

E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' Grade | Accredited by NBA (CSE, EEE, MECH)

NAGAPATTINAM – 611 002



B.E ELECTRONICS AND COMMUNICATION ENGINEERING

Third Year – Fifth Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1702EC501	Analog Communication	3	0	0	3	40	60	100
1702EC502	Antenna and Wave Propagation	3	0	0	3	40	60	100
1702EC503	Digital Signal Processing	3	2	0	4	40	60	100
1702EC504	Computer Networks	3	0	0	3	40	60	100
1703EC004	Biomedical Engineering (Elective – I)	3	0	0	3	40	60	100
1703EC008	Measurement and Instrumentation (Elective – II)	3	0	0	3	40	60	100
Laboratory Course								
1702EC551	Analog Communication Laboratory	0	0	4	2	50	50	100
1702EC552	Digital Signal Processing Laboratory	0	0	4	2	50	50	100
1704EC553	Technical Seminar	0	0	2	1	100	-	100
1704GE551	Life Skills: Aptitude – I	0	0	2	1	100	-	100
Total		18	2	12	25	540	460	1000

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1702EC501

ANALOG COMMUNICATION

L	T	P	C
3	0	0	3

PREREQUISITE:

1. Digital circuits and systems
2. Signals and systems

COURSE OBJECTIVES:

1. To provide an introduction on different analog modulation and demodulation systems.
2. To study various types of noise and analyze the noise performance of various receiver.
3. To learn Pulse analog modulation and demodulation techniques.

UNIT I INTRODUCTION TO COMMUNICATION SYSTEMS

9 Hours

Basic communication systems – classification - Modulation - Need for modulation – Classifications of modulation techniques – Principles of Amplitude Modulation- AM envelope- Frequency spectrum of AM- Amplitude modulation index- Degree of modulation – AM voltage distribution- Average power calculations of AM- Generation of AM - Detection of AM - Transmitters-Receiver-Super heterodyne receiver.

UNIT II VARIOUS AMPLITUDE MODULATION SYSTEMS

9 Hours

Double Side Band Suppressed Carrier (DSBSC) systems - generation and detection – Balanced modulator – Single Side Band (SSB) systems- with carrier- suppressed carrier-reduced carrier- SSB-SC generation and detection, Vestigial Side Band (VSB) generation and detection - Comparison of various Amplitude modulation systems.

UNIT III ANGLE MODULATION SYSTEMS

9 Hours

Frequency modulation: Narrowband and wideband FM- Phase Modulation- Generation of FM signal: Direct FM, indirect FM- Phase Modulators- Demodulation of FM signals -FM stereo multiplexing- FM transmitters- FM receivers-Phase Locked Loop.

UNIT IV NOISE IN COMMUNICATION SYSTEM

9 Hours

External Noise-Internal Noise-Noise calculation-Noise figure-Noise temperature-Noise equivalent bandwidth- Narrowband noise-Noise in AM receiver-Noise in FM receiver-Pre-emphasis and de-emphasis in FM system- Comparison of noise performance of AM and FM systems.

UNIT V PULSE ANALOG MODULATION AND SAMPLING

9 Hours

PAM-PWM-PPM-Time Division Multiplexing- Frequency Division Multiplexing- Pulse Time Modulation systems: generation –detection-Sampling of Band limited Low pass signals-ideal and practical sampling- Anti aliasing and reconstruction filters.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Working principle of MODEM, AM /FM broadcasting.
2. Design of AM and FM radio, Television Receivers.

REFERENCES:

1. J.G. Proakis, "Digital Communications", McGraw Hill, 5th edition, 2007
2. Simon Haykin, Communication Systems, John Wiley, 2001.
3. Jack Quinn, 'Digital Data Communication', Prentice Hall; 1st edition, -1999)
4. P. Michael Fitz, Fundamentals of Communication System, Tata McGraw-Hill -2008.
5. P. Rama Krishna rao, Analog Communication, Tata McGraw-Hill -2011

1702EC502	ANTENNAS AND WAVE PROPOGATION	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Engineering Electromagnetics
2. Transmission Lines and Waveguides

COURSE OBJECTIVES:

1. To introduce the fundamental principles of antenna theory and various types of antennas.
2. Applying the principles of antennas to the analysis, design, and measurements of antennas.
3. To introduce the propagation of radio waves.

UNIT I FUNDAMENTALS OF RADIATION 9 Hours

Definition of antenna parameters – Gain, Directivity, Effective aperture, Radiation Resistance, Band width, Beam width, Input Impedance. Matching – Baluns, Polarization mismatch, Antenna noise temperature, Radiation from oscillating dipole, Half wave dipole. Folded dipole, Yagi array.

UNIT II ANTENNA ARRAYS 9 Hours

N element linear array, Pattern multiplication, Broadside and End fire array – Concept of Phased arrays, Adaptive array, Basic principle of antenna Synthesis-Binomial Arrays, Tchebychev polynomial

UNIT III APERTURE AND SLOT ANTENNAS 9 Hours

Radiation from rectangular apertures, Uniform and Tapered aperture, Horn antenna , Reflector antenna , Aperture blockage , Feeding structures , Slot antennas ,Microstrip antennas – Radiation mechanism – Application ,Numerical tool for antenna analysis

UNIT IV SPECIAL ANTENNAS 9 Hours

Principle of frequency independent antennas –Spiral antenna, Helical antenna, Log periodic. Modern antennas-Reconfigurable antenna, Active antenna, Dielectric antennas, Electronic band gap structure and applications, Antenna Measurements-Test Ranges, Measurement of Gain, Radiation pattern, Polarization, VSWR.

UNIT V PROPAGATION OF RADIO WAVES 9 Hours

Modes of propagation , Structure of atmosphere , Ground wave propagation , Tropospheric propagation , Duct propagation, Troposcatter propagation , Flat earth and Curved earth concept Sky wave propagation – Virtual height, critical frequency , Maximum usable frequency – Skip distance, Fading , Multi hop propagation.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Concept and benefits of smart antennas,
2. Fixed weight beam forming basics, Adaptive beam forming.

REFERENCES:

1. John D Kraus, Ronald J Marhefka, Ahmad S Khan, Antennas for All Applications, 3rd Edition, TheMcGraw Hill Companies. 2010.
- 2.K. D. Prasad, “Antenna & Wave Propagation”, SatyaPrakashan, New Delhi
- 3.John D Kraus, “ Antenna& Wave Propagation”, 4th Edition, McGraw Hill, Communications and Networking, Morgan Kaufmann Publishers, An Imprint of Elsevier, 2008.
4. C.A. Balanis, “Antenna Theory - Analysis and Design", John Wiley.
5. Vijay K Garg, Wireless Communications and Netwoking, Morgan Kaufmann Publishers, An Imprint of Elsevier, 2008.

1702EC503	DIGITAL SIGNAL PROCESSING	L	T	P	C
		3	2	0	4

PREREQUISITE:

1. Linear Algebra and Partial Differential Equations
2. Signals and Systems

COURSE OBJECTIVES:

1. To study about a programmable Digital signal processor.
2. To learn discrete Fourier transform, properties and its computation
3. To know the characteristics of IIR filter and to learn the design of IIR filters for filtering undesired signals.
4. To know the characteristics of FIR filter and to learn the design of FIR filter for filtering undesired signals.
5. To understand Finite word length effects and DSP Applications.

Unit I DISCRETE FOURIER TRANSFORM 9 Hours

Discrete Signals and Systems- A Review – Introduction to DFT – Properties of DFT – Circular Convolution - Filtering methods based on DFT – FFT Algorithms –Decimation in time Algorithms ,Decimation in frequency Algorithms – Use of FFT in Linear Filtering.

Unit II IIR FILTER DESIGN 9 Hours

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF)filter design using frequency translation.

Unit III FIR FILTER DESIGN 9 Hours

Structures of FIR – Linear phase FIR filter – Fourier Series - Filter design using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques – Finite word length effects in digital Filters: Errors, Limit Cycle, Noise Power Spectrum.

Unit IV FINITE WORDLENGTH EFFECTS AND DSP APPLICATIONS 9 Hours

Fixed point and floating point number representations – Quantization- Truncation and Rounding errors - Quantization noise – quantization error – Overflow error – Round off noise power - limit cycle oscillations due to product round off and overflow errors –DSP applications -Multirate signal processing: Decimation, Interpolation, Adaptive Filters.

Unit V DIGITAL SIGNAL PROCESSORS 9 Hours

Introduction – TMS320c5X Architecture – Features – Addressing Formats – Functional modes - Introduction to Commercial DSP Processors –TMS320C64XX, TMS320 C54X.

TOTAL: 45+15 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Spectrum estimation.
2. Linear estimation and prediction.

REFERENCES:

1. J.G. Proakis and D.G. Manolakis, ‘Digital Signal Processing Principles, Algorithms and Applications’, Pearson Education, New Delhi, PHI. 2003.
2. S.K. Mitra, ‘Digital Signal Processing – A Computer Based Approach’, McGraw Hill Edu, 2013.
4. B.Venkataramani and M.Bhaskar, “Digital Signal Processors – Architecture, Programming and Applications” – Tata McGraw – Hill Publishing Company Limited. New Delhi, 2003.
3. Robert Schilling & Sandra L.Harris, Introduction to Digital Signal Processing using Matlab”, Cengage Learning, 2014.
5. R. Lakshmi Rekha, "Digital Singal Processing" – ALR Publications – 2016.

1702EC504

COMPUTER NETWORKS

L	T	P	C
3	0	3	3

PREREQUISITE:

Basic Computer Knowledge

COURSE OBJECTIVES:

1. To understand networking concepts and basic communication model
2. To understand network architectures and components required for data communication.
3. To analyze the function and design strategy of physical, data link, network layer and transport layer
4. To acquire basic knowledge of various application protocol for internet security issues and services.

UNIT I INTRODUCTION AND CONCEPTS OF NETWORKS

9 Hours

Networks – Categories of Networks –Network hardware– Network software– Network Architecture – TCP/IP reference models – Network LAN technologies.

UNIT II DATA LINK LAYER AND PHYSICAL LAYER

9 Hours

Data link layer: Functionality of data link layer- Data link control and protocols – Error Detection - MAC – Ethernet- Wireless LAN- Broadband wireless – Bluetooth – Data link layer switching – **Physical layer:** Basis for data communication - Transmission media- Multiplexing

UNIT III NETWORK LAYER

9 Hours

Network layer – Functionality of network layer- Network addressing- Network routing- Routing algorithms- Internetworking- Quality of service- Network layer protocols- Switching concepts – Circuit switching – Packet switching- Network layer design issues.

UNIT IV TRANSPORT LAYER

9 Hours

Functionality of transport layer- Transport layer service – Elements of transport protocols- Transmission control protocol– Congestion control and avoidance – User datagram protocol- Delay tolerant networking- Transport for Real Time Applications (RTP).

UNIT V APPLICATIONS AND SECURITY

9 Hours

Applications protocols– Client and server model- Network services- DES- RSA- Web security- Recent trends, development and issues

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Socket Programming
2. Connectionless Transport “ UDP

REFERENCES:

1. Achyut S Godbole, Atul Hahate, “ Data Communications and Networks”, Second edition 2011
2. Andrew S. Tannenbaum David J. Wetherall, “Computer Networks” Fifth Edition , Pearson Education 2011
3. Douglas E. Comer, —Internetworking with TCP/IP (Volume I) Principles, Protocols and Architecture, Sixth Edition, Pearson Education, 2013.
4. Forouzan, “ Data Communication and Networking”, Fifth Edition , TMH 2012.
5. James F. Kurose, Keith W. Ross, “Computer Networking: A Top-down Approach, Pearson Education, Limited, sixth edition, 2012.
6. Larry L. Peterson & Bruce S. Davie, “Computer Networks – A systems Approach”, Fifth Edition, Morgan Kaufmann, 2012
7. William Stallings, —Data and Computer Communications, Tenth Edition, Pearson Education, 2013

1703EC508	MEASUREMENT AND INSTRUMENTATION	L	T	P	C
		3	0	0	3

PREREQUISITE:

Electronic Circuits

COURSE OBJECTIVES:

1. Learn the use of DC and AC bridges for measuring R, L and C
2. Learn the use of different types of analog meters for measuring electrical quantities such as current, voltage, power, energy, power factor and frequency
3. Learn the applications of CRO, other electronic measuring devices, graphical programming palettes and tools in virtual instrumentation

UNIT I MEASUREMENT CONCEPTS

9 Hours

Principles of operation and construction of PMMC-Static and dynamic characteristics-units and standards of measurements-error analysis-moving coil, moving iron meters, multi meters-True RMS Meters-Bridge measurements: Maxwell, Kelvin, Hay, Schering, Anderson and Wien bridge-Q meters.

UNIT II TRANSDUCERS

9 Hours

Classification of transducers-selecting a transducer-strain gauges-temperature transducer – LVDT Advantages and disadvantages-capacitive transducers-Piezo electric transducers – opto electronic transducers.

UNIT III FUNCTION GENERATORS

9 Hours

Function generators-RF signal generators-Sweep generators-Frequency synthesizer-wave analyzer-Harmonic distortion analyzer-spectrum analyzer-heterodyne wave analyzer-frequency counters- Time Interval measurement- Measurement of voltage, current, phase and frequency using CRO.

UNIT IV VIRTUAL INSTRUMENTATION

9 Hours

Introduction- Block diagram of a virtual instrument physical quantities and analog interfaces- Hardware and soft ware user interface- Advantages over conventional instruments- Architecture of a virtual instruments and its relation to the operating system-overview of software-lab view- Graphical user interface-controls and indicators-labels and texts-data types – format-data flow programming – editing debugging and running a virtual instrument-graphical programming palettes and tools.

UNIT V MODERN MEASUREMENT TECHNIQUES

9 Hours

A/D & D/A converters-Elements of a digital data acquisition system-interfacing of transducers – multiplexing- Use of recorders in digital systems-digital recording system-liquid crystal display-computer controlled instrumentation-IEEE 488 bus-fiber optic measurements for power and system loss.

TOTAL: 60 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Vector meters and distortion meters-Measurement of Pressure, Temperature, and velocity.
2. Special type of CRO-Front panel objects-functions and libraries.
3. Optical time domains reflect meter.

REFERENCES:

1. Ernest, Doebelin, Dhanesh and N.Manik, Measurement Systems - Application and Design, Tata McGraw - Hill, 2007
2. Sawhney A K, "Electrical And Electronic Measurements And Instrumentation" Publisher: Dhanpat Rai & Co. 2005.
3. Albert D.Helfrick and William D.Cooper, Modern Electronic Instrumentation and Measurement Techniques, PHI, 2003
4. B.C.Nakara, K.K.Chaudhry, Instrumentation Measurement and Analysis, Tata McGraw - Hill,2004.
5. Joseph J.Carr, Elements of Electronics Instrumentation and Measurement, PHI, 2003.
6. Alan. S. Morris, Principles of Measurements and Instrumentation, PHI, 2003

1704EC553

TECHNICAL SEMINAR

L	T	P	C
0	0	2	1

PREREQUISITE :

Technical Engineering Knowledge & Verbal ability

COURSE OBJECTIVES:

1. To develop self-learning skills of utilizing various technical resources to make a technical presentation.
2. To promote the technical presentation and communication skills.
3. To impart the knowledge on intonation, word and sentence stress for improving communicative competence, identifying and overcoming problem sounds.
4. To promote the ability for Interacting and sharing attitude.
5. To encourage the commitment-attitude to complete tasks.

The students are expected to make two presentations on advanced topics (recent trends) related to III or IV semester subjects. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also. Students are encouraged to use various teaching aids such as power point presentation and demonstrative models.

TOTAL: 30 HOURS

COURSE OUTCOMES:

After completion of the course, Student will be able to

- CO1 Identify and utilize various technical resources available from multiple field.
- CO2 Improve the technical presentation and communication skills.
- CO3 Improve communicative competence.
- CO4 Interact and share their technical knowledge.
- CO5 Understand and adhere to deadlines and commitment to complete the assignments.

ASSESSMENT PATTERN :

Continuous Assessment (100 Marks)

Distribution of marks for Continuous Assessment	Marks
Presentation I	40
Report	10
Presentation II	40
Report	10
Total	100

1704GE551

LIFE SKILLS: APTITUDE – I

L	T	P	C
0	0	2	1

PREREQUISITE :

Technical English – I and II

COURSE OBJECTIVES:

1. To brush up problem solving skill and to improve intellectual skill of the students
2. To be able to critically evaluate various real life situations by resorting to Analysis Of key issues and factors
3. To be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
4. To enhance analytical ability of students
5. To augment logical and critical thinking of Student

UNIT I INTRODUCTION TO NUMBER SYSTEM, BASIC SHORTCUTS OF ADDITION, MULTIPLICATION, DIVISION 6 Hours

Classification of numbers – Types of Numbers - Divisibility rules - Finding the units digit - Finding remainders in divisions involving higher powers - LCM and HCF Models - Fractions and Digits – Square, Square roots – Cube, Cube roots – Shortcuts of addition, multiplication, Division.

UNIT II RATIO AND PROPORTION, AVERAGES 6 Hours

Definition of Ratio - Properties of Ratios - Comparison of Ratios - Problems on Ratios - Compound Ratio - Problems on Proportion, Mean proportional and Continued Proportion Definition of Average - Rules of Average - Problems on Average - Problems on Weighted Average - Finding average using assumed mean method.

UNIT III PERCENTAGES, PROFIT AND LOSS 6 Hours

Introduction Percentage - Converting a percentage into decimals - Converting a Decimal into a percentage - Percentage equivalent of fractions - Problems on percentages - Problems on Profit and Loss percentage-Relation between Cost Price and Selling price - Discount and Marked Price - Two different articles sold at same Cost Price - Two different articles sold at same Selling Price - Gain% / Loss% on Selling Price.

UNIT IV CODING AND DECODING, DIRECTION SENSE 6 Hours

Coding using same set of letters - Coding using different set of letters - Coding into a number - Problems on R-model - Solving problems by drawing the paths - Finding the net distance travelled - Finding the direction - Problems on clocks - Problems on shadows - Problems on direction sense using symbols and notations.

UNIT V NUMBER AND LETTER SERIES NUMBER AND LETTER ANALOGIES, ODD MAN OUT 6 Hours

Difference series - Product series - Squares series - Cubes series - Alternate series - Combination series - Miscellaneous series - Place values of letters - Definition of Analogy - Problems on number analogy - Problems on letter analogy - Problems on verbal analogy - Problems on number Odd man out - Problems on letter Odd man out - Problems on verbal Odd man out

Total: 30 Hours

REFERENCES:

1. Arun Sharma, 'How to Prepare for Quantitative Aptitude for the CAT', 7th edition, McGraw Hills publication, 2016.
2. Arun Sharma, 'How to Prepare for Logical Reasoning for CAT', 4th edition, McGraw Hills publication, 2017.
3. R S Agarwal, 'A modern approach to Logical reasoning', revised edition, S.Chand publication, 2017.
4. R S Agarwal, 'Quantitative Aptitude for Competitive Examinations' revised edition, S.Chand publication, 2017.
5. Rajesh Verma, "Fast Track Objective Arithmetic", 3rd edition, Arihant publication, 2018.
6. B.S. Sijwali and InduSijwali, "A New Approach to REASONING Verbal & Non-Verbal", 2nd edition, Arihant publication, 2014.