd edition, QUE international Publishing.
5. Atul Kahate, "Cryptography and Network Security", 2nd edition, TATA McGraw Hill
6. Kenneth Mansfield, "Computer Networking from LANs to WANs: Hardware, software & Security", CENGAGE learning.
7. Nurul Sarkar, "Computer Networking & Hardware concepts", Information Science Publisher, USA.

B. E. Eighth Semester

(Electronics /Electronics & Communication/ Electronics & Telecommunication Engg)

COMPUTER COMMUNICATION NETWORK

Duration: 2 Hrs.
College Assessment: 25 Marks
University Assessment: 25Marks

Subject Code: BEECE802P/ BEETE802P/ BEENE802P **[0 – 2 – 0– 2]**

Objectives:
The objective of this course is to provide students with understanding of
1. Various physical equipments used for networking
2. Various types of protocols working on various layers of OSI reference model
3. Connecting computers in Local Area Network

Outcomes: At the end of the course the student should be able to
1. understand and select various cables and connectors used for networking
2. Establish peer to peer computers as well as Local Area Network connectivity
3. Effectively use available networking tools in Computer Communication Network

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Any EIGHT practicals are to be conducted

LIST OF EXPERIMENTS

1. To study network simulator & get familiar with NS2
2. To create network Topology in NS2.
3. To demonstrate data transmission using Ping protocol, tracert, IP configuration & hub.
4. To study the fundamental of socket programming.
5. To understand IP address of the system, dhcp, network address translation.
6. To understand the domain name server.
7. To Study Protocol analyzer.
8. To configure router
9. To Study of FTP ,HTFT protocol.
10. To perform PC to PC communication using RS-232 port.
11. To understand Wireless TCP and UDP protocols
12. To demonstrate Network security cryptography

B. E. Eighth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

WIRELESS & MOBILE COMMUNICATION

Duration: 3 Hr.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE803T/ BEETE803T **[4 – 0 – 0 – 4]**

Objectives:

1. **To impart the fundamental concept of mobile communication system.**
2. **To give the student the idea about cellular communication theory & technology**
3. **To introduce various technology and protocol involved in mobile communication**
4. **To provide the student with an understanding the cellular concept.**

Outcome: By the end of the course, the students shall be able to:

1. **Design a model of cellular system communication and analyze their operation and performance.**
2. **Quantify the causes and effects of path loss and signal fading on received signal characteristics.**
3. **to construct and analyze the GSM system**

Unit 1: The cellular concept **(06)**

Evolution of mobile radio communication. Cellular telephone system, frequency reuse, channel assignment and handoff strategies, interference and system capacity, trunking and grade of service, improving capacity in cellular system.

Unit 2:- The mobile radio environment **(08)**

Causes of propagation path loss, causes of fading-long and short term, definition of sample average , statistical average, probability distribution, level crossing rate and average duration of fade, delay spread, coherence bandwidth, inter-symbol interference.

Unit 3:- Equalization, diversity and channel coding **(08)**

Fundamentals of equalization, space polarization, frequency and time diversity techniques, space diversity , polarization diversity, frequency and time diversity, fundamentals of channel coding.

Unit 4:- GSM **(08)**

Global system for mobile: services and features, GSM system architecture, GSM radio subsystem, GSM channel type, GSM frame structure, signal processing in GSM, introduction to CDMA digital cellular standard, Third generation wireless networks, 3G technology.

Unit 5:-**Introduction to wireless networking** **(08)**

Difference between wireless and fixed telephone networks, development of wireless network, traffic routing in wireless networks.

Mobile IP and wireless access protocol, mobile IP, operation of mobile IP, collocated address, Registration, Tunneling, WAP Architecture, overview, WML scripts,WAP service, WAP session protocol.

Unit 6: Wireless LAN Technology **(07)**

Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs, IEEE 802 protocol, Architecture, IEEE802 architecture and services, 892.11 medium access control, 802.11 physical layer.

Wireless Application Protocol: architecture, WDP,WTLS, WTP, WSP, WAE,WML scripts.

TEXT BOOKS:

1. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, PHI, 2nd Edn.
2. Wireless Communication and Networking – William Stallings, PHI, 2003.
3. Mobile Communications- Jochen Schiller, Pearson Education, 2004.

REFERENCES:

1. Wireless Digital Communications – KamiloFeher, PHI, 1999.
2. Principles of Wireless Networks – KavehPahLaven and P. Krishna Murthy, Pearson Education, 2002.
3. Fourozan, Data communications and Networking, third edition, Tata McGraw-Hill Publication,2004.
4. Mobile Cellular Telecommunications-William C Y Lee, 2 edition, Mc. Graw Hill Publication.

B. E. Eighth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

Elective 2- WIRELESS SENSOR NETWORK

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE804T/ BEETE804T **[3 – 0 – 1 – 4]**

Objectives:

1. Introduce wireless sensor network architectures and communications protocols provide an understanding of mutual relationships and dependencies between different protocols and architectural decisions by offering an in-depth investigation of relevant protocol mechanisms.
2. Introduce sensor network platforms, operating systems and programming tools for sensor networks.
3. Introduce design spaces for sensor networks
4. Study wireless sensor network solutions with practical implementation examples and case studies.
5. Introduction to wireless sensor networks: Challenges for WSNs, enabling technologies.
6. Single node architecture: Hardware components, energy consumption of sensor nodes, operating systems and execution environments.

Outcome: By the end of this course, the students shall be able to

1. Demonstrate advanced knowledge and understanding of the engineering principle of sensor design, signal processing, established digital communications techniques, embedded hardware and software, sensor network architecture, sensor networking principles and protocols.
2. Demonstrate a computing science approach, in terms of software techniques, for wireless sensor networking with emphasis on tiny sensors, sensor specific programming languages, RFID technology, embedded architectures, software program design and associated hardware, data fusion.
3. Demonstrate knowledge of the associated business, legislative, safety and commercial issues; future technological advances and the way these will impact on the engineering product enterprise process.

Unit – I **(08)**

Introduction and Overview of Wireless Sensor Networks, Commercial and Scientific Applications of Wireless Sensor Networks, Basic Wireless Sensor Technology, Sensor Taxonomy, wireless network environment, wireless network trends.

Unit – II **(08)**

Radio technology primer, Available wireless technologies, Wireless Sensors Networks Protocols, Physical Layer, Fundamentals of Medium Access Control Protocols for Wireless Sensor Networks, MAC protocols for WSN, Case Study, IEEE 802.15 4LR WPAN, Standard case study.

Unit – III **(08)**

Sensors Network Protocols, Data dissemination and gathering, Routing Challenges and design issues in wireless sensor network, Routing strategies in WSN.

Unit – IV **(08)**

Protocols, Transport Control Protocols for Wireless Sensors Networks, Traditional transport control protocol, transport protocol design issues, examples of existing transport control protocol, performance of TCP.

Unit – V **(06)**

Middleware for Sensor Networks, WSN middleware principles, Middleware architecture, existing middleware.

Unit – VI **(07)**

Network Management for Wireless Sensor Networks, Requirements, Design issues, Examples of management Architecture, Performance and Traffic Management Issues.

Text Books:

1. Morgan Kaufmann F. Zhao and L. Guibas, ' Wireless Sensor Networks',San Francisco, 2004.
2. C. S. Raghavendra, Krishna M. Sivalingam, Taieb F. Znati , 'Wireless sensor networks',Edition: 2, Published by Springer, 2004 ISBN 1402078838, 9781402078835

Reference Books:

1. "Wireless Sensor Networks: Technology, Protocols, and Applications", Kazem Sohraby, Daniel Minoli, Taieb Znati, WIey Interscience Publication, 2007
2. "Computer Networks", Andrew Tanenbaum, 4th ed, Pearson Education,2007

B. E. Eighth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

Elective 2- EMBEDDED SYSTEMS

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE804T/ BEETE804T [3 – 0 – 1 – 4]

Objectives:

1. To give sufficient background for understanding embedded systems design.
2. To give knowledge of RISC processor.
3. To understand connections of various peripherals with microcontroller based system
4. To study of embedded system design aspects.

Outcome: By the end of the course, the students shall be able to

1. design embedded based system .
2. design embedded system based on RTOS and communication protocols.

UNIT I: EMBEDDED SYSTEM INTRODUCTION (08)

History, Design challenges, Optimizing design metrics, Time to market, NRE and UNIT cost design metrics, Application of embedded systems and recent trends in embedded systems.

UNIT II: EMBEDDED SYSTEM ARCHITECTURE (08)

Hardware and software architecture, Processor selection for Embedded System, Memory Architecture and IO devices , Interrupt Service Mechanism ,Context switching, Device Drivers.

UNIT III: ARM PROCESSOR (10)

Architecture and Programming: RISC and CISC, ARM organization, ARM Programmers model, operating modes, Exception Handling, Nomenclature, Core Extensions, ARM Assembly Language Programming, Introduction to ARM instruction set

UNIT IV: PROTOCOLS (06)

Bluetooth, IEEE 802.11 and IEEE 802.16, GPRS, MODBUS CAN, I2C and USB

UNIT V: REAL TIME OPERATING SYSTEM CONCEPTS (08)

Architecture of the kernel , Task scheduler , ISR , Semaphores , Mailbox , Message queues , Pipes, Events , Timers , Memory Management.

UNIT VI: CASE STUDY OF EMBEDDED SYSTEM: (05)

Based on Communication, Automation, Security, Automobile Fields

Text Books:

1) Raj Kamal, “Embedded Systems “, TMH Publications.
2) Frank Vahid, “Embedded System Design”, Wiley Publications, New edition 2001.
3) Sloss endrew & Dominic Symes, “ARM system Developers Guide”, Morgan Kaufmann , 2004 .

Reference Books :

1) Dr. K.V.K.K. Prasad , “Embedded / Real Time Systems”, Dreamtech Publications
2) Iyer, Gupta , “Embedded Real systems programming”, TMH Publications.
3) Steve Heath, “Embedded System Design”, Neuwans Publications
4) Jonathan,W. Valvano, “ Embedded Microcomputer System Realtime Interfacing”, Cenage Publications, 3rd Edition.

B. E. Eighth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

Elective 2- DIGITAL IMAGE PROCESSING

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE804T/ BEETE804T **[3 – 0 – 1 – 4]**

Objectives:

1. Provide the student with the fundamentals of digital image processing.
2. Introduce the students to some advanced topics in digital image processing.
3. Give the students a useful skill base that would allow them to carry out further study in the field of Image processing.

Outcome: **By the end of the course, students shall be able to**

1. have an appreciation of the fundamentals of Digital image processing including the topics of filtering, transforms and morphology, and image analysis and compression.
2. implement basic image processing algorithms in MATLAB.
3. have the skill base necessary to further explore advanced topics of Digital Image Processing.
4. make a positive professional contribution in the field of Digial Image Processing

Unit 1: Digital Image Fundamentals **(06)**

Components of Image Processing System. , Image Sensing and Acquisition, Image Sampling & Quantization, Spatial and Gray Level Resolution, Basic Relationships between Pixels. Statistical parameters, Measures and their significance, Mean, standard deviation, variance, SNR, PSNR etc.

Unit 2: Image Enhancement **(10)**

Enhancement in Spatial Domain: basic gray level transformations, histogram processing, equalization, Arithmetic and logical operations between images, Basics of spatial filtering, smoothening and sharpening spatial filters, Image Enhancement in frequency Domain: smoothening and sharpening frequency domain filters, Fundamental of color image processing: color models, RGB, CMY, YIQ, HIS, Pseudo Color Image processing: Intensity filtering, gray level to color transformation, Basics of full color image processing.

Unit 3: Image Transforms **(08)**

2D-DFT, FFT, DCT, the KL Transform, Walsh/Hadamard Transform, Haar Transform, slant Transform , Basics of wavelet transform.

Unit 4: Image Coding and Compression **(08)**

Image Coding Fundamentals, Image Compression Model, fundamentals- redundancy: coding, interpixel, psychovisual, fidelity criteria, Basic compression methods Error Free Compression - variable length, bit plane, LZW arithmetic Lossless Predictive, Lossy Compression- Lossy Predictive. Fundamentals of JPEG, MPEG, fractals.

Unit 5: Image Analysis **(08)**

Segmentation: Point, line, Hough Transform, Edge detection, Boundary detection and

Thersholding, Region Based segmentation.

Representation & Description :Boundary representation by chain codes, signature & skeleton Boundary descriptors, shape number, Fourier descriptors ,Basics of Regional descriptor, boundary representation by chain codes and B splines, Hough Transform, Morphological Image Processing: Dilation, Erosion, Opening, Closing on Binary Images.

Unit 6: Image restoration and reconstruction (05)

Image Degradation Mode, Noise Models, and Restoration in Presence c Noise in spatial Domain. Inverse Filtering, wiener filtering, Introduction to Image reconstruction from projections applications of Image Processing.

Text Books

1. Gonzalez and Woods, "Digital Image Processing", Pearson Education,
2. Arthur Weeks Jr., "Fundamentals of Digital Intake Processing", PHI.
3. S Jayaraman, “Digital Image Processing”, Tata McGraw Hill Publications.
4. A. K. Jain, "Fundamentals of Digital Image Processing"; Pearson Education

Reference Book

1. Pratt William, "Digital Image Processing", John Wiley & Sons
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Second Edition, Thomson Learning, 2001
3. Milan Sonka, Vaclav halvac , “Image Processing analysis & Machine Vision”, Cenage Learning

B. E. Eighth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

Elective 2- ARTIFICIAL INTELLIGENCE

Duration: 3 Hr.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE804T/ BEETE804T [3 – 0 – 1 – 4]

Objectives:

1. To introduce the fundamental concepts of artificial intelligence;
2. To equip students with the knowledge and skills in logic programming using Prolog;
3. To explore the different paradigms in knowledge representation and reasoning;
4. To explain the contemporary techniques in machine learning;
5. To evaluate the effectiveness of hybridization of different artificial intelligence techniques.

Outcome: By the end of the course students shall be able to:

1.understand the history, development and various applications of artificial intelligence;
2.familiarize with propositional and predicate logic and their roles in logic programming;
3.understand the programming language Prolog and write programs in declarative programming style; .
4.learn the knowledge representation and reasoning techniques in rule-based systems, case-based systems, and model-based systems;
5.understand how uncertainty is being tackled in the knowledge representation and reasoning process, in particular, techniques based on probability theory and possibility theory (fuzzy logic);
6.master the skills and techniques in machine learning, such as decision tree induction, artificial neural networks, and genetic algorithm;
7.apply and integrate various artificial intelligence techniques in intelligent system development as well as understand the importance of maintaining intelligent systems.

Unit 1: Foundation (08)

Intelligent Agents, Agents and environments, Good behavior, The nature of environments, structure of agents, Problem Solving, problem solving agents, example problems, searching for solutions, uniformed search strategies, avoiding repeated states, searching with partial information.

Unit 2: Searching (08)

Search and exploration, Informed search strategies, heuristic function, local search algorithms and optimistic problems, local search in continuous spaces, online search agents and unknown environments, Constraint satisfaction problems (CSP), Backtracking search and Local search for CSP, Structure of problems, Adversarial Search, Games: Optimal decisions in games, Alpha- Beta Pruning, imperfect real-time decision, games that include an element of chance.

Unit 3: Knowledge Representation (08)

First order logic, representation revisited, Syntax and semantics for first order logic, Using first order logic, Knowledge engineering in first order logic, Inference in First order logic, prepositional versus first order logic, unification and lifting, forward chaining, backward chaining, Resolution, Knowledge representation, Ontological Engineering, Categories and objects, Actions - Simulation and events, Mental events and mental objects.

Unit 4: Learning (08)

Learning from observations: forms of learning, Inductive learning, Learning decision \trees, Ensemble learning, Knowledge in learning, Logical formulation of learning, Explanation based learning, Learning using relevant information, Inductive logic programming, Statistical learning methods, Learning with complete data, Learning with hidden variable, EM algorithm, Instance based learning, Neural networks - Reinforcement learning, Passive reinforcement learning, Active reinforcement learning, Generalization in reinforcement learning.

Unit 5: Perception and Expert System (06)

Visual perception -Waltz's algorithm, Introduction to Expert System, Architecture and functionality, Example Expert system

Unit 6: Natural Language Understanding (07)

Why NL, Formal grammar for a fragment of English, Syntactic analysis, Augmented grammars, Semantic interpretation, Ambiguity and disambiguation, Discourse understanding, Grammar induction, Probabilistic language processing, Probabilistic language models.

Text Book

1. Stuart Russell, Peter Norvig, "Artificial Intelligence, A Modern Approach", 2nd Edition, Pearson Education / Prentice Hall of India, 2004.

Reference Books

1. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw- Hill,
3. George F. Luger, "Artificial Intelligence-Structures and Strategies for Complex Problem Solving", Pearson Education / PHI, 2002.
4. Eugene charniak, "Introduction to Artificial Intelligence", Pearson Education.
5. Deepak Khemani, "A First Course in Artificial Intelligence", McGraw Hill Publications

B. E. Eighth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

Elective 3- RANDOM SIGNAL THEORY

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE805T/ BEETE805T **[3 – 0 – 1 – 4]**

Objectives:

1. **To Learn the Random Variables and Random Processes**
2. **To Design the systems which involves randomness using mathematical analysis and computer simulations.**

Outcome: At the end of the course, students shall be able to

1. **Apply theory of probability in identifying and solving relevant problems.**
2. **Define and differentiate random variables and vector through the use of cumulative distribution function (CDF), probability density function (PDF), probability mass function (PMF) as well as joint, marginal and conditional CDF, PDF and PMF.**
3. **Show probability and expectation computations using important discrete and continuous random variable types.**
4. **Define and specify random processes and determine whether a given process is stationary or wide sense stationary.**

Unit I: **RANDOM VARIABLES** **(08)**

Introduction: *Random input signals, , random experiments and events.*

Random Variables*: Concept of random variable, distribution functions, density functions, mean values and moments, density functions related to Gaussian-Rayleigh distribution, Maxwell distribution, Chi-square distribution, normal distribution, uniform distribution, exponential distribution, Conditional probability distribution and density functions.*

Unit II : **(09)**

Several random variables **:** *Two random variables, joint conditional probability, statistical independence, correlation between random variables, density function of sum of two random variables, probability density function of two random variables, the characteristic function.*

Elements of statistics*: curve fitting and linear regression, correlation between two sets of data.*

Unit III: RANDOM PROCESSES (08)

Random Processes*: Continuous and discrete, deterministic and non-deterministic, stationary and non-stationary, ergodic and non-ergodic.*

Correlation functions : Introduction, autocorrelation function of a binary process, properties of auto correlation functions, examples of auto-correlation functions, cross-correlation functions, properties of cross correlation functions, examples and applications of cross-correlation functions.

Unit IV: SPECTAL DENSITY (08)

Introduction, relation of spectral density to the fourier transform, properties of spectral density, mean square values from spectral density, relation of spectral density to the auto-correlation function, White noise, Cross spectral density, examples and applications of spectral density.

Unit V: RESPONSE OF LINEAR SYSTEMS TO RANDOM INPUT (06)

Analysis in the time domain, mean and mean square value of system output auto-correlation function of system output, cross-correlation between input and output, spectral density at the system output.

Unit VI: OPTIMUM LINEAR SYSTEMS (06)

Criteria of optimality, restrictions on the optimum system, optimization by parameter adjustment systems that maximizes signal to noise ratio, systems that minimize mean square error.

Text Books *:*

1. G.R. Cooper and C.D. Mcgillem : Probabilistic Methods of Signal and System Analysis, Third Ed, Oxford University Press.
2. M. Lefebvre : Applied Probability and Statistics, Springer, McMillan India Ltd.
3. A. Papoulis, S.U. Pillai : Probability, Random Variable and Stochastic Process , TMH.
4. Peyton J. Peebles (Jr), “Problems and Solutions in Probability, Random Variables and Random Signal Principles”, McGraw Hill Publications.
5. P Ramesh Babu, “Probability Theory and Random Processes”, McGraw Hill Publications

B. E. Eighth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

Elective 3- ROBOTICS & AUTOMATION

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE805T/ BEETE805T [3 – 0 – 1 – 4]

Objectives:

1. The course has been so designed to give the students an overall view of the mechanical components.

2. The mathematics associated with the same. Actuators and sensors necessary for the functioning of the robot.

Outcome: By the end of the course, the students shall be able to

1. Explore 8051 microcontroller architecture

2. Effectively utilize instruction set for assembly language programming

3. Interface different on & off chip peripherals with 8051 using C language

4. Basics of 8051 can be used for robotic applications

UNIT1: (10)

Definition of a Robot, A brief introduction to Robot Technology, Sensory perception, Intelligence, End Effectors, Sensory feedback, Robot Vision / Computer Vision and its fundamental components, Tactile Sensing, Range finding and real world navigation Speech synthesis and recognition.

***Robot control fundamentals** : The Artificial intelligence view point, comparison of human brain and computer in the context of intelligent behavior, problem representation in A.I., system problem solving technique in A.I.*

UNIT 2: (08)

Definition of knowledge, Domain and logic : Elements of logic, proportional calculus, predicate calculus, pros and cons of logic, production system and their basis elements, about Expert system comparison of various methods of knowledge representation.

UNIT 3: **(08)**

Elements of speech, Time Domain Analysis / Synthesis of speech and waveform digitization, frequency Domain Analysis / Synthesis of speech phoneme Speech Synthesis, various type of speech recognition Systems and their basics ideas, Isolated word Recognition, Connected Speech understanding.

UNIT4: **(06)**

Elements of vision, Image Transformation, Image Analysis, Image Understanding of Machine perception, Industrial Vision System.

UNIT 5: **(06)**

Triangularation Method, Time of Flight (TOF), Ranging Method, Robot Position and Proximity Sensing, Tactile- Sensing System, Sensing Joint Forces and their importance in Robot programming, sensing tough and slip

UNIT 6 : **(07)**

Various Root Programming Languages and their characteristics, characteristics of Robot Task Level language, comparison of Robot programming language, features of the high level languages used in conventional programming language, featuring with the high level language used in conventional programming.

TEXT BOOKS :

1. Staugard A.C. : "Robotic and AI", Prentice Hall, Engle Wood Cliff N.J. 1987.
2. Lee C.S.G., Fu K. S., Gonzalez R.C. : "Robotic-Control, Sensing and Intelligence", Mc- Graw Hill, Singapore, 1987.

REFERENCE BOOKS :-

1. Klafferetal : "Robotics", Prantice Hall Publications
2. Parent M. and Laugreau C. : "Robot Technology (Vol.4 : Logic and Programming", Kogan Page, London, 1985.
3. Aleksander I. ,Farreny H. and Ghallab M. : "Robot Technology" (Vol-1)., Decision and Intelligence "Kogan Page", 1986.
4. S.R. Deb, " Robotics Technology & Flexible Automation", McGraw Hill Publication
5. S.K. shaha, "Introduction to Robotics", McGraw Hill Publication

B. E. Eighth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

Elective 3- SATELLITE COMMUNICATION

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE805T/ BEETE805T [3 – 0 – 1 – 4]

Objectives:

1. To learn working principle of satellite communication system.
3. To understand the orbital aspects and components of a satellite communication system.
4. To analyze the link budget of a satellite communication system and study of satellite orbits and launching.
5. To get knowledge and relate different components in satellite communication and use them in projects.

Outcome: At the end of the course, the student shall be able to :

1. Do research with capabilities in the design, development and manufacture of satellite communication systems used in a wide spectrum of applications.
2. Experience real world experience from household appliances to sophisticated satellite communication, from electronic ignition to neural networks and signal processing chips & to integrate academic discipline with project-based engineering applications, classroom learning theory
3. Able for Acquisition of technical competence in specialized areas of Satellite Communication engineering.
4. Able to identify, formulate and model problems and find Satellite Communication engineering solutions based on a system approach.

UNIT I: (08)

Introduction: Origin of Satellite communication, Current state of satellite communication. Orbital aspect of satellite communication: Orbital mechanism, equation of orbit, locating satellite in orbit, orbital elements, and orbital perturbation. Space craft subsystem:Attitude and orbit control system, Telemetry tracking and command power system, and communication subsystem.

UNIT II: (08)

Satellite link design: System noise temperature and T / T ratio, down link design, domestic satellite system, uplink design, design of satellite link for specified (C / N).

UNIT III: (08)

Multiple access techniques: FDMA, FDM / FM / FDMA, effects of intermodulation, companded FDM / FM / FDMA, TDMA, TDMA frame structure and design, TDMA synchronization and timing, code division multiple access, SS transmission and reception; Applicability of CDMA to commercial system, multiple access on board processing SCPS system, digital speech interpolation system, DAMA.

UNIT IV: **(08)**

Propagation on satellite: Earth's path – propagation effects, atmospheric absorption, Scintillation effects, Land and Sea multipath, Rain and ice effects, Rain drop distribution, calculation of attenuation. Rain effects on Antenna noise temperature.

UNIT V: **(08)**

Encoding and forward error correction: Error detection and correction, channel capacity, error detecting codes, linear block codes, error correction with linear block codes, performance of block error correction codes, convolution codes, cyclic codes, BCH and codes, error detection on satellite links.

UNIT VI: **(05)**

Earth Station technology: Earth Station design; antennas tracking, LNA, HPA, RF multiplexing, factors affecting orbit utilization, tracking, equipment for earth station.

Text BOOKS:

1. "Satellite Communication" by T. Pratt. Charles Bostian and Jeremy Allnutt, 2nd Edition, John Wiley & Sons, 2003.
2." Satellite Communication", D. C. Agrawal, Khanna Publishers
3. "Satellite Communication", Dennis Roddy , 4th Edition, McGraw- Hill International edition, 2006.
4. "Satellite Communication", T. T. Hai., Mc.Graw Hill Publications

REFERENCES BOOKS:

1. Satellite Communication Systems Engineering, W. L. Pitchand, H. L. Suyderhoud, R. A. Nelson, 2nd Ed., Pearson Education., 2007.

2. Satellite Communication, Mark R Chartrand, Cenage Learning

B. E. Eighth Semester

(Electronics & Communication/ Electronics & Telecommunication Engg)

Elective 3- CMOS VLSI DESIGN

Duration: 3 Hrs.
College Assessment: 20 Marks
University Assessment: 80 Marks

Subject Code: BEECE805T/ BEETE805T **[3 – 0 – 1 – 4]**

Objectives:

1. Motivating students to learn basics of CMOS VLSI design.
2. To learn CMOS device parameters and characteristics.
3. To detect faults and errors in the design.
4. To learn physical design of logic gates.
5. To Study CMOS processing technology.

Outcome: By the end of course, the students shall be able to

1. Design PMOS and NMOS transistor.
2. Implementation different combinational logic circuits.
3. Design layout for various circuits.
4. Design CMOS transistor.
5. Experiment on CMOS logic design.
6. Detect and correct errors in VLSI Design.

UNIT 1: MOS TRANSISTORS **(08)**

nMOS enhancement and pMOS enhancement transistor, threshold voltage, body effect, MOS effect, MOS device equations, small signal model for MOS transistor.

UNIT 2: CMOS INVERTER **(08)**

Principle of operation, dc characteristics, transient characteristics, β_n/β_p ration, noise margin, static load MOS inverter, transmission gate, introduction to Bi-CMOS inverter.

UNIT 3: STUDY OF CMOS LOGIC **(08)**

Study of combinational logic, gates, compound gates, multiplexers, and memory elements using CMOS technology.

UNIT 4: CIRCUIT CHARACTERIZATION AND PERFORMANCE ESTIMATION **(06)**

Resistance and capacitance estimation, switching characteristics, power dissipation, charge sharing.

UNIT 5: VLSI DESIGN **(06)**

VLSI processing integration, layout design rules, and stick diagram representation latch up, CMOS circuits and logic design: transistor sizing, fan-in, fan-out and physical design of simple logic gates, CMOS logic structures and clocking strategies.

UNIT 6: DESIGN FAULTS (09)

Types of fault, stuck open, short, stuck at 1, 0 faults, Fault coverage, Need of Design for Testability (DFT), Controllability, predictability, testability, Built In Self Test (BIST), Partial and full scan check, Need of boundary scan check, JTAG, Test Access Port (TAP) controller.

Text Books:

1. "Principal of CMOS VLSI design", Neil H. E. Weste, K. Eshraghian, Addison Wesley VLSI Series.
2. "Digital Interrogated circuits, A Design Perspective" , J. M. Rabaey, A. Chandrakasan, and B. Nikolic., PHI Publications .
3. "CMOS VLSI Design" , Pucknell & K. Eshraghain, PHI Publications

REFERENCES BOOKS:

1. "VLSI Technology", S.M. Sze, McGraw Hill Publications
2. "VLSI Design Technologies for Analog & Digital Circuits", Randall L Gei , McGraw Hill Publications