INSTITUTE OF ENGINEERING,
JIWAJI UNIVERSITY , GWALIOR
B.E. (ELECTRONICS ENGG.)
SCHEME w.e.f. 2018

Institute Of Engineering, Jiwaji University , Gwalior
B.E. III Sem . (Electronics Engineering)
Scheme (w.e.f.2018-2022 batch)
Subject wise distribution of marks and corresponding credits

S.NO.	Subject Code	Subject Name & Title	Theory Slot			Practical Slot			Total Marks	Credit alloted Subjectwise			Total Credits
										Period per week			
			End Sem	Mid Sem	Total -1	Sessional	Practical	Total-II	T1+T2	L	T	P	C
1	BE-301	Mathematics -II	80	20	100	_	_	_	100	3	1	0	4
2	EC-302	Data Structure & algorithms	80	20	100	_	_	_	100	3	1	0	4
3	EC-303	Electronics Devices & Circuits	80	20	100	50	50	100	200	3	1	2	6
4	EC-304	Instrumentation & Measurement	80	20	100	50	50	100	200	3	1	2	6
5	EC-305	Network Analysis	80	20	100	50	50	100	200	3	1	2	6
6	EC-306	JAVA(Computer language)	_	_	_	50	50	100	100	0	0	2	2
7	EC-307	Self Study (Internal Assesment)	_	_	_	50	_	50	50	0	2	0	2
8	EC-308	Seminar / Group Discussion (Internal Assesment)	_	_	_	50	_	50	50	0	2	0	2
		Total	**400**	**100**	**500**	**300**	**200**	**500**	**1000**	**15**	**9**	**8**	**32**

L: Lecture - **T: Tutorial -** **P: Practical**

B.E. 301 - ENGINEERING MATHEMATICS II

Unit I

Fourier Series: Introduction of Fourier series , Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series Fourier Transform: Definition and properties of Fourier transform, Sine and Cosine transform.

Unit II

Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations

Unit III

Second Order linear differential equation with variable coefficients : Methods one integral is known, removal of first derivative, changing of independent variable and variation of parameter, Solution by Series Method

Unit IV

Linear and Non Linear partial differential equation of first order: Formulation of partial differential equations, solution of equation by direct integration, Lagrange's Linear equation, charpit's method. Linear partial differential equation of second and higher order: Linear homogeneous and Non homogeneous partial diff. equation of nth order with constant coefficients. Separation of variable method for the solution of wave and heat equations

Unit V

Vector Calculus: Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem

References

(i) Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
(ii) Higher Engineering Mathematics by BS Grewal, Khanna Publication
(iii) Advance Engineering Mathematics by D.G.Guffy
(iv) Mathematics for Engineers by S.Arumungam, SCITECH Publuication
(v) Engineering Mathematics by S S Sastri. P.H.I.

EC- 302 Data Structures and algorithms

Unit I

Structural programming, top-down design., abstract data type, implementation of arrays,triangular arrays, structures, character strings, Pointers dynamic memory management.

Unit II

Singly linked list, implementation linked list using arrays, implementation of linked list using dynamic memory allocation circular link list, Josphus problem, doubly linked list, polynomial manipulation using linked list, representation of sparse matrices. Stacks - their concepts and implementation, multiple stacks. Conversion of infix to postfix notation using stack, evaluation of postfix expression, recursion, how recursion- works, queues their concepts and implementation, Queue, primary queues, simulation.

Unit III

Trees, Binary tree - their representation and operations, tree traversals, threaded binary trees, conversion of general trees to binary trees, binary expression tree, applications of trees. sequential searching, binary search, height balanced tree and weight balanced trees, multiway search trees, digital search, trees, hashing and collision - resolution techniques.

Unit IV

Various sorting algorithms viz. bubble sort, selection sort, inserted sort, Quicksort, merge sort, address calculation sort and heap sort, complexity of the algorithm.

Unit V

Graphs, terminology, representation of graphs, reachability, minimum path problem, critical events, Graph traversals, spanning trees, application of graph.

References:

1. Data structures using C: By Tannenbaum
2. Data structures: By Trembley Sorenson
3. Data structures using C: By Rajiv Jindal

EC - 303 Electronics Device & Circuit

Unit I

Diode Application : Diode clipping and clamping circuit, rectifiers, diode resistance and capacitance, Graphical analysis of diode, circuits, type of diode and their applications (signal diode, power diode, zener diode, varactor diode, schottky diode, pin diode, tunnel diode, solar cell, led) advantages and disadvantages of Leds.

Unit II

h – Parameters Model : CE, CB, CC h - parameter model, comparison, conversion, transistor switching, miller's theorem, frequency response, voltage, current and power gain, designing of basic amplifier circuit, Transistor biasing and thermal stabilization, JFET transistor.

Unit III

(a) **Differential amplifier: -** Introduction, differential amplifiers, configuration, analysis using h parameters, Differential gain, common mode gain, CMRR, constant current sources, current mirrors, level shifting circuits, direct couple amplifier.

(b) **OP – amp. : -** Ideal characteristics op- Of AMP, OP AMP parameters – slew rate & its effect on full power bandwidth, i/p offset voltage, Bias and offset currents, compensation, lag compensation, application of OP – AMP – inverting and non-inverting mode, diff. Mode, comparator, Schmitt trigger, log. Amp, analog computation: - summer, avg. integrator, differentiators, scaling, multipliers.

Unit IV

(a) **Feedback Amplifier and Oscillator :** Negative and positive feedback, gain and sensitivity, bandwidth, types of feedback, oscillator and application, UJT characteristic, multi vibrater circuit & applications.

(b) **Power Amplifiers :** Classification, type of power amplifier circuits, complementary, symmetry circuits, push pull amplifier crossover distortion, heat sink, derating curve

Unit V

(a) **Regulator :** Classification of voltage regulators, type of voltage regulator, current Limiting circuit, adjustable voltage regulators, 3 terminal positive series regulators dual IC power supply SMPS.

(b) Designing of feedback amp, multivibrator circuits and oscillators.

LIST OF EXPERIMENTS :

1 V – I Characteristic of p – n junction diode, zener diode.

2 To study the transistor characteristics.

3 Analysis of the h – parameters of bipolar junction transistor.

4 UJT characteristics and application

5 JFET & MOSFET characteristics.

6 Designing of single stage & double stage (DC couple & transformer couple) amplifier with given specifications of parameters & component.

7 Design of different type of feedback amplifier determine gain and bandwidth.

8 Designing of different types of oscillators and power amplifiers.

9 Differential amplifiers analysis and determine differential gain, commen mode gain.OP – AMP's application as a summer, integrator diff., scaling and multiplier.

10 Schmitt trigger, logarithmic amplifier.

SUGGESTED FURTHER READINGS :

1 Millman Halkias – Integrated electronics
2 Sedral smith – Micro electronic circuits
3 Milliman Grabe
4 Boyelstad
5 R.A. Gaykwad – OP – AMP's and linegintegrated circuits.

EC-304 Instrumentation & measurement

Course Title	Course Code
Instrumentation & Measurement	**EL-304**

UNIT - I

Measurement and error, Accuracy and precision, sensitivity resolution, Type of errors, Electronic voltmeter, AC voltmeter with rectifier and Amplifier compo nation Electronic millimeters, DC Ammeters, AC current indicating instrument AC probes, singles trace and dual beam CRO s.

UNIT - II

Measurement of inductance, Capacitance and Q of the coil, Maxwell's Bridge, Wiens bridge, Sharing bridge, Weather earring, Elector impedance meter, transducers, Classification of transducer, Strain gauge, Photoelectron transducer, Linear variable. Differential Transducer (LVDT), Photo electronic transducer, temperatures measurement, thermocouples, photosensitive device, nuclear radiation detection instrument.

UNIT - III

Signal generators, Function generator, sweep frequency generator, pulse and square Wave generation wave Analyzer, Harmonic distortion Analyzer, spectrum Analysis, Hetro dyne frequency counter & meter, measurement errors, Automatics and computing counter.

UNIT - IV

Digital instrument: Advantages of digital instrument, Over along instrument, D-A, A-Conversion, Digital voltmeter, Ramp type DVM integrating DVM, Successive approximation DVM, Display(LED, LCD and seven segment etc.), Instrument used in computer controlled instrumentation, RS232C, IEEE498, GPIB electrical interface, interfacing to electronic control.

UNIT - V

Microwave instruments, Scattering Parameters, Transmission and reflection parameter s, Network analyzer, Measurements & uncertainly measurements with scalar and vector Network, Analysers microwaves power measurement, sources and detectors, Fibers optic power measurement, Stabilized calibrated light sources end to and measurement of fiber losses, Optical time domain reflectometry.

SUGGESTED LIST OF EXPERIMENTS:

1 Study of strain gauge.
2. Displacement measurement by LVDT.
3. Temperature measurement thermister.
4. Temperature measurement using R.T.D
5. Temperature measurement using thermocouple.
6. Measurement of water level. Measurement using water level using sensor
7. Study of 7-Segment Display
8. Measure the unknown value of introduction having low Q factor using Maxwell Bridge
9. Measurement of capacitance using Wien Bridge.
10. Study of different parts of microwave components.

SUGGESTED READING:

1. Albert D. Cooper PHI - Modern Electric Instrumentation
2. A.K. Maini, Khanna Publisher - Microwave and Radars.
3. A.K. Shani - Instrument and Measurement.

EC- 305 Network Analysis

Unit I

Introduction to circuit elements R,L,C and their characteristics in terms of linearity & time dependant nature, voltage & current sources controlled & uncontrolled sources KCL and KVL analysis, Nodal & mesh analysis, analysis of magnetically coupled circuits, Transient analysis :-Transients in RL, RC&RLC Circuits, initial conditions, time constants. Steady state analysis-Concept of phasor & vector, impedance & admittance, Network topology, concept of Network graph, Tree, Tree branch & link, Incidence matrix, cut set and tie set matrices, dual networks,Dot convention, coupling co-efficient, tuned circuits, Series & parallel resonance.

Unit II

Network Theorems for AC & DC circuits- Thevenins & Norton's, Superpositions,Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem,Tellegen's theorem, problems with dependent & independent sources.

Unit III

Frequency domain analysis – Laplace transform solution of Integro-differential equations,transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain

Unit IV

Concept of signal spectra, Fourier series co-efficient of a periodic waveform, symmetries as related to Fourier coefficients, Trigonometric & Exponential form of Fourier series.

Unit V

Network function & Two port networks – concept of complex frequency, Network & Transfer functions for one port & two ports, poles and zeros, Necessary condition for driving point & transfer function. Two port parameters – Z,Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks,Terminated two port network.

References:

1. M.E. Van Valkenburg, Network Analysis, (PHI)
2. F.F.Kuo, Network Analysis.
3. Mittal GK; Network Analysis; Khanna Publisher
4. Mesereau and Jackson; Circuit Analysis- A system Approach; Pearson.
5. Sudhakar & Pillai; Circuit & Networks- Analysis and Synthesis; TMH
6. Hayt W.H. & J.E. Kemmerly; Engineering Circuit Analysis; TMH
7. Decarlo lin; Linear circuit Analysis; Oxford
8. William D Stanley : Network Analysis with Applications, Pearson Education
9. Roy Choudhary D; Network and systems; New Age Pub
10. Charles K. Alexander & Matthew N.O. Sadiku: Electrical Circuits :TMH
11. Chakraborti :Circuit theory: Dhanpat Rai
12. B.Chattopadhyay & P.C.Rakshit; Fundamental of Electrical circuit theory; S Chand

List of experiments (Expandable):

All experiments (wherever applicable) should be performed through the following steps.

Step 1:Circuit should be designed/ drafted on paper.
Step 2: The designed/drafted circuit should be
simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER).
Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.
Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. To Verify Thevenin Theorem.
2. To Verify Superposition Theorem.
3. To Verify Reciprocity Theorem.
4. To Verify Maximum Power Transfer Theorem.
5. To Verify Millman's Theorem.
6. To Determine Open Circuit parameters of Two Port Network.
7. To Determine Short Circuit parameters of a Two Port Network.
8. To Determine A,B, C, D parameters of a Two Port Network
9. To Determine h parameters of a Two Port Network
10. To Find Frequency Response of RLC Series Circuit.
11. To Find Frequency Response of RLC parallel Circuit.

EC - 306 Java (Computer Language)

UNIT-I

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors,Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

UNIT–II

Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees,Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector.C and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

UNIT–III

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads,Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking,Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

UNIT–IV

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

UNIT–V

Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

References:

1. Deitel & Deitel, "JAVA, How to Program"; PHI, Pearson.
2. E. Balaguruswamy, "Programming In Java"; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, "Peter Norton Guide To Java Programming", Techmedia.
5. Merlin Hughes, et al; Java Network Programming , Manning Publications/Prentice Hall

List of Program to be perform (Expandable)

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write a Program to show Inheritance and Polymorphism
6. Write a program to show Interfacing between two classes
7. Write a program to Add a Class to a Package
8. Write a program to demonstrate AWT.
9. Write a program to Hide a Class
10. Write a Program to show Data Base Connectivity Using JAVA
11. Write a Program to show "HELLO JAVA " in Explorer using Applet
12. Write a Program to show Connectivity using JDBC
13. Write a program to demonstrate multithreading using Java.
14. Write a program to demonstrate applet life cycle.

EC-307 Self Study (Internal Assessment)

Objective of Self Study: is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

EC -308 Seminar / Group Discussion(Internal Assessment)

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.

Institute Of Engineering, Jiwaji University , Gwalior
B.E. IV Sem . (Electronics Engineering)
Scheme (w.e.f.2018-2022 batch)
Subject wise distribution of marks and corresponding credits

S.NO.	Subject Code	Subject Name & Title	Theory Slot			Practical Slot			Total Marks	Credit alloted Subjectwise			Total Credits
										Period per week			
										L	T	P	
			End Sem	Mid Sem	Total -1	Sessional	Practical	Total-II	T1+T2	L	T	P	C
1	BE-401	Mathematics-III	80	20	100	_	_	_	100	3	1	_	4
2	EC-402	Electromagnetic Theory	80	20	100	_	_	_	100	3	1	_	4
3	EC-403	Digital Electronics	80	20	100	50	50	100	200	3	1	2	6
4	EC-404-New	Linear Integrated circuits and its application	80	20	100	50	50	100	200	3	1	2	6
5	EC-405	Analog Communication	80	20	100	50	50	100	200	3	1	2	6
6	EC-406	Software Lab-II	_	_	_	50	50	100	100	0	0	2	2
7	EC-407	Self Study (internal Assesment)	_	_	_	50	_	50	50	0	2	0	2
8	EC-408	Seminar / Group Discussion (Internal Assesment)	_	_	_	50	_	50	50	0	2	0	2
		Total	**400**	**100**		**300**	**200**	**500**	**1000**	**15**	**9**	**8**	**32**

L: Lecture - **T: Tutorial -** **P: Practical**

B.E. 401 - ENGINEERING MATHEMATICS III

Unit I

Functions of complex variables : Analytic functions, Harmonic Conjugate, Cauchy-Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem , Application of Residues theorem for evaluation of real integrals

Unit II

Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi , Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equatins by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods

Unit III

Difference Operators, Interpolaüon (Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae), Numerical Differentiation and Numerical Integration.

Unit IV

Solution of Ordinary Differential Equations(Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method), Correlation and Regression, Curve Fitting (Method of Least Square).

Unit V

Concept of Probability : Probability Mass function, Probability density function. Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution ,Gamma Distribution ,Beta Distribution ,Testing of Hypothesis |:Students t-test, Fisher's z-test, Chi-Square Method

Reference:

(i) Numerical Methods using Matlab by J.H.Mathews and K.D.Fink, P.H.I.

(ii) Numerical Methods for Scientific and Engg. Computation by MKJain, Iyengar and RK Jain, New Age International Publication

(iii) Mathematical Methods by KV Suryanarayan Rao, SCITECH Publuication

(iv) Numerical Methods using Matlab by Yang,Wiley India

(v) Pobability and Statistics by Ravichandran ,Wiley India

(vi) Mathematical Statistics by George R., Springer

EC- 402 Electromagnetic Theory

Unit I

Review of vector calculus: orthogonal coordinate systems, gradient, divergence and curl. Laplacian operator for scalar and vectors. Vector integral and differential identities and theorems. Phasor representation of harmonic variation of scalar and vectors Static electric fields, Columb's law, electric flux density and electric field intensity, permittivity, dielectric constant, field of distributed charges in free space, potential function, Laplace's and Poisson's equations, electric dipole, stored electric energy density. Boundary conditions at abrupt discontinuities between two media including conducting boundaries, surface charge distribution capacitance between two isolated conductors

Unit II

Solution of Laplace's equations in systems of dielectric and conducting boundaries, uniqueness theorem, two dimensional boundary condition problems, solution by symmetry, conformal transformation of functions, image theory etc. fields in parallel wire, parallel plane and coaxial systems. Static currents and magnetic fields- flow of charge in conductive media, lossy conductive medium, current density, specific conductivity, mobility, explanation of Ohm's law employing mobility. Magnetic effects of current flow, Biot-Savart's law in vector form magnetic field intensity, magnetic flux, and permeability, closed loop currents, Ampere's circuital law in integral and differential vector form, magnetic vector potential and related equations. Problems related to straight wire toroidal and cylindrical solenoids, inductance. Boundary conditions on magnetic field, equivalent surface currents for abrupt discontinuity of magnetic field.

Unit III

Time varying fields – Faraday's law in integral and differential forms, displacement current concept, Maxwell's equations in differential and integral forms, wave equations in source free region electric and magnetic stored energy density, continuity equation, Poynting vector theorem. Time harmonic fields, r.m.s. phasor representation of field vectors, Maxwell's equations for TH field, average energy density, complex Poynting vector, duality concept. Helmholtz wave equation, general solution in free space in various coordinates, plane polarized wave in free space, properties of plane waves, wave front, power flow, stored energy density.

Unit IV

Circular and elliptic polarization, resolution in terms of linear polarized waves and vice- versa. Plane waves in lossy medium, low loss dielectric, good conducting and ionized media, complex permittivity, loss tangent, skin depth, transmission line analogy, boundary conditions at perfect conductor surface, surface current density Interference of two plane waves traveling at oblique directions.

Unit V

Reflection and refraction of plane waves at dielectric media and conducting Surfaces, Brewster's angle, total internal reflection, resultant fields and power flow in both media. Frequency dispersive propagation, phase velocity and group velocity. Magnetic vector potential for sources in free space, retarded potential, radiation principles, boundary condition at infinity

References:

1. Mathew N.O Sadiku: Elements of Electromagnetic, Oxford University Press

2. William H. Hayt: Engineering Electromagnetic, TMH.

3. John D. Kraus: Electromagnetics, Mc. Graw Hill.

4. Jordan Balmian: Electromagnetic wave and Radiating System, PHI.

5. David K. Cheng: Electromagnetic Fields and Wave, Addison Wesley.

6. Ramo, Whinnerry and VanDuzzer " Fields and waves in communication electronics ", Wiley 1984 7. Harrington RF, "Electromagnetic fields" Mc Graw Hill

EC - 403 Digital Electronics

Unit-I

Review of Number systems and Binary codes, Binary arithmetic – addition, subtraction, multiplication and division algorithms. Boolean algebra: theorems and functions, Simplification of Boolean functions, minimization techniques, Karnaugh's map method, Quine and McCluskey's method, realization of various binary functions using AND ,OR ,NOT,XOR logic gates.

Unit-II

Universal gates: NAND, NOR, realization of boolean function using universal gates. Half and full adder, half and full subtractor, Series and parallel adder, BCD adders, lookahead carry generator. Decoders, Encoders, multiplexers and de-multiplexers. Analysis and design of combination circuits, realization of various Boolean functions using NAND, NOR gates and multiplexers.

Unit-III

Multivibrators: Astable, Monostable and bistable multivibrators, 555 timer chip and its application in multivibrators. Flip-Flops: R-S, Clocked R-S, T, D, J-K, race around problem, Master-slave J-K., State and Excitation Tables Shift registers and counters . synchronous and asynchronous counters, Binary ripple counter, up-down counter, Johnson and ring counter. Analysis and Design of Sequential Circuits.

Unit-IV

Semiconductor memories: Organization and construction of RAM, SRAM, DRAM, RAMBUS ROM, PROM, EPROM, EEPROM, PAL and PLAs etc

Unit-V

Logic families: RTL, DTL, TTL, ECL, IIL, PMOS, NMOS and CMOS logic etc. Interfacing between TTL and MOS, vice-versa.

References:

1. M. Mano : Digital Logic and Computer Design, Pearson Education

2. W.H. Gothman : Digital Electronics, PHI.

3. Millman and Taub : Pulse, Digital and Switching Waveforms, MGH

4. Salivahanan and Ari Vahagan : Digital Circuits and Design, Vikas Publishing House

5. Leach and Malvino : Digital Principles and Applications, TMH

6. Rajkamal : Digital Systems – Priciples and Design, Pearson Education

List of Experiments (Expandable):

All experiments (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/drafted on paper.

Step 2: The designed/drafted circuit should be simulated using simulation Software (TINAPRO/ PSPICE/ LABVIEW/ CIRCUIT MAKER).

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: The bread board circuit should be fabricated on PCB by one batch using PCB machine.

1. To test and study of operation of all logic Gates for various IC's.

2. Implementation of AND, OR, NOT, NOR, X-OR and X-NOR Gates by NAND and NOR Universal gates.

3. Binary Addition by Half Adder and Full Adder circuit.

4. Binary Subtraction by Half Subtractor and Full Subtractor circuit.

5. Design a BCD to excess-3 code converter.

6. Verification of the Demorgan's Theorem.

7. Study of RS, JK, T & D flip-flops.

8. Multiplexer/Demultiplexer based boolean function realization.

9. Study and Application of 555 timer (Astable, Monostable, Schmitt trigger, VCO).

EC-404-New (Linear Integrated Circuits and its Applications)

UNIT-I:

Introduction to Operational Amplifiers and Characteristics Introduction, Block diagram, characteristics and equivalent circuits of an ideal op-amp, various types of Operational Amplifiers and their applications, Power supply configurations for OPAMP applications, inverting and non-inverting amplifier configurations.

UNIT-II:

The Practical op-amp Introduction, Input offset voltage, offset current, thermal drift, Effect of variation in power supply voltage, common-mode rejection ratio, Slew rate and its Effect, PSRR and gain –bandwidth product, frequency limitations and compensations, transient response, interpretation of TL082 datasheet.

UNIT-III:

Amplifiers and Oscillators Summing amplifier, Integrators and differentiators, Instrumentation amplifier, Differential input and differential output amplifier, Voltage-series feedback amplifier, Voltage-shunt feedback amplifier, Log/ Antilog amplifier, isolation amplifiers, Triangular/rectangular wave generator, phase-shift oscillators, Wein bridge oscillator, analog multiplier-MPY634, VCO.

UNIT-IV:

Active Filters Characteristics of filters, Classification of filters, Magnitude and frequency response, Butterworth 1st and 2nd order Low pass, High pass and band pass filters, Chebyshev filter characteristics, Band reject filters, notch filter, All pass filters, self-tuned filters .

UNIT-V:

Comparators and Converters: Comparator, Zero Crossing Detector, Monostable and Astable Multivibrator ,Schmitt Trigger, Voltage limiters, Clipper and clampers, Absolute value output circuit, Peak detector, Sample and hold Circuit, Precision rectifiers, Voltage-to-current converter, Current-to-voltage converter.

UNIT-VI:

Advanced applications Applications as Frequency Divider, PLL, AGC,AVC using op-AMP and analog multipliers, Amplitude modulation using analog multiplier, Frequency Shift Keying, simple OP-AMP Voltage regulator, Fixed and Adjustable Voltage Regulators, Dual Power supply, Basic Switching Regulator and characteristics of standard regulator ICs – TPS40200, TPS40210.

List of Experiments

Tools Required –Function Generator, TL082, MPY634/ASLK Pro, Power Supply, Oscilloscopes, Connecting wires.

1. Study the characteristics of negative feedback amplifier

2. Design of an instrumentation amplifier.

3. Study the characteristics of regenerative feedback system with extension to design an astable multivibrator.

4. Study the characteristics of integrator circuit.

5. Design of Analog filters – I.

6. Design of Analog filters – II. Grading System 2015-16

7. Design of a self-tuned Filter.

8. Design of a function generator.

9. Design of a Voltage Controlled Oscillator.

10. Design of a Phase Locked Loop (PLL).

11. Automatic Gain Control (AGC) Automatic Volume Control (AVC).

12. Design of a low drop out regulator.

13. DC-DC Converter.

TEXT Books:

1. D. Roy Chowdhury, " Linear Integrated Circuits", New Age International (P) Ltd, 2nd Edition, 2003.

2. K. Lal Kishore, " Operational Amplifiers and Linear Integrated Circuits", Pearson Education, 2007.

REFERENCES :

1. Ramakanth A. Gayakwad, "Op-Amps & Linear ICS", PHI, 4th edition, 1987.

2. R.F. Coughlin & Fredrick Driscoll, "Operational Amplifiers & Linear Integrated Circuits" , 6th Edition, PHI

3. David A. Bell, "Operational Amplifiers & Linear ICs", Oxford University Press, 2nd edition, 2010.

4. Sergio Franco, "Design with Operational Amplifiers & Analog Integrated Circuits" Mcgraw Hill, 1988.

5. C.G. Clayton , "Operational Amplifiers " , Butterworth & Company Publ. Ltd./Elsevier, 1971.

EC - 405 Analog Communication

Unit-I

Different types of Signals (Continuous, Discrete, Periodic), Time Domain and Frequency Domain Representation, Introduction to basic Transform Techniques applicable to these Signals. Spectral Analysis: Fourier Technique, Fourier Transform and their Properties, Transform of Gate Signal, Impulse Function and Unit Step Function, Fourier Transform Technique for Periodic Signal, Transform of Train of Pulses and Impulses, Sine and Cosine wave. Signal Energy and Power, Spectral Density of various types of signals, Spectra (Parseval's Theorem), Density Spectra of Periodic Gate and Impulse train. Linear Time Invariant (LTI) Systems, Impulse Response, Convolution, Convolution with Impulse Function, Casual and Non Causal System, Distortion less System, Impulse Response of Distortion less System, Ideal Filter and Practical Filter.

Unit-II

Modulation Techniques: Need and types of modulation techniques, Amplitude Modulation, Frequency Spectrum, Power Distribution, Modulation by Complex Signal, Low Level and High Level AM Modulators, Linear Integrated Circuit AM Modulators, Suppressed Carrier Generation (Balance/Chopper and Square Law Modulation), SSB Generator (Phase and Frequency Discrimination Method), VSB Transmission and Application. Detection of AM signals: Envelope Detector Circuit, RC Time Constant, Synchronous Detection Technique, Error in Synchronous Detection, SSB signal detection, PLL and its use in demodulation.

Unit-III

Angle Modulation: Frequency and Phase Modulation Frequency spectrum, bandwidth requirement, Frequency and Phase Deviation, Modulation Index, NBFM and WBFM, Multiple frequencies FM. FM Modulators: Direct (Parameter Variation Method) and Indirect (Armstrong) Method of frequency modulation. FM Detector: Slope Detector, Foster Seely Discriminator, Ratio Detector and PLL detectors.

Unit-IV

Radio Transmitters: AM transmitter, block diagram and working of Low Level and High Level Transmitters, Trapezoidal Pattern and Carrier Shift, SSB Transmitters, FM transmitters - Frequency Multiplication Applied to FM Signals, FM transmitters. Radio Receivers: Block Diagram of Radio Receiver, Receiver Characteristics (Selectivity, Fidelity and Sensitivity), AM Receiver, RF Receiver, Super-heterodyne Receiver, RF Amplifier, Frequency Mixer, AVC and AFC, Image Signal, Intermediate Frequency Selection, Diversity Reception, FM Receiver.

Unit-V

Noise : Sources and types of noise and their power density, White Noise, Noise from Single and Multiple noise source for Linear Systems, Super Position of Power Spectrum, Equivalent Noise Bandwidth, Noise Figure, and Equivalent Noise Temperature, their Relationship, Calculation of Noise Figure and Noise Temperature for Cascade Systems, Noise Performance of Communication System, Band Pass Noise Representation in Terms of Low Pass, In-phase and Quadrature Phase Component and their Power

Spectral Density, Figure of Merit, Calculation for AM, AM-SC and SSB System, Noise in Angle Modulated System, Figure of Merit for FM, Noise Density of Output of FM Detector, Pre-Emphasis and De-Emphasis, Phasor Representation of Noise, Capture Effect, Comparison of Noise Performance of AM and FM.

References:

1. B.P. Lathi : Modern Analog and Digital Communication System, Wiley Eastern limited

2. Taub and Schilling : Principles of communication Systems, TMH

3. Singh and Sapre : Communication Systems, TMH

4. S Haykin : Communication Systems, John Wiley and Sons Inc

5. S Ghose: Signals and Systems, Pearson Education.

6. A Bruce Carlson : Communication System, TMH

7. Steven : Communication Systems – Analysis and Design, Pearson Education

List of Experiments (Expandable):

All experiments (wherever applicable) should be performed through the following steps.

Step 1: Circuit should be designed/drafted on paper.

Step 2:The designed/drafted circuit should be simulated using simulation Software (TINAPRO/ PSPICE/ LABVIEW/ CIRCUIT MAKER).

Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.

Step 4: The bread board circuit should be fabricated on PCB by one batch using PCB machine.

1. Analysis of AM Modulation and Demodulation Techniques (Transmitter and Receiver), Calculation of Parameters

2. Analysis of FM Modulation and Demodulation (Transmitter and Receiver) and Calculation of Parameters

3. To Construct and Verify Pre-emphasis and De-emphasis and Plot the Waveforms.

4. Study of Super-heterodyne Receiver and Characteristics of Radio Receiver.

5. To Construct Frequency Multiplier Circuit and to Observe the Waveform

6. Study of AVC and AFC.

EC – 406 Software Lab-II

ADVANCED SIMULATION/ VERIFICATION SOFTWARE

Study of simulation/ verification software (any one- LAB-VIEW/KTECHLAB/ GNU CIRCUIT ANALYSIS PACKAGE/ LOGISIM/ MULTISIM/ SCILAB etc). Overview and Study of the key features and applications of the software. Application of the software in the field of Electronic Circuits, Digital Electronics and Analog Communication. Design, Optimization, simulation and verification of

1. Electronic circuits (example amplifiers, oscillators etc).

2. Realization and verification of various digital electronic circuits (example logic gates, adders, subtractors etc)

3. Realization of various signals and communication link etc.

Students should simulate and verify atleast six circuits they are learning in the curren

Institute Of Engineering, Jiwaji University , Gwalior

B.E. V Sem . (Electronics Engineering)

Scheme (w.e.f.2018-2022 batch)

Subject wise distribution of marks and corresponding credits

S.NO.	Subject Code	Subject Name & Title	Theory Slot			Practical Slot			Total Marks	Credit alloted Subjectwise			Total Credits
										Period per week			
			End Sem	Mid Sem	Total -1	Sessional	Practical	Total-II	T1+T2	L	T	P	C
1	EC-501	Voice & Data Communication	80	20	100	_	_	_	100	3	1	_	4
2	EC-502	Control System	80	20	100	_	_	_	100	3	1	_	4
3	EC-503	Digital Communication	80	20	100	50	50	100	200	3	1	2	6
4	EC-504	Microprocessors & Microcontrollers	80	20	100	50	50	100	200	3	1	2	6
5	EC-505	Communication Network and Transmission Lines	80	20	100	50	50	100	200	3	1	2	6
6	EC-506	Software LabIII				50	50	100	100	0	0	2	2
7	EC-507	Self Study (internal Assesment)				50	_	50	50	0	2	0	2
8	EC-508	Seminar / Group Discussion (Internal Assesment)				50	_	50	50	0	2	0	2
		Total	400	100	500	300	200	500	1000	15	9	8	32

L: Lecture - T: Tutorial - P: Practical

EC-501 Voice and Data Communication

Unit I

Telephone instruments and signals Introduction, the subscriber loop, standard telephone set, basic call procedure, call progress tones and signals, cordless telephones, caller identification, electronic telephones. Telephone circuit Introduction, the local subscriber loop, channel noise and units of power measurements, transmission parameters, voice frequency circuit arrangements, crosstalk.

Unit II

Public telephone network Introduction, transmission system environment, public telephone network, instruments, local loops, trunk circuits, - local central and operator-assisted exchanges, automated central office switches and exchanges, telephone numbering plan, telephone services, telephone switching hierarchy, common channel signaling system. Multiplexing of telephone channels Introduction, time division multiplexing, T1 digital carrier, digital hierarchy, digital carrier line encoding, T carrier systems, digital carrier frame synchronization, bit versus word interleaving, statistical TDM, codecs and combo chips, frequency division multiplexing, FDM hierarchy, composite baseband signal, formation of master group, wavelength division multiplexing.

Unit III

Multiplexing of telephone channels Introduction, time division multiplexing, T1 digital carrier, digital hierarchy, digital carrier line encoding, T carrier systems, digital carrier frame synchronization, bit versus word interleaving, statistical TDM, codecs and combo chips, frequency division multiplexing, FDM hierarchy, composite baseband signal, formation of mastergroup, wavelength division multiplexing.

Unit IV

Data Communications Components, protocols and standards, standards organizations, line configuration, topology, transmission mode, digital signals, digital to digital encoding, digital data transmission, DTE-DCE interface, interface standards, modems, cable modem, transmission media- guided and unguided, transmission impairment, performance, wavelength and Shannon capacity.

Unit V

Error detection and correction Types of error, error detection- redundancy check (longitudinal, vertical and cyclic), checksum, error correction-hamming code. Switching Circuit switching (space-division, time division and space-time division), packet switching (virtual circuit and datagram approach), message switching.

References:

1. Tomasi: Advanced Electronic Communication Systems, PHI Learning.

2. Forouzan: Data Communications and Networking, TMH.

3. Tomasi: Introduction to Data Communication Systems, Pearson Education.

4. William Stallings: Data and Computer Communications, Pearson Education

5. Brijendra Singh: Data Communications and Networks, PHI Learning.

EC- 502 Control Systems

Unit-I

Control system Terminology and classification of control system, examples of control system, mathematical modeling of mechanical and electrical systems, differential equations, block diagram representation and reduction, signal flow graph techniques. Feedback characteristics of control systems Feedback and non-feedback systems, reduction of parameter variations by use of feedback, control over system dynamics and effects of disturbances by the use of feedback, linearization effect of feedback, regenerative feedback.

Unit-II

Time response analysis Standard test signals, time response of 1st order system, time response of 2nd order system, steady-state errors and error constants, effects of additions of poles and zeros to open loop and closed loop system. Time domain stability analysis Concept of stability of linear systems, effects of location of poles on stability, necessary conditions for stability, Routh-Hurwitz stability criteria, relative stability analysis, Root Locus concept, guidelines for sketching Root-Locus.

Unit-III

Frequency response analysis Correlation between time and frequency response, Polar plots, Bode Plots, all-pass and minimum-phase systems, log-magnitude versus Phase-Plots.. Frequency domain stability analysis Nyquist stability criterion, assessment of relative stability using Nyquist Criterion (phase margin, gain margin and stability), closed-loop frequency response.

Unit-IV

Approaches to system design Design problem, types of compensation, design of phase-lag, phase lead and phase lead-lag compensators in time and frequency domain, proportional, derivative, integral and PID compensation. Digital control systems System with digital controller, difference equations, the z-transform, pulse transfer function, inverse ztransform, the s and z domain relationship.

Unit-V

Concept of state, state variables and state model, State space representation of systems, block diagram for state equation, transfer function decomposition, solution of state equation, transfer matrix, relationship between state equation and transfer function, controllability and observability.

References:

1. Nagrath and Gopal: Control System Engineering, New Age International Publishers.

2. Kuo: Automatic Control Systems, PHI Learning.

3. Varmah: Control Systems, TMH.

4. Distefano (Schaum series): Control Systems, TMH

5. Manke: Linear Control System, Khanna Publishers.

6. Stefani, Shahian: Design of feedback control systems, Oxford University Press.

7. Ogata: Modern Control Engineering, PHI Learning.

EC- 503 Digital Communications

Unit-I

Random variables Cumulative distribution function, Probability density function, Mean, Variance and standard deviations of random variable, Gaussian distribution, Error function, Correlation and autocorrelation, Central-limit theorem, Error probability, Power Spectral density of digital data.

Unit-II

Digital conversion of Analog Signals Sampling theorem, sampling of band pass signals, Pulse Amplitude Modulation (PAM), types of sampling (natural, flat-top), equalization, signal reconstruction and reconstruction filters, aliasing and anti-aliasing filter, Pulse Width Modulation (PWM), Pulse Position Modulation (PPM). Digital transmission of Analog Signals Quantization, quantization error, Pulse Code Modulation (PCM), companding, scrambling, TDM-PCM, Differential PCM, Delta modulation, Adaptive Delta modulation, vocoders.

Unit-III

Digital Transmission Techniques Phase shift Keying (PSK)- Binary PSK, differential PSK, differentially encoded PSK, Quadrature PSK, M-ary PSK.Frquency Shift Keying (FSK)- Binary FSK (orthogonal and non-orthogonal), M-ary FSK. Comparison of BPSK and BFSK, Quadrature Amplitude Shift Keying (QASK), Minimum Shift Keying (MSK).

Unit-IV

Other Digital Techniques Pulse shaping to reduce inter channel and inter symbol interference- Duobinary encoding, Nyquist criterion and partial response signaling, Quadrature Partial Response (QPR) encoder decoder. Regenerative Repeater- eye pattern, equalizers. Optimum Reception of Digital Signals Baseband signal receiver, probability of error, maximum likelihood detector, Bayes theorem, optimum receiver for both baseband and passband receiver- matched filter and correlator, probability of error calculation for BPSK and BFSK.

Unit-V

Information Theory Source Coding: Introduction to information theory, uncertainty and information, average mutual information and entropy, source coding theorem, Huffman coding, Shannon-Fano-Elias coding, Channel Coding: Introduction, channel models, channel capacity, channel coding, information capacity theorem, Shannon limit.

References:

1. Taub and Schilling: Principles of Communication Systems, TMH.

2. Lathi: Modern Digital and Analog Communication Systems, Oxford University Press.

3. Simon Haykins: Communication Systems, John Wiley.

4. Ranjan Bose: Information Theory, Coding and Cryptography, TMH.

5. Das, Mallik, Chatterjee: Principles of Digital Communication, New Age International

6. Skylar and Ray: Digital Communications, Pearson Education.

7. Rao: Digital Communications, TMH.

List of Experiments:

1. Study of Sampling Process and Signal Reconstruction and Aliasing.

2. Study of PAM, PPM and PDM.

3. Study of PCM Transmitter and Receiver.

4. Time Division Multiplexing (TDM) and Demultiplexing.

5. Study of ASK, PSK and FSK Transmitter and Receiver.

EC- 504 Microprocessors and Microcontrollers

Unit I

Architecture of 8086 Microprocessor BIU and EU, register organization, pin diagram, memory organization, clock generator 8284, buffers and latches, 8288 bus controller, maximum and minimum modes.

Unit II

Assembly Language Programming of 8086 Instruction formats, addressing modes, instruction set, assembly language programming, ALP tools- editor, assembler, linker, locator, debugger, emulator. 8086 based multiprocessor systems Interconnection topologies, coprocessors 8087 NDP, I/O processors 8089 IOP, bus arbitration and control, lightly and tightly coupled systems.

Unit III

Peripheral devices and their interfacing Memory interfacing, Programmable input/output ports 8255, Programmable interval timer 8253, keyboard/ display controller 8279, CRT controller 8275, Programmable communication interface 8251 USART.

Unit IV

Interrupts of 8086 Interrupts and interrupt service routine, interrupt cycle, maskable and non-maskable interrupts, interrupt programming. Programmable interrupt controller 8259. DMA in 8086 Basic DMA operation, modes of DMA transfer, DMA controller 8257.

Unit V

8051 Microcontroller Features, architecture, Pin Diagram, memory organization, external memory interfacing, instruction syntax, data types, subroutines, addressing Modes, instruction set, ALP of 8051. Applications of 8051.

References:

1. Ray and Bhurchandi: Advanced microprocessors and peripherals, TMH.

2. Brey: The Intel Microprocessors, Architecture, Programming and Interfacing, Pearson Education.

3. Senthil Kumar: Microprocessors and interfacing, Oxford University press.

4. Bahadure: Microprocessors 8086 and Pentium family, PHI Learning.

5. Udayashankara and Mallikarjunaswamy: 8051 Microcontroller, TMH.

6. Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education

7. D. V. Hall: Microprocessors and Interfacing, TMH.

List of Experiments:

1. Assembly Language Programs of Microprocessor 8086.
2. Assembly Language Programs of Microcontroller 8051.
3. Assembly Language Programs for Interfacing Chips.

EC– 505 Communication Networks and Transmission Lines

Unit I

Characteristic Parameters of symmetrical and asymmetrical two port networks and their design Image impedance, iterative impedance, characteristic impedance, propagation coefficient, image transfer coefficient , iterative transfer coefficient, Lattice and Bridged T networks, reactive matching networks, matching techniques, insertion loss, symmetrical and asymmetrical attenuators and their design.

Unit II

Passive LC Filters Analysis and design of Low pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, Filter specifications, Butterworth approximation, Chebyshev approximation, elliptic function approximation, frequency transformation.

Unit III

Positive real function LC, RL, RC, and RLC network synthesis, Foster and Cauer network, minimum positive real function, Brune's method, Bott-Duffin method, Synthesis-Coefficient.

Unit IV

Transmission line fundamentals Lumped parameter equivalent, voltage and current on a transmission line, infinite line, characteristic impedance and propagation constant, waveform distortion, attenuation and phase equalizers, distortion-less line, loading, liner reflection on a line, reflection coefficient, input and transfer impedances, open circuit and short circuit line, reflection factors, reflection loss, insertion loss, T and π equivalents of a line, location of line fault, construction and design of two wire line and coaxial cable.

Unit V

Line at radio frequencies Parameters of line and coaxial cable at radio frequencies, dissipation-less line, voltage and current on a dissipation-less line, standing waves, standing wave ratio, input impedance of open circuit and short circuit, power and impedance measurement on lines, eighth-wave, quarter-wave and half wave line, circle diagram, Smith chart, solution of problems using Smith chart, single and double stub matching .introduction to microstrip lines and its analysis.

References:

1. Ryder: Networks and Transmission Lines, PHI Learning.

2. Valkenberg: Introduction to Modern Network synthesis, Wiley India.

3. Suresh: Electric Circuits and Networks, Pearson Education.

4. Raju: Electromagnetic field theory and Transmission Lines, Pearson Education.

5. Ganesan: Transmission Lines and Waveguides, TMH.

6. Rao: Electromagnetic Waves and Transmission Lines, PHI learning.

List of Experiments:

1. To set up the standing waves formation on a transmission line and observe their maxima and minima using frequency domain method.

2. To measure the characteristic impedance of transmission lines using frequency domain method and to differentiate between the matched and unmatched lines.

3. To measure the VSWR, reflection coefficient and return loss in a transmission line.

4. To measure the dielectric constant of insulator in the transmission line.

5. To measure the velocity of propagation and wavelength in the given transmission line.

6. To study the attenuation characteristics of signal along a transmission line and observe its variation with frequency. Also calculate the phase constant and propagation constant.

7. To study the effect of reactive loads on transmission lines.

8. To study the difference between lossy and loss less line.

9. To study the physical dimensions of transmission line and estimation of characteristic impedance.

10. To study behavior of infinite and short lines.

11. To study the operation of Balun transformer.

12. To study the loading of transmission lines and estimate the cut off frequency of a loaded line.

13. To study the use of coaxial lines as tuned circuits and delay lines.

14. To study the input and output impedance of any RF circuits and match it to 50/75 ohms.

15. Simulation of various filters

EC– 506 Software Lab-III Study of simulation software (any one Scilab/ MatLab etc.)

Introduction to Scilab / Matab, Study of Scilab / Matlab programming environment, Modeling, Design and development of Programs. Overview and Study of the key features and applications of the software. Application of the software in the field of Control Systems, Data Communications and Communication Systems. 1. Programs Related to Control System- open-loop and closed loop control system, frequency response plots, determining transient response, specifications of second order system, effect of PID controller on control system, Bode plot, Nyquist plot and Root Locus plot, state space analysis. 2. Programs Related to Communication Systems--Simulation of a Communication System (Generation, addition of noise and Detection), AM, FM, PM, PAM, PCM, PSK, FSK etc. 3. Programs related to Data Communications- simulations of CRC, LRC, VRC, hamming codes, line encoding techniques.

References:

1. Rudra Pratap: Getting Started with MATLAB, Oxford University Press.

2. http://www.scilab.in 3. http://ekalavya.it.iitb.ac.in/contents.do?topic=Scilab

4. Vinu V. Das: Programming in Scilab, New Age Publisher.

5. Chapman Stephen J.: MATLAB Programming for Engineers, Thomson Cengage

6. Proakis: Contemporary Communication System Using MATLAB; Thomson Cengage.

7. Kuo: Automatic Control Systems, PHI Learning. 8. Singh and Chaudhari: Matlab Programming, PHI Learning

Institute Of Engineering, Jiwaji University , Gwalior

B.E. VI Sem . (Electronics Engineering)

Scheme (w.e.f.2018-2022 batch)

Subject wise distribution of marks and corresponding credits

S.NO.	Subject Code	Subject Name & Title	Theory Slot			Practical Slot			Total Marks	Credit alloted Subjectwise Period per week			Total Credits
			End Sem	Mid Sem	Total -1	Sessional	Practical	Total-II	T1+T2	L	T	P	C
1	EC-601	Industrial Electronics	80	20	100	_	_	_	100	3	1	_	4
2	EC-602	Cellular Mobile Communication	80	20	100	_	_	_	100	3	1	_	4
3	EC-603	Digital Signal Processing	80	20	100	50	50	100	200	3	1	2	6
4	EC-604	Antenna & Wave Propagation	80	20	100	50	50	100	200	3	1	2	6
5	EC-605	VLSI Circuits & System	80	20	100	50	50	100	200	3	1	2	6
6	EC-606	Software Lab-IV	_	_	_	50	50	100	100	0	0	2	2
7	EC-607	Self Study (internal Assesment)	_	_	_	50	_	50	50	0	2	0	2
8	EC-608	Seminar / Group Discussion (Internal Assesment)	_	_	_	50	_	50	50	0	2	0	2
		Total	**400**	**100**	**500**	**300**	**200**	**500**	**1000**	**15**	**9**	**8**	**32**

L: Lecture - **T: Tutorial -** **P: Practical**

EC – 601 Industrial Electronics

Unit-I

Power Supplies Power supply, rectifiers (half wave, full wave), performance parameters of power supplies, filters (capacitor, inductor, inductor-capacitor, pi filter), bleeder resistor, voltage multipliers . Regulated power supplies (series and shunt voltage regulators, fixed and adjustable voltage regulators, current regulator), switched regulator (SMPS), comparison of linear and switched power supply, switch mode converter (flyback, buck, boost, buk-boost, cuk converters).

Unit-II

Thyristors Silicon controlled rectifies (SCR), constructional features, principle of operation, SCR terminology, turn-on methods, turn-off methods, triggereing methods of SCR circuits, types of commutation, comparison of thyristors and transistors, thermal characteristics of SCR, causes of damage to SCR, SCR overvoltage protection circuit, seies and parrel operation of sCRs, Line commutated converters (half wave rectifier with inductive and resistive load, single phase and three phase full wave rectifiers).

Unit-III

Other members of SCR family Triacs, Diacs, Quadracs, recovery characteristics, fast recovery diodes, power diodes, power transistor, power MOSFET, Insulated gate bipolar transistor (IGBT), loss of power in semiconductor devices, comparison between power MOSFET, power transistor and power IGBT.

Unit-IV

Applications of OP-AMP Basics of OP-AMP, relaxation oscillator, window comparator, Op-comp as rectangular to triangular pulse converter and vice- versa, Wien bridge oscillator, function generator, frequency response of OP-AMP, simplified circuit diagram of OP-AMP, power supplies using OP-AMP, filters (low-pass, high pass) using OP-AMP.

Unit-V

Programmable Logic Controller (PLC) Functions, applications, advantages and disadvantages of PLC over conventional relay controllers, comparison of PLC with process control computer system, factors to be considered in selecting PLC, functional block diagram of PLC, microprocessor in PLC, memory, input and output modules (interface cards), sequence of operations in a PLC, status of PLC, event driven device, ladder logic language, simple process control applications of PLC, Programming examples.

References:

1. Bishwanath Paul: Industrial Electronics and control, PHI Learning.

2. Rashid: Power Electronics- Circuits, devices and applications, Pearson Education.

3. Singh and Khanchandani: Power Electronics, TMH

4. Bhimbra: Power Electronics, Khanna Publishers.

5. Moorthi: Power Electronics, Oxford University Press.

6. Webb: Programmable Logic Controllers- Principles and Applications, PHI Learning.

7. Petruzulla: Programmable Logic Controllers, TMH.

EC-602 Cellular Mobile Communications

Unit-I

Introduction to cellular mobile system A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning of cellular system. Elements of cellular radio system design General description of problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I in an omni-directional antenna system, hand off mechanism, cell splitting, components of cellular systems.

Unit-II

Cell coverage for signal and traffic General introduction, mobile point-to-point model, propagation over water or flat open area, foliage loss, propagation in near- in distance, long distance propagation, path loss from point-to-point prediction model, cell site antenna heights and signal coverage cells, mobile-to-mobile propagation. Cell site antennas and mobile antennas Equivalent circuits of antennas, gain and pattern relationship, sum and difference patterns, antennas at cell site, unique situations of cell site antennas, mobile antennas.

Unit-III

Cochannel interference reduction Cochannel interference, real time cochannel interference measurement at mobile radio transceivers, design of antenna systems - omni directional and directional, lowering the antenna height, reduction of cochannel interference, umbrella- pattern effect, diversity receiver, designing a system to serve a predefined area that experiences cochannel interference. Types of Noncochannel interference Adjacent channel interference, near-end-far-end interference, effect on near-end mobile units, cross-talk, effects of coverage and interference by applying power decrease, antenna height decrease, beam tilting, effects of cell site components, interference between systems, UHF TV interference, long distance interference.

Unit-IV

Frequency management and Channel Assignment Frequency management, frequency spectrum utilization, setup channels, channel assignment, fixed channel assignment, non-fixed channel assignment algorithms, additional spectrum, traffic and channel assignment, perception of call blocking from the subscribers Handoffs and dropped calls Value of implementing handoffs, initiation of handoff, delaying a handoff, forced handoff, queuing of handoff, power- difference handoff, mobile assisted handoff and soft handoff, cell-site handoff and intersystem handoff, dropped call rate formula.

Unit-V

Digital Cellular Systems GSM- architecture, layer modeling, transmission, GSM channels and channel modes, multiple access scheme. CDMA- terms of CDMA systems, output power limits and control, modulation characteristics, call processing, hand off procedures. Miscellaneous mobile systems- TDD systems, cordless phone, PDC, PCN, PCS, non cellular systems.

References:

1. Lee: Cellular and Mobile Telecommunication- Analog & digital systems, TMH.

2. Rappaport: Wireless Communications- principles and practice, Pearson Education.

3. Lee: Mobile communications design fundamentals, Wiley India.

4. Faher Kamilo: Wireless Digital Communication, PHI Learning.

5. Raj Kamal: Mobile Computing, Oxford University Press.

EC – 603 Digital Signal Processing

Unit – I

Discrete-Time Signals and Systems Discrete-time signals, discrete-time systems, analysis of discrete-time linear time-invariant systems, discrete time systems described by difference equation, solution of difference equation, implementation of discrete-time systems, stability and causality, frequency domain representation of discrete time signals and systems.

Unit - II

The z-Transform The direct z-transform, properties of the z-transform, rational z-transforms, inversion of the z transform, analysis of linear time-invariant systems in the z- domain, block diagrams and signal flow graph representation of digital network, matrix representation.

Unit - III

Frequency Analysis of Discrete Time Signals Discrete fourier series (DFS), properties of the DFS, discrete Fourier transform (DFT), properties of DFT, two dimensional DFT, circular convolution.

Unit - IV

Efficient Computation of the DFT FFT algorithms, decimation in time algorithm, decimation in frequency algorithm, decomposition for 'N' composite number.

Unit – V

Digital filters Design Techniques Design of IIR and FIR digital filters, Impulse invariant and bilinear transformation, windowing techniquesrectangular and other windows, examples of FIR filters, design using windowing.

References:

1. Oppenheim and Schafer: Digital Signal Processing, PHI Learning.

2. Johnny R. Johnson: Introduction to Digital Signal Processing, PHI Learning.

3. Proakis: Digital Signal Processing, Pearson Education.

4. Rabiner and Gold: Theory and Application of Digital Signal Processing, PHI Learning.

5. Ingle and Proakis: Digital Signal Processing- A MATLAB based Approach, Thompson, Cengage Learning.

List of Experiments:

1. Generation, analysis and plots of discrete-time signals.

2. Implementation of operations on sequences (addition, multiplication, scaling, shifting, folding etc).

3. Implementation of Linear time-invariant (LTI) systems and testing them for stability and causality.

4. Computation and plot of DTFT of sequences, verification of properties of DTFT.

5. Computation and plots of z-transforms, verification of properties of z-transforms.

6. Computation and plot of DFT of sequences, verification of properties of DFT.

7. Computation and plots of linear/circular convolution of two sequences.

8. Computation of radix-2 FFT- Decimation in time and Decimation in frequency.

9. Implementation of IIR and FIR filter structures (direct, cascade, parallel etc).

10. Implementation of various window design techniques (Rectangular, Bartlett, Hann, Hamming etc).

EC – 604 Antennas and Wave Propagation

Unit I

Radiation Potential function and the Electro magnetic field, potential functions for Sinusoidal Oscillations, retarded potential, the Alternating current element (or oscillating Electric Dipole), Power radiated by a current element, Application to short antennas, Assumed current distribution, Radiation from a Quarter wavemonopole or Half wave dipole, sine and cosine integral, Electromagnetic field close to an antenna, Solution of the potential equations, Far-field Approximation.

Unit II

Antenna Fundamentals Introduction, network theorems, directional properties of dipole antennas, travelling –wave antennas and effect of feed on standing-wave antennas, two –element array, horizontal patterns in broad-cast arrays, linear arrays, multiplication of patterns ,effect of earth on vertical patterns, Binomial array, antenna gain, effective area.

Unit III

Types of antennas Babinet's principles and complementary antenna, horn antenna, parabolic reflector antenna, slot antenna, log periodic antenna, loop antenna, helical antenna, biconical antenna, folded dipole antenna, Yagi-Uda antenna, lens antenna, turnstile antenna. Long wire antenna: resonant and travelling wave antennas for different wave lengths, V-antenna, rhombic antenna, beverage antenna, microstrip antenna.

Unit IV

Antenna array synthesis Introduction, retarded potentials, array structures, weighting functions, linear array analysis, different forms of linear arrays, Schelknoff unit circle, linear array synthesis, sum and difference patterns, DolphChebychev synthesis of sum pattern, Taylor synthesis of sum patterns, Bayliss synthesis of difference patterns, planar arrays, arrays with rectangular boundary.

Unit V

Propagation of radio waves Fundamentals of electromagnetic waves, effects of the environment, modes of propagation. Ground wave propagation- Introduction, plane earth reflection, space wave and surface wave, transition between surface and space wave, tilt of wave front due to ground losses. Space wave propagation- Introduction, field strength relation, effects of imperfect earth, curvature of earth and interference zone, shadowing effect of hills and buildings, absorption by atmospheric phenomena, variation of field strength with height, super refraction, scattering, tropospheric propagation, fading, path loss calculations. Sky wave propagation- Introduction, structural details of the ionosphere, wave propagation mechanism, refraction and reflection of sky waves by ionosphere, ray path, critical frequency, MUF, LUF, OF, virtual height, skip distance, relation between MUF and skip distance.

References:

1. Jordan and Balmain: Electromagnetic Waves and Radiating System, PHI Learning.

2. Krauss: Antennas and wave propagation, TMH.

3. Balanis: Antenna Theory Analysis and Design, Wiley India Pvt. Ltd.

4. Harish and Sachidananda: Antennas and wave propagation, Oxford University Press.

5. Raju: Antennas and Wave Propagation, Pearson Education.

6. Kennedy: Electronic Communication Systems, TMH.

List of Experiments:

1. To Plot the Radiation Pattern of an Omni Directional Antenna.
2. To Plot the Radiation Pattern of a Directional Antenna.
3. To Plot the Radiation Pattern of a Parabolic Reflector Antenna.
4. To Plot the Radiation Pattern of a Log Periodic Antenna.
5. To Plot the Radiation Pattern of a Patch Antenna.
6. To Plot the Radiation Pattern of a Dipole/ Folded Dipole Antenna.
7. To Plot the Radiation Pattern of a Yagi (3-EL/4EL) Antenna.
8. To Plot the Radiation Pattern of a Monopole/ WHIP/ Collinear Antenna.
9. To Plot the Radiation Pattern of a Broad site Antenna.
10. To Plot the Radiation Pattern of a Square Loop Antenna.

EC – 605 VLSI Circuits and Systems

Unit I

Introduction Introduction to CMOS VLSI circuit, VLSI design flow, Design strategies ,Hierarachy, regularity, modularity, locality, MOS Transistor as a Switches, CMOS Logic, Combinational circuit, latches and register, Introduction of CAD Tool , Design entry, synthesis, functional simulation.

Unit II

Specification of sequential systems Characterizing equation & definition of synchronous sequential machines. Realization of state diagram and state table from verbal description, Mealy and Moore model machines state table and transition diagram. Minimization of the state table of completely and incompletely specified sequential machines.

Unit III

Asynchronous Sequential Machine Introduction to asynchronous sequential machine, Fundamental mode and Pulse mode asynchronous sequential machine, Secondary state assignments in asynchronous sequential machine, races and hazards.

Unit IV

State Machine Algorithmic state machine and fundamental concept of hardware/ firmware algorithms. Controllers and data system designing.

Unit V

Fault Detection in combinational circuit Types of faults, Fault detection using Boolean Difference and path sensitization method. Concept of PROM, PLA, PAL, CPLD and FPGA, PALASM software applications.

Refrences:

1. Neil Weste: Principle of CMOS VLSI Design, TMH.

2. Kohavi: Switching & Finite Automata Theory, TMH.

3. Lee: Digital Circuits and Logic Design, PHI Learning..

4. Roth Jr.: Fundamentals of Logic Design, Jaico Publishing House.

5. Parag K. Lala: Fault Tolerant and Fault Testable Hardware Design, BS Publication.

EC – 606 Software Lab- IV

VHDL Hardware abstraction, Basic language elements: identifiers, data objects, data types, operators, behavioral modeling, data flow modeling, structural modeling, simulation and analysis. VERILOG Overview of digital design with Verilog, Hierarchical Modeling: basic concepts, models and ports, gate level modeling, data flow modeling, behavioral modeling, logic synthesis with Verilog HDL, simulation. Experiments: Design and simulation of following using Verilog/ VHDL . Logic gates: NAND, NOR, XOR, XNOR. Half adder, full adder, subtractor, latches, multiplexers- 2:1, 4:1, 8:1, comparators, decoders- 2:4, 3:8, 4:16. 4-bit ripple carry full adder,4-bit Ripple carry counter, parity generator, up/down counters.

References:

1. Samir palnitkar: Verilog HDL- A Guide to Digital Design and Synthesis, Pearson Education.

2. Bhasker: A Verilog HDL Primer –synthesis, Pearson Education

3. Pedroni: Circuit Design with VHDL, PHI Learning.

4. Perry: VHDL- Programming by example, TMH.

Institute Of Engineering, Jiwaji University , Gwalior

B.E. VII Sem . (Electronics Engineering)

Scheme (w.e.f.2018-2022 batch)

Subject wise distribution of marks and corresponding credits

S.NO.	Subject Code	Subject Name & Title	Theory Slot			Practical Slot			Total Marks	Credit alloted Period per week			Total Credits
			End Sem	Mid Sem	Total -1	Sessional	Practical	Total-II	T1+T2	L	T	P	C
1	EC-701	Elective-I	80	20	100	–	–	–	100	3	1	–	4
2	EC-702	Satellite Communication	80	20	100	–	–	–	100	3	1	–	4
3	EC-703	Optical Communication	80	20	100	50	50	100	200	3	1	2	6
4	EC-704	Microwave Engg.	80	20	100	50	50	100	200	3	1	2	6
5	EC-705	VLSI Design	80	20	100	50	50	100	200	3	1	2	6
6	EC-706	Minor Project & Seminar	–	–	–	50	50	100	100	0	2	2	4
7	EC-707	Industrial Training (45 Days)	–	–	–	50	50	100	100	0	0	2	2
		Total	**400**	**100**	**500**	**250**	**250**	**500**	**1000**	**15**	**7**	**10**	**32**

Elective-I

EC-7011 **Wireless Communication**

EC-7012 **Digital image Processing**

EC-7013 **Neural Networks**

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EC 701 Elective – I (EC – 7011 Wireless Communication)

Unit-I

Introduction Applications and requirements of wireless services: history, types of services, requirements for the services, economic and social aspects. Technical challenges in wireless communications: multipath propagation, spectrum limitations, limited energy, user mobility, noise and interference-limited systems. Propagation mechanism: free space loss, reflection and transmission, diffraction, scattering by rough surfaces, wave guiding.

Unit-II

Wireless Propagation channels Statistical description of the wireless channel: time invariant and variant two path models, small-scale fading with and without a dominant component, Doppler spectra, temporal dependence of fading, large scale fading. Wideband and directional channel characteristics: causes of delay dispersion, system theoretic description of wireless channels, WSSUS model, condensed parameters, ultra wideband channels, directional description.

Unit-III

Channel models: Narrowband, wideband and directional models, deterministic channel-modeling methods. Channel sounding: Introduction, time domain measurements, frequency domain analysis, modified measurement methods, directionally resolved measurements. Antennas: Introduction, antennas for mobile stations, antennas for base stations.

Unit-IV

Transceivers and signal processing: Structure of a wireless communication link: transceiver block structure, simplified models. Modulation formats, demodulator structure, error probability in AWGN channels, error probability in flat-fading channels, error probability in delay and frequency-dispersive fading channels.

Unit V

Diversity: Introduction, microdiversity, macrodiversity and simulcast, combination of signals, error probability in fading channels with diversity reception, transmit diversity. Equalizers: Introduction, linear equalizers, decision feedback equalizers, maximum likelihood sequence estimation (Viterbi detector), comparison of equalizer structures, fractional spaced equalizers, blind equalizers.

References:

1. Molisch: Wireless Communications, Wiley India.

2. Taub and Schilling: Principles of Communication Systems, TMH.

3. Haykin: Mordern Wireless Communication, Pearson Education.

4. Upena Dalal: Wireless Communication, Oxford University Press.

5. Rappaport: Wireless Communication, Pearson Education.

6. Price: Wireless Communication and Networks, TMH.

7. Palanivelu and Nakkereeran : Wireless and Mobile Communication, PHI Learning.

8. Chidambara Nathan: Wireless Communication, PHI Learning.

EC 701 Elective – I (EC – 7012 Digital Image Processing)

Unit-I

Digital Image Processing (DIP) Introduction, examples of fields that use DIP, fundamental steps in DIP, components of an image processing system. Digital Image Fundamentals: elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels.

Unit-II

Image Transforms Two-dimensional (2D) impulse and its shifting properties, 2D continuous Fourier Transform pair, 2D sampling and sampling theorem, 2D Discrete Fourier Transform (DFT), properties of 2D DFT. Other transforms and their properties: Cosine transform, Sine transform, Walsh transform, Hadamard transform, Haar transform, Slant transform, KL transform.

Unit-III

Image Enhancement Spatial domain methods: basic intensity transformation functions, fundamentals of spatial filtering, smoothing spatial filters (linear and non-linear), sharpening spatial filters (unsharp masking and high boost filters), combined spatial enhancement method. Frequency domain methods: basics of filtering in frequency domain, image smoothing filters (Butterworth and Gaussian low pass filters), image sharpening filters (Butterworth and Gaussian high pass filters), selective filtering.

Unit-IV

Image Restoration Image degradation/restoration, noise models, restoration by spatial filtering, noise reduction by frequency domain filtering, linear position invariant degradations, estimation of degradation function, inverse filtering, Wiener filtering, image reconstruction from projection.

Unit-V

Image Compression Fundamentals of data compression: basic compression methods: Huffman coding, Golomb coding, LZW coding, Run-Length coding, Symbol based coding. Digital image watermarking, representation and description- minimum perimeter polygons algorithm (MPP).

References:

1. Gonzalez and Woods: Digital Image Processing, Pearson Education.

2. Anil Jain: Fundamentals of Digital Image Processing, PHI Learning.

3. Annadurai: Fundamentals of Digital Image Processing, Pearson Education.

4. Sonka, Hlavac and Boyle: Digital Image Processing and Computer Vision, Cengage Learning.

5. Chanda and Majumder: Digital Image Processing and Analysis, PHI Learning.

EC 701 Elective – I (EC – 7013 Neural Networks)

Unit-I

Neural Network (NN) Introduction, benefits of neural network, models of a neuron, neural network as directed graph, network architectures, artificial intelligence and neural network. Learning processes: error correction learning, memory based learning, Hebbian learning, competitive learning, Boltzman learning, learning tasks, adaptation, statistical nature of learning process, statistical learning theory.

Unit-II

Perceptrons Single layer perceptrons: adaptive filtering problem, unconstrained optimization technique, linear least squares filter, least mean square algorithm (LMS), perceptron convergence theorem Multi layer perceptron: architecture, back propagation algorithm, generalization, approximations of functions, network pruning techniques.

Unit-III

Radial Basis Function (RBF) Networks Cover's theorem on the separability of patterns, interpolation problem, supervised learning as an Ill-posed hyper surface reconstruction problem, regularization theory, regularization network, generalized radial basis function networks (RBF), estimation of the regularization parameter, approximation properties of RBF networks, comparison of RBF networks and multilayer perceptrons, Kernel regression and its relation to RBF networks, learning strategies.

Unit-IV

Information- Theoretic Models Entropy, maximum entropy principle, mutual information, Kullback-Leibler divergence, mutual information as an objective function to be optimized, maximum mutual information principle, infomax and redundancy reduction, spatially coherent and incoherent features, independent components analysis, maximum likelihood estimation, maximum entropy method.

Unit V

Dynamically Driven Recurrent Networks introduction, recurrent network architectures, state space model, non-linear autogressive with exogenous inputs model, computational power of recurrent networks, learning algorithms, back propagation through time, real time recurrent learning, Kalman filter, decoupled Kalman filter, vanishing gradients in recurrent networks, system identification, model reference adaptive control.

References:

1. Haykin: Neural Networks- A Comprehensive Foundation, PHI Learning.

2. Sivanandam, Sumathi and Deepa: Introduction to Neural Networks using Matlab, TMH.

3. Freeman and Skapura: Fundamentals of Neural Networks- algorithms, applications and programming techniques, Pearson Education.

4. Hagan, Demuth and Beale: Neural Network Design, Cengage Learning.

5. Anderson: An introduction ro Neural Networks, PHI Learning.

6. Satish Kumar: Neural Networks, TMH.

EC-702 Satellite Communication

Unit-I

Overview of satellite systems: Introduction, Frequency allocations for satellite systems. Orbits and launching methods: Kepler's three laws of planetary motion, terms used for earth orbiting satellites, orbital elements, apogee and perigee heights, orbit perturbations, inclined orbits, local mean solar point and sun-synchronous orbits, standard time.

Unit-II

The Geostationary orbit: Introduction, antenna look angles, polar mount antenna, limits of visibility, near geostationary orbits, earth eclipse of satellite, sun transit outage, launching orbits. Polarization: antenna polarization, polarization of satellite signals, cross polarization discrimination. Depolarization: ionospheric, rain, ice.

Unit-III

The Space segment: introduction, power supply, attitude control, station keeping, thermal control, TT&C subsystem, transponders, antenna subsystem, Morelos and Satmex 5, Anik-satellites, Advanced Tiros-N spacecraft. The Earth segment: introduction, receive-only home TV systems, master antenna TV system, Community antenna TV system, transmit-receive earth station.

Unit-IV

The space link: Introduction, Equivalent isotropic radiated power (EIPR), transmission losses, the link power budget equation, system noise, carrier-to-noise ratio (C/N), the uplink, the downlink, effects of rain, combined uplink and downlink C/N ratio, inter modulation noise, inter-satellite links. Interference between satellite circuits.

Unit-V

Satellite services VSAT (very small aperture terminal) systems: overview, network architecture, access control protocols, basic techniques, VSAT earth station, calculation of link margins for a VSAT star network. Direct broadcast satellite (DBS) Television and radio: digital DBS TV, BDS TV system design and link budget, error control in digital DBS-TV, installation of DBS-TV antennas, satellite radio broadcasting.

References:

1. Roddy: Satellite Communications, TMH.

2. Timothy Prattt: Satellite Communications, Wiley India.

3. Pritchard, Suyderhoud and Nelson: Satellite Communication Systems Engineering, Pearson Education.
4. Agarwal: Satellite Communications, Khanna Publishers.

5. Gangliardi: Satellite Communications, CBS Publishers.

6. Chartrand: Satellite Communication, Cengage Learning.

7. Raja Rao: Fundamentals of Satellite communications, PHI Learning.

8. Monojit Mitra: Satellite Communication: PHI Learning

EC-703 Optical Communication

Unit-I

Overview of Optical Fiber Communications (OFC): Motivation, optical spectral bands, key elements of optical fiber systems. Optical fibers: basic optical laws and definitions, optical fiber modes and configurations, mode theory for circular waveguides, single mode fibers, graded-index fiber structure, fiber materials, photonic crystal fibers, fiber fabrication, fiber optic cables.

Unit-II

Optical sources: Light emitting diodes (LED): structures, materials, quantum efficiency, LED power, modulation of an LED. Laser diodes: modes, threshold conditions, laser diode rate equations, external quantum efficiency, resonant frequencies, structure and radiation patterns, single mode lasers, modulation of laser diodes. Power launching and coupling: source to fiber power launching, fiber to fiber joints, LED coupling to single mode fibers, fiber splicing, optical fiber connectors.

Unit-III

Photo detectors: pin photo detector, avalanche photodiodes, photo detector noise, detector response time, avalanche multiplication noise. Signal degradation in optical fibers: Attenuation: units, absorption, scattering losses, bending losses, core and cladding losses. Signal distortion in fibers: overview of distortion origins, modal delay, factors contributing to delay, group delay, material dispersion, waveguide dispersion, polarization-mode dispersion. Characteristics of single mode fibers: refractive index profiles, cutoff wavelength, dispersion calculations, mode field diameter, bending loss calculation. Specialty fibers.

Unit-IV

Optical receivers: fundamental receiver operation, digital receiver performance, eye diagrams, coherent detection: homodyne and heterodyne, burst mode receiver, analog receivers. Digital links: point to point links, link power budget, rise time budget, power penalties. Analog links: overview of analog links, carrier to noise ratio, multi channel transmission techniques.

Unit-V

Optical technologies Wavelength division multiplexing (WDM) concepts: operational principles of WDM, passive optical star coupler, isolators, circulators, active optical components: MEMS technology, variable optical attenuators, tunable optical filters, dynamic gain equalizers, polarization controller, chromatic dispersion compensators. Optical amplifiers: basic applications and types of optical amplifiers, Erbium Doped Fiber Amplifiers (EDFA): amplification mechanism, architecture, power conversion efficiency and gain. Amplifier noise, optical SNR, system applications. Performance Measurement and monitoring: measurement standards, basic test equipment, optical power measurements, optical fiber characterization, eye diagram tests, optical time-domain reflectometer, optical performance monitoring.

References:

1. Keiser: Optical Fiber Communications, TMH.

2. Senior: Optical Fiber Communication- Principles and Practices, Pearson Education.

3. Agarwal: Fiber Optic Communication Systems, Wiley India.

4. Palais: Fiber Optics Communications, Pearson Education.

5. Satish Kumar: Fundamentals of optical Communications, PHI Learning.

6. Khare: Fiber Optics and Optoelectronics, Oxford University Press.

7. Ghatak and Thyagrajan: Fiber Optics and Lasers, Macmillan India Ltd.

8. Gupta: Optoelectronic Devices and Systems, PHI Learning.

9. Sterling: Introduction to Fiber Optics, Cengage Learning.

List of Experiments:

1. Launching of light into the optical fiber and calculate the numerical aperture and V-number.

2. Observing Holograms and their study.

3. Measurement of attenuation loss in an optical fiber.

4. Diffraction using gratings.

5. Construction of Michelson interferometer.

6. Setting up a fiber optic analog link and study of PAM.

7. Setting up a fiber optic digital link and study of TDM and Manchester coding.

8. Measurement of various misalignment losses in an optical fiber.

EC-704 Microwave Engineering

Unit-I

Microwave Transmission System General representation of EM field in terms of TEM, TE and TM components, Uniform guide structures, rectangular wave guides, Circular Wave guides, Solution in terms of various modes, Properties of propagating and evanescent modes, Dominant modes, Normalized model voltages and currents, Power flow and energy storage in modes frequency range of operation for single mode working, effect of higher order modes, Strip line and micro strip lines general properties, Comparison of coaxial, Micro strip and rectangular wave guides in terms of band width, power handling capacity, economical consideration etc.

Unit-II

Microwave Networks and Component Transmission line ports of microwave network, Scattering matrix, Properties of scattering matrix of reciprocal, Non reciprocal, loss less, Passive networks, Examples of two, three and four port networks, wave guide components like attenuator, Phase shifters and couplers, Flanges, Bends, Irises, Posts, Loads, Principle of operation and properties of E-plane, H-plane Tee junctions of wave guides, Hybrid T, Multi-hole directional coupler, Directional couplers, Microwave resonators- rectangular. Excitation of wave guide and resonators by couplers. Principles of operation of non reciprocal devices, properties of ferrites, Isolators and phase shifters.

Unit-III

Microwave Solid State Devices and Application PIN diodes, Properties and applications, Microwave detector diodes, detection characteristics, Varactor diodes, parametric amplifier fundamentals, Manley-Rowe power relation MASER, LASER , Amplifiers, Frequency converters and harmonic generators using varactor diodes, Transferred electron devices, Gunn effect, Various modes of operation of Gunn oscillator, IMPATT, TRAPATT and BARITT.

Unit-IV

Microwave Vacuum Tube Devices Interaction of electron beam with electromagnetic field, power transfer condition. Principles of working of two cavity and Reflex Klystrons, arrival time curve and oscillation conditions in reflex klystrons, modefrequency characteristics. Effect of repeller voltage variation on power and frequency of output. Principle of working of magnetrons. Electron dynamics in planar and cylindrical magnetrons, Cutoff magnetic field, Resonant cavities in magnetron, Π-mode operation Mode separation techniques, Rising sun cavity and strapping. Principle of working of TWT amplifier. Slow wave structures, Approximate gain relationship in forward wave TWT.

Unit-V

Microwave Measurements Square law detection, Broadband and tuned detectors. Wave-guide probes, Probe and detector mounts, Slotted line arrangement and VSWR meter, Measurement of wave-guide impedance at load port by slotted line, Microwave bench components and source modulation. Measurement of scattering matrix parameters, High, Medium and low-level power measurement techniques, Characteristics of bolometers, bolometer mounts, Power measurement bridges, Microwave frequency measurement techniques, calibrated resonators (transmission and absorption type). Network Analyzer and its use in measurements.

References:

1. Liao: Microwave Devices and Circuits, Pearson Education.

2. Das: Microwave Engineering, TMH.

3. Rao: Microwave Engineering, PHI Learning.

4. Collins: Foundations of Microwave Engineering, Wiley India.

5. Srivastava and Gupta: Microwave Devices and Circuits, PHI Learning.

6. Reich: Microwave Principles, East West Press.

7. Pozar: Microwave Engineering, Wiley India.

8. Roy and Mitra: Microwave Semiconductor Devices, PHI learning

List of Experiments:

Following illustrative practical should be simulated with the help of any RF simulation software:-

1. Study the characteristics of Klystron Tube and to determine its electronic tuning range.

2. To determine the frequency and wavelength in a rectangular wave-guide working on TE10 mode.

3. To determine the Standing Wave-Ratio and reflection coefficient.

4. To measure an unknown impedance with Smith Chart.

5. To study the V-I characteristics of Gunn Diode.

6. 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.

7. 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.

8. 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.

9. 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.

10. 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.

11. Study of a network analyzer and measurements using it.

EC-705 VLSI Design

UNIT I

Practical Consideration and Technology in VLSI Design Introduction, Size and complexity of Integrated Circuits, The Microelectronics Field, IC Production Process, Processing Steps, Packaging and Testing, MOS Processes, NMOS Process, CMOS Process, Bipolar Technology, Hybrid Technology, Design Rules and Process Parameters.

UNIT II

Device Modeling Dc Models, Small Signal Models, MOS Models, MOSFET Models in High Frequency and small signal, Short channel devices, Sub threshold Operations, Modeling Noise Sources in MOSFET's, Diode Models, Bipolar Models, Passive component Models.

UNIT III

Circuit Simulation Introduction, Circuit Simulation Using Spice, MOSFET Model, Level 1 Large signal model, Level 2 Large Signal Model, High Frequency Model, Noise Model of MOSFET, Large signal Diode Current, High Frequency BJT Model, BJT Noise Model, Temperature Dependence of BJT.

UNIT IV

Structured Digital Circuits and Systems Random Logic and Structured Logic Forms, Register Storage Circuits, Quasi Static Register Cells, A Static Register Cell, Micro coded Controliers, Microprocessor Design, Systolic Arrays, Bit-Serial Processing Elements, Algotronix.

UNIT V

CMOS Processing Technology Basic CMOS Technology, A Basic n-well CMOS Process, Twin Tub Processes, CMOS Process Enhancement, Interconnects and Circuit Elements, Layout Design Rules, Latch up, Physical Origin, Latch up Triggering, Latch up Prevention, Internal Latch up Prevention Techniques.

References:

1. Geiger, Allen and Strader: VLSI Design Techniques for Analog and Digital Circuits, TMH.

2. Sorab Gandhi: VLSI Fabrication Principles, Wiley India.

3. Weste and Eshraghian: Principles of CMOS VLSI design, Addison-Wesley

4. Weste, Harris and Banerjee: CMOS VLSI Design, Pearson-Education.

5. Pucknell and Eshraghian: Basic VLSI Design, PHI Learning.

6. Sze: VLSI Technology, TMH.

EC-706 Minor Project and Seminar

The student should select a topic (from the subjects he has studied so far or any topic related to real life problem). He should do the literature survey, analyze the problem and propose some solution for the same. He should prepare a detailed (typed) report regarding the topic and should present the same with the help of power point presentation at the end of the semester. The analysis of the problem may be done with the help of some software or any hardware (which may be made by the student). Grading System

EC-707 Industrial Training Duration:

4 weeks after the VI semester in the summer break. Assessment in VII semester. SCHEME OF EXAMINATION For the assessment of industrial training undertaken by the students, following components are considered with respective weightage. A) Term work In Industry Marks allotted 1. Attendance and General Discipline 05 2. Daily diary Maintenance 05 3. Initiative and Participative attitude during training 05 4. Assessment of training by Industrial Supervisor/s 15 Total 30 (B) Practical/Oral Examination (Viva-voce In Institution Marks allotted 1. Training Report 20 2. Seminar and cross questioning (defense) 30 Total 50 Marks of various components in industry should be awarded to the student, in consultation with the Training and Placement Officer (TPO)/ Faculty of the institute, who must establish contact with the supervisor/ authorities of the organization where, students have taken training, to award the marks for term work. During training, students will prepare a first draft of the training report in consultation with the section incharge. After training they will prepare final draft with the help of the TPO/ faculty of the institute. Then, they will present a seminar on their training and will face viva-voce on training in the institute.

Institute Of Engineering, Jiwaji University , Gwalior
B.E. VIII Sem . (Electronics Engineering)
Scheme (w.e.f.2018-2022 batch)
Subject wise distribution of marks and corresponding credits

S.NO.	Subject Code	Subject Name & Title	Theory Slot			Practical Slot			Total Marks	Credit alloted Period per week			Total Credits
			End Sem	Mid Sem	Total -1	Sessional	Practical	Total-II	T1+T2	L	T	P	C
1	EC-801	Elective-II	80	20	100	_	_	_	100	3	1	_	4
2	EC-802	Advanced Communication System	80	20	100	_	_	_	100	3	1	_	4
3	EC-803	Computer Networks	80	20	100	50	50	100	200	3	1	2	6
4	EC-804	TV& Radar Engg.	80	20	100	50	50	100	200	3	1	2	6
5	EC-805	Major Project	_	_	_	100	200	300	300	0	4	6	10
6	EC-806	Seminar & Group Disscusion	_	_	_	100	_	100	100	0	2	0	2
		Total	**320**	**80**	**400**	**300**	**300**	**600**	**1000**	**12**	**10**	**10**	**32**

L: Lecture - **T: Tutorial -** **P: Practical**

Elective- II

EC-8011 Advanced Data Networks
EC-8012 Microwave Circuits
EC-8013 Principles of Management & managerial Economics
EC-8014 Introduction to Microcontrollers for Embedded System

COURSE: EC-8011 Advanced Data Network

Unit-I

Principles of Wireless Networks Network Planning: Introduction, wireless network topologies, cellular topology. Wireless network operation: introduction, mobility management, radio resources and power management, security in wireless networks.

Unit-II

Mobile Data Networks Introduction, the data-oriented CDPD network, GPRS and higher data rates, short messaging services in GSM, mobile application protocols. Wireless LANs (WLAN) Introduction, historical overview of the LAN industry, evolution of the WLAN industry, new interest from military and service providers, a new explosion of market and technology, wireless home networking.

Unit-III

IEEE 802.11 WLANs Introduction, what is IEEE 802.11? The PHY layer, MAC sublayer, MAC management sublayer. HIPERLAN Introduction HIPERLAN, HIPERLAN-2 Wireless Geolocation Systems Introduction, Wireless geo location system architecture, technologies for wireless geolocation, geolocation standards for E-911 services, performance measures for geo location systems.

Unit-IV

Wireless Personal Area Network (WPAN) Introduction- IEEE 802.15 WPAN, Home RF, Bluetooth? Interference between Bluetooth and 802.11. Satellite Networks Satellite navigation and global positioning system: Introduction, radio and satellite navigation, GPS position location principles, GPS time, GPS receivers and codes, the C/A code, Satellite signal acquisition, GPS signal levels, timing accuracy, GPS receiver operation, GPS C/A code accuracy, differential GPS.

Unit-V

Optical Networks Network Concepts: terminology, categories, layers. Network topologies: performance of passive linear buses, performance of star architectures, SONET/SDH: transmission formats and speeds, optical interfaces, SONET/SDH rings, SONET/SDH networks. High speed light-wave links: links operating at 10, 40 and 160 Gbps. Optical add/drop multiplexing (OADM): OADM configurations, reconfigurable OADM. Optical switching: optical cross-connect, wavelength conversion, wavelength routing, optical packet switching, optical burst switching. WDM network examples: wideband long-haul WDM networks, narrowband metro WDM networks, passive optical network. Mitigation of transmission impairments: chromatic dispersion compensating fiber, bragg grating dispersion compensators, polarization mode dispersion compensation, optical amplifier gain transients.

References:

1. Pahlavan and Krishnamurthy: Principles of Wireless Networks, PHI Learning.

2. Stallings: Wireless Communications and Networks, Pearson Education.

3. Keiser: Optical Fiber Communications, TMH.

4. Pratt, Bostian and Allnut: Satellite Communications, Wiley India.

5. Upena Dalal: Wireless Communications, Oxford University Press.

EC-8012 Microwave Circuits

Unit I

Transmission lines: Impedance matching and transformation Plane Electromagnetic waves, Transmission Lines: Line Equations and analysis, Smith Chart, Impedance Matching and transformation single stub, double stub matching, triple –stub tuner, impedance mismatch factor, quarter wave transformer, theory of small reflections, binomial and Chebyshev transformer, tapered transmission lines, triangular, exponential and Klopfenstein taper.

Unit II

Field analysis of transmission lines: Analysis of general transmission line and terminated transmission line circuits, Planar Transmission lines, Micro strip lines. Strip lines: Characteristic Impedance, conductor losses, Dielectric losses, Radiation Losses, Higher order modes and dispersion, Micro strip attenuation ,high frequency properties , suspended and inverted micro strip lines, coplanar lines, slot lines, Fin-lines, Coupled Lines. Substrates for microwave printed circuits

Unit III

Microwave (solid state) Amplifiers: BJT and FET, Power gains: definitions, Stability: stability circles, tests for unconditional stability, Constant Power Gain Circles, Constant Mismatch Circles, Single stage and multi stage transistor Amplifier design, Broadband transistor Amplifier Design, Power amplifiers. Basic Noise theory, Low noise amplifier designs, Microwave amplifier designs using S-parameters.

Unit IV

Microwave oscillators and mixers: RF oscillators, Microwave oscillators, Oscillators Phase Noise, Frequency Multipliers, Gunn oscillators and circuits, Transistor oscillators, Oscillator circuits and design. Mixers: Mixer characteristics, linear and non-linear mixer operation, Mixer noise figure, Balanced mixers, Single ended diode mixer, single ended FET mixer, image reject mixers, other mixers, Mixer analysis using Harmonic Balancing.

Unit V

Microwave Filters: Periodic structures: analysis, Filter design : image parameter and insertion loss method. specification of power loss ratio, Filter transformations, Filter Implementations, Stepped-Impedance low –pass filters, coupled line filters, Filters using coupled resonators, Impedance and Admittance inverters, micro strip half-wave filter, Quarter –wave coupled cavity filters, direct –coupled cavity filters, Low-Pass filter designs, Frequency transformations and expansions, Narrowband and wideband microwave filters.

References:

1. Collin: Foundations for Microwave Engineering, Wiley India.

2. Rizzi: Microwave Engineering- Passive Circuits, PHI Learning.

3. Pozar: Microwave Engineering, Wiley India.

4. Vendelin, Pavid and Rohde, Microwave Circuit Design, Wiley India.

5. Srivastava and Gupta: Microwave Devices and Circuit Design, PHI

EC-8013 Principles of Management and Managerial Economics

Unit I

Management Concept: Management, Administration and Organization Difference and Relationship between Organization Management and Administration. Importance of Management, Characteristics of Management.

Unit II

Management: Scientific Management, Principles of Management, Process of Management, Functions of Management, Levels of Management, Project Management.

Unit III

Decision Making: Introduction and Definition, Types of Decisions, Techniques of Decision Making, Decision making under certainty Decision making under uncertainty, Decision Making under risk.

Unit IV

Managerial Economics: Introduction, Factors Influencing Manager, Micro and Macro-economics, Theory of the Cost, Theory of the Firm, Theory of Production Function.

Unit V

Productivity: Input-Output Analysis, Micro-economics Applied to Plants and Industrial Undertakings, Production and Production system, Productivity, Factors affecting Productivity, Increasing Productivity of Resources.

References:

1. Peter Drucker, Harper and Row: The Practice of Management.

2. Koontz: Essentials of Management, PHI Learning.

3. Staner: Management, PHI Learning.

4. Daft: Principles of Management, Cengage Learning.

5. T. N. Chhabra: Principle and Practice of Management, Dhanpat Rai, New Delhi.

6. Hirschey: Managerial Economics, Cengage Learning.

7. T. R. Banga and S.C. Sharma: Industrial Organisation and Engineering Economics, Khanna Publishers.
8. O.P. Khanna: Industrial Engineering and Management, Dhanpat Rai.

9. Joel Dean: Managerial Economics, PHI learning.

EC-8014-New (Introduction to Microcontrollers for Embedded systems)

UNIT-I:

Introduction to Embedded systems Embedded system overview and applications, features and architecture considerations-ROM, RAM, timers, data and address bus, Memory and I/O interfacing concepts, memory mapped I/O. CISC Vs RISC design philosophy, Von-Neumann Vs Harvard architecture, instruction set, instruction formats, and various addressing modes of 32-bit. Fixed point and floating point arithmetic operations. Introduction ARM architecture and Cortex – M series, Introduction to the Tiva family viz. TM4C123x & TM4C129x and its targeted applications, Tiva block diagram, address space, on-chip peripherals (analog and digital) Register sets, Addressing modes and instruction set basics.

UNIT-II:

Microcontroller Fundamentals for Basic Programming I/O pin multiplexing, pull up/down registers, GPIO control, Memory Mapped Peripherals, programming System registers, Watchdog Timer, need of low power for embedded systems, System Clocks and control, Hibernation Module on Tiva, Active vs Standby current consumption. Introduction to Interrupts, Interrupt vector table, interrupt programming. Case Study: Tiva based embedded system application bringing up the salient features of GPIO, Watchdog timer, etc.

UNIT- III

Timers, PWM and Mixed Signals Processing Timer, Basic Timer, Real Time Clock (RTC), Timing generation and measurements, Analog interfacing and data acquisition: ADC, Analog Comparators, DMA, Motion Control Peripherals: PWM Module & Quadrature Encoder Interface (QEI). Case Study: Tiva based embedded system application using ADC & PWM.

UNIT-IV

Communication protocols and Interfacing with external devices Synchronous/Asynchronous interfaces (like UART, SPI, I2C, USB), serial communication basics, baud rate concepts, Interfacing digital and analog external device, I2C protocol, SPI protocol & UART protocol. Implementing and programming I2C, SPI & UART interface using Tiva. CAN & USB interfaces on Tiva platform. Case Study: Tiva based embedded system application using the interface protocols for communication with external devices "Sensor Hub BoosterPack"

UNIT V

Embedded networking and Internet of Things Embedded Networking fundamentals, Ethernet, TCP/IP introduction IoT overview and architecture, Overview of wireless sensor networks and design examples. Various wireless protocols and its applications: NFC, ZigBee , Bluetooth, Bluetooth Low Energy, Wi-Fi. Adding Wi-Fi capability to the Microcontroller, Embedded Wi-Fi, User APIs for Wireless and Networking applications Building IoT applications using CC3100 user API: connecting sensor devices

using Tivaware sensor library. Case Study: Tiva based Embedded Networking Application: "Smart Plug with Remote Disconnect and Wi- Fi Connectivity"

Lab

1.Interfacing and programming GPIO ports in C using Tiva (blinking LEDs , push buttons)

2.Interrupt programming examples through GPIOs

3.Use Hibernation mode and wake on RTC interrupt

4.PWM generation using PWM Module on Tiva

5.Interfacing potentiometer with Tiva GPIO

6.PWM based Speed Control of Motor controlled by potentiometer connected to Tiva GPIO

7.Connect the Tiva to terminal on PC and echo back the data using UART

8.Interfacing an accelerometer with Tiva using I2C

9.Experiment on USB (Sending data back and forth across a bulk transfer-mode USB connection.)
10.Using IQmath Library for implementing Low pass FIR filter

11.Review of User APIs for TI CC3100 & Initialization and Setting of IP addresses

12.A basic Wi-Fi application – Communication between two Tiva based sensor nodes using TIVA sensor library in TivaWare

13.Setting up the CC3100 as a HTTP server

TEXT Books:

1. John Davies, "MSP430 Microcontroller Basics", Newnes, 1st Edition

2. Ajit Pal, "Microcontrollers Principles and applications", PHI

3. B. Kanta Rao, "Embedded Systems", PHI

4. Rajkamal, "Embedded Systems Architecture Programming and design", McGraw Hill,

EC-802 Advanced Communication Systems

Unit-I

Spread Spectrum Modulation Introduction, frequency hopping multiple access, CDMA, cellular CDMA systems, multi user detection, time hopping impulse radio

Unit-II

Orthogonal Frequency Division Multiplexing (OFDM) Introduction, principle of OFDM, implementation of transceivers, frequency-selective channels, channel estimation, peak to average power ratio, inter carrier interference, adaptive modulation and capacity, multiple access, multi carrier code division multiple access, single carrier modulation with frequency-domain equalization.

Unit-III

Multi antenna system: smart antennas, multiple input multiple output systems, multi user MIMO.

Unit-IV

Cognitive Radio Problem description, cognitive transceiver architecture, principle of interweaving, spectrum sensing, spectrum management, spectrum sharing, overlay, underlay.

Unit V

Cooperative Communication Introduction and motivation, fundamentals of relaying, relaying with multiple parallel relays, routing and resource allocation in multi hop networks, routing and resource allocation in collaborative networks, applications, network coding.

References:

1. Molisch: Wireless Communications, Wiley India.

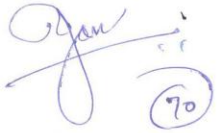
2. Upena Dalal: Wireless Communications, Oxford University Press.

3. Kamilo Feher: Wireless Digital Communications, PHI Learning.

4. Zeimer, Peterson and Borth: Introduction to Spread Spectrum Communication, Pearson Education.

5. Mullet: Introduction to Wireless Telecommunication Systems and Networks, Cengage Learning.

6. Dixon: Spread Spectrum Systems, Wiley India.



EC-803 Computer Networks

Unit I

Computer Networks Introduction, applications, types of networks, network software, reference models- OSI model, TCP/IP model, comparison of OSI and TCP/IP models, example networks. The Physical layer Design Issues, review of data communication concepts (configuration, topology, transmission mode, mediaguided and unguided, types of switching etc).

Unit II

The Data Link layer Design issues, error detection and correction, data link protocols- stop and wait and sliding window ARQ, utilization of ARQ techniques, example of data link protocol- HDLC. The Medium Access Control Layer Static and dynamic channel allocation, multiple access protocols- Pure and slotted ALOHA, CSMA, Collision free protocols, limited contention protocols, CSMA/CD (ETHERNET), fast Ethernet, Gigabit Ethernet.

Unit III

Wireless Protocols The 802.11, the 802.16, Bluetooth, RFID, Data link layer switching- uses of repeaters, hubs, bridges, switches, routers and gateways. The Network Layer Design Issues, Virtual Circuit and datagram networks, routing algorithms- adaptive and non-adaptive algorithms, congestion control algorithms, quality of service, internetworking, Network layer in the Internet- IPv4 protocol, IP addresses, IPv6 protocol, Internet control protocols, Mobile IP.

Unit IV

The Transport Layer Design issues and services, Transport protocols, congestion control, UDP and TCP protocols, performance issues.

Unit V

The Application Layer The Domain Name System, E-mail, World Wide Web, streaming audio and video, content delivery.

References:

1. Tanenbaum: Computer Networks, Pearson Education.

2. Bertsekas and Gallager: Data Networks, PHI Learning.

3. Black: Computer Networks, PHI Learning.

4. Forouzan: Computer Networks, TMH.

5. Stallings: Computer Networking and Internet Protocol, Pearson Education.

6. Keiser: Local Area Network, TMH.

7. Forouzan: Data Communication and Networking, TMH.

8. Gupta: Data Communications and Computer Networks, PHI Learning.

EC-804 TV and Radar Engineering

Unit I

Basic Television System Introduction: Scanning principles: sound and picture transmission, scanning process, camera pick-up devices, video signal, transmission and reception of video signals, brightness perception and photometric quantities, aspect ratio and rectangular scanning, persistence of vision and flicker, vertical resolution, the Kell factor, horizontal resolution and video bandwidth, interlaced scanning. Composite Video Signal: Lines and scanning, video signal components, horizontal sync and blanking standards, vertical sync and blanking standards, video modulation and vestigial side band signal, sound modulation and inter-carrier system. Television Standards: Standard channel characteristics, reception of the vestigial side band signals, television broadcast channel, consolidated CCIR system-B standard, various television broadcast systems. Television Pick-up devices and Cameras: Camera lenses, auto-focus systems, television camera pick-ups, Silicon Vidicon, CCD image sensors, video processing of camera pick-up signal.

Unit II

Colour Television Colour fundamentals: mixing of colours and colour perception, chromaticity diagram, colour television camera, colour TV signals and transmission, NTSC, SECAM and PAL system, Trinitron picture tube, automatic degaussing, plasma, LCD displays. Television transmission and reception: requirement of TV broadcast transmission, design principle of TV transmitters, IF modulation, power output stages, block diagram of TV transmitter, co-channel interference and ghost images during propagation of television signals, antenna requirements for television system, block schematic and function requirements for television receivers, trends in circuit design, colour television receiver.

Unit III

Digital Television Technology Merits of digital technology, fully digital television system, digital television signals, digitized video parameters, digital video hardware, transmission of digital TV signals, bit rate reduction, digital TV receivers, video processor unit, audio processor unit. Other television systems: Closed Circuit television system (CCTV), Cable television system (CATV), multiplexed analog component encoding television system (MAC TV), High definition television system (HDTV), High definition multiplexed analog component television (HD-MAC TV), High Performance Computer Controlled TV (HPCC TV), 3-D stereoscopic television techniques..

Unit IV

RADAR The Radar range equation, block diagram and operation, performance factors: prediction of range performance, minimum detectable signal, receiver noise, probability density functions, signal to noise ratios. Radar cross section of targets, transmitter power, pulse repetition frequency and range ambiguities, antenna parameters. The CW radar: the Doppler effect, FM-CW radar. The Moving Target Indicator (MTI) Radar: delay line cancellers.

Unit V

Radar Receivers The radar receiver, noise figure, mixers, low noise front ends, displays- type A and PPI representations, duplexer and receiver protectors. Other Radar systems: Synthetic aperture radar, HF over the horizon radar, Air Surveillance Radar (ASR), Bistatic radar.

References:

1. Dhake: Television and Video Engineering, TMH.

2. Skolnik: Introduction to Radar Systems, TMH, New Delhi.

3. Gupta: Television Engineering and Video Systems, TMH, New Delhi.

4. Gulati: Monochrome and Colour Television, New Age International.

5. Grob and Herndon: Basic Television and Video Systems, McGraw Hill International.

6. Peebles, Jr.: Radar Principles, Wiley India Pvt. LTD.

7. Edde: Radar- Principles, Technology Applications, Pearson Education.

List of Experiments:

Section A: Television Engineering

1. (a) To Study the Circuit Description of RF Tuner Section.

b) To Study the RF Section by Measuring Voltages at Various Test Points.

(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for RF Section.

2.

(a) To Study the Circuit Description of VIF Tuner Section.

(b) To Study the VIF Section by Measuring Voltages at Various Test Points.

(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for VIF Section.

3.

(a) To Study the Circuit Description of Video and Chroma Section Tuner Section.

(b) To Study the Video and Chroma Section by Measuring Voltages at Various Test Points

(c) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Video and Chroma Section.

4.

(a) To Observe the Horizontal Oscillator and Horizontal Output Section through Various Test Point.

(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Horizontal Oscillator and Horizontal Output Section.

5.

(a) To Observe the Vertical Oscillator and Vertical Output Section through Various Test Point.

(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Vertical Oscillator and Vertical Output Section.

6. To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for Sound Output Section.

7. To Study the Circuit Description of Audio and Video Section Tuner Section.

8.

(a) To Study the System Control Section by Measuring Voltages at Various Test Points.

(b) To Study the Fault Simulation and Step-by-Step Fault Finding Procedure for System Control Section.

Section B: RADAR

1. Study of Doppler Effect.

2. To Measure Speed of a fan and various Other Objects (Pendulum, Tuning Fork, Plate etc.)

3. To Simulate the Variable Speed of Moving Objects using Velocity Simulator.