

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 (CIVIL, CSE, ECE, EEE, IT, MECH)

NAGAPATTINAM – 611 002



B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

Full Time Curriculum And Syllabus

Second Year – Third Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1901MA301	Engineering Mathematics III (Linear Algebra and Vector Calculus)	3	1	0	4	40	60	100
1902EC301	Electronic Devices	3	0	0	3	40	60	100
1902EC302	Circuits and Networks	2	1	0	3	40	60	100
1902EC303	Digital Electronics	2	1	0	3	40	60	100
1901EC304	Biology for Engineers	3	0	0	3	40	60	100
1902CS306	Object Oriented Programming and Data Structures	3	0	0	3	40	60	100
Laboratory Course								
1902EC351	Devices and Circuits Laboratory	0	0	2	1	50	50	100
1902EC352	Digital Electronics Laboratory	0	0	2	1	50	50	100
1902CS354	Object Oriented Programming and Data Structures Laboratory	0	0	2	1	50	50	100
1904GE351	Life Skills: Verbal Ability	0	0	2	1	100	0	100
Total		18	3	6	23	590	510	1100
Audit Course								
1901MCX02	Constitution of India	2	0	0	0	0	-	0

L–Lecture|T–Tutorial|P–Practical|C–Credit|CA –ContinuousAssessment| ES–EndSemester

1901MA301

**ENGINEERING MATHEMATICS III (LINEAR
ALGEBRA AND VECTOR CALCULUS)**

L	T	P	C
3	1	0	4

MODULE I VECTOR SPACES

12 Hours

Vector spaces – Subspaces – Linear combinations and system of Linear equations – Linear independence and Linear dependence – Bases and Dimensions

MODULE II LINEAR TRANSFORMATIONS

12 Hours

Linear combination system of linear equation – algebra of transformation – Linear transformation of matrices – Linear functional – transpose of linear transformation

MODULE III FOURIER SERIES

12 Hours

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic analysis.

MODULE IV FOURIER TRANSFORMS

12 Hours

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity

MODULE V Z – TRANSFORMS AND DIFFERENCE EQUATIONS

12 Hours

Z - transforms – Elementary properties – Inverse Z – transform (using partial fraction and residues) – Convolution theorem – Formation of difference equations – Solution of difference equations using Z – transform.

TOTAL: 60 HOURS

REFERENCES:

1. Friedberg, A.H., Insel, A.J. and Spence, L., —Linear Algebra, Prentice - Hall of India, New Delhi, 2004.
2. Veerarajan. T., “Transforms and Partial Differential Equations”, Second reprint, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012
3. Kumaresan, S., —Linear Algebra – A geometric approach, Prentice – Hall of India, New Delhi, Reprint, 2010.
4. Grewal. B.S., “Higher Engineering Mathematics”, 42nd Edition, Khanna Publishers, Delhi, 2012.
5. Bali.N.P and Manish Goyal, “A Textbook of Engineering Mathematics”, 7th Edition, Laxmi Publications Pvt Ltd , 2007
6. Ramana.B.V., “Higher Engineering Mathematics”, Tata Mc-GrawHill Publishing Company Limited, New Delhi, 2008.
7. Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G “Advanced Mathematics for Engineering Students” Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998.
8. www.nptelvideos.in/2012/11/mathematics-iii.html

1902EC301

ELECTRON DEVICES

L T P C

3 0 0 3

MODULE I SEMICONDUCTOR DIODE

9 Hours

PN junction diode, Current equations, Diffusion and drift current densities, forward and reverse bias characteristics, Switching Characteristics.

MODULE II BIPOLAR JUNCTION TRANSISTOR

9 Hours

NPN - PNP – Junctions - Early effect - Current equations – Input and Output characteristics of CE, CB, CC - Hybrid - π model - h-parameter model, Ebers Moll Model- Gummel Poon-model, Multi Emitter transistor.

MODULE III FIELD EFFECT TRANSISTORS

9 Hours

JFETs – Drain and Transfer characteristics - Current equations - Pinch off voltage and its significance – MOSFET - Characteristics - Threshold voltage - Channel length modulation, D-MOSFET, E-MOSFET- Current equation - Equivalent circuit model and its parameters, FINFET, DUAL GATE MOSFET.

MODULE IV SPECIAL SEMICONDUCTOR DEVICES ,

9 Hours

Metal-Semiconductor Junction- MESFET, Schottky barrier diode - Zener diode - Varactor diode Tunnel diode- Gallium Arsenide device, LASER diode, LDR.

POWER DEVICES AND DISPLAY DEVICES

UJT, SCR, Diac, Triac, Power BJT, LED, Photo diode, Photo transistor, Opto Coupler, Solar cell, LCD, CCD.

MODULE V RECTIFIERS & POWER SUPPLIES

9 Hours

Full-wave: Centre tapped and bridge rectifiers with resistive load -Analysis for V_{dc} and ripple voltage with C, C-L, L-C and C-L-C filters. Clippers and clampers. Zener diode regulator – Transistor voltage regulators: Series and shunt regulators - Switched mode power supply

Total:

45 Hours

TEXT BOOKS:

1. Salivahanan .S and Sureshkumar .N, —Electronic Devices & Circuits, 3rd Edition, Tata McGraw- Hill, New Delhi, 2011, ISBN : 9781259006418

References:

1. Jacob Millman, Christos C. Halkias—Electronic Devices and Circuits, 3rd Edition, McGraw Hill Education (India) Private Limited, 2010, ISBN : 9780070700215
2. Allen Mottershead, —Electronic Devices and Circuits-An Introduction, 1st Edition, PHI, New Delhi, 1990, ISBN : 9788120301245.
3. Electronic Devices and Circuits Theory, Boylsted, Prentice Hall Publications.
4. <https://www.youtube.com/watch?v=oqOG6XErA18>
5. <https://www.youtube.com/watch?v=Kp-jS6NHsB8&list=PLF178600D851B098F>

1902EC302

CIRCUITS AND NETWORKS

L	T	P	C
2	1	0	3

MODULE I BASIC ELECTRIC CIRCUITS

9+3=12 Hours

Basic of electric circuits, Ohms law- Thevenin theorem-Norton theorem-Maximum power transfer theorem- KCL and KVL, Nodal analysis and Mesh analysis with dependant and independent Current & Voltage Sources, Analysis of ladder and lattice networks - Tuned circuits

MODULE II RLC CIRCUITS

9+3=12 Hours

Voltage current relationship of Capacitor- Inductor- Resistor, First order RL, RC circuits- Laplace transformation-S domain- Source free and step response of RL-RC-Tank Circuit, Second order RLC- Source free and step response of RLC serial & parallel

MODULE III AC POWER ANALYSIS

9+3=12 Hours

Sinusoidal waves- Phasor-Impedance and Admittance in AC-Phasor based circuit analysis-Power and Energy calculation, Self-inductance – Mutual Inductance- Ideal transformers, Frequency response and resonance

MODULE IV TWO PORT NETWORK

9+3=12 Hours

Network functions - Poles and Zeros of network functions - Complex frequency - Two port parameters Z, Y, H and ABCD - Scaling network functions - Interrelationships between the parameters-T and π equivalent circuits- Bridged networks- Coupled circuits as two port network

MODULE V NETWORKS AND GRAPHS

9+3=12 Hours

Loop Impedance and Node Admittance Matrices, Duality in Electrical Networks, Network graph-Tie set-Cut set-Duality

Total:

45+15 =60 Hours

References:

1. David A Bell “Electric Circuits, (7th Edition, 2011)”. Oxford press.
2. Franklin F.Kuo, “Network Analysis and Synthesis (5th Edition ,2012)” Wiley International;2010
3. A.V.Bakshi, U.A.Bakshi “Circuit Theory” (First edition, 2009), Technical Publications
4. A Nagoorkani "Circuit theory" (Third Edition 2016) Mcgraw hill education
5. S. Salivahanan, N.Suresh Kumar, Electronic devices and circuits (Second edition, 2011), Mcgraw hill Education
6. M.E.VanValkenberg, “Introduction to Modern Network Synthesis”, Wiley Eastern.

1902EC303

DIGITAL ELECTRONICS

L	T	P	C
2	1	0	3

MODULE I BOOLEAN ALGEBRA AND LOGIC GATES (6+2) 8 Hours

Boolean Algebra: Boolean expression – Minimization of Boolean expressions – Minterm – Maxterm – Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization (2, 3, 4, 5 Variables) – Quine- McCluskey method of minimization.

MODULE II COMBINATIONAL LOGICS (9+3) 12 Hours

Introduction – Design procedure – Adders & subtractor (Half adder, Full Adder, Half subtractor, Full subtractor Fast Adders, Serial Adder/Subtractor, BCD adder) – Binary Multiplier/Divider – Multiplexer/Demultiplexer – decoder/encoder – parity generators/checker – code converters – Magnitude Comparator

MODULE III SEQUENTIAL LOGICS (12+4) 16 Hours

Latches, Flipflops, SR, JK, D, T, Edge triggering, Level Triggering – Design of Synchronous counters, Synchronous Up/Down counters, Programmable counters, Modulo-n counter – Registers, Universal shift registers – Asynchronous Ripple or serial counter, Asynchronous Up/Down counter – State Machines – Problems in Asynchronous Circuits

MODULE IV PROGRAMMABLE LOGIC DEVICES (9+3) 12 Hours

Classification of memories (RAM, ROM, PROM, EPROM, EEPROM) – Programmable Logic Devices (PLA, PAL, FPGA) – Implementation of combinational logic circuits using ROM, PLA, PAL

MODULE V 8085 MICROPROCESSOR (9+3) 12 Hours

Evolution Of Microprocessors - 8-Bit Processor - 8085 Architecture, Register Organization, Instruction Sets, Timing Diagram, Addressing Modes, Interrupts, Interrupt Service Routines- Assembly Language Programming Using 8085.

Total: (45+15) 60 Hours

References:

1. Ronald J. Tocci, Neal S. Widmer & Gregory L. Moss, “Digital Systems: Principles and Applications”, 10th Edition, Pearson Prentice Hall, 2007
2. M. Morris Mano, “Digital Design”, 4th Edition, Prentice Hall of India Pvt. Ltd., 2008/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003
3. Ramesh Gaonkar "Microprocessor Architecture, Programming, and Applications with the 8085"- 5th edition Penram International Publishing-2000.
4. John F. Wakerly, “Digital Design”, Fourth Edition, Pearson/PHI, 2008
5. John. M. Yarbrough, “Digital Logic Applications and Design”, Thomson Learning, 2006

E-References

1. <https://www.coursera.org/learn/digital-systems> (Digital Systems: From Logic Gates to Processors from barcelona autonomous university)
2. Electronics-Digital Circuit Design-Udemy
3. <https://nptel.ac.in/courses/117106086/> (Digital Circuits and Systems by IITM)

1901EC304

BIOLOGY FOR ENGINEERS

L	T	P	C
3	0	0	3

MODULE I Life (Introduction to cells)

8 Hours

Biomolecules: Carbohydrates, Proteins, Nucleic Acids, Lipids, Enzymes. Cell structure and composition; The central dogma in molecular biology; Darwinian evolution; Molecular perspective and classification; Phylogenetic trees; Study of inter-and intra-species relationships; Microorganisms and Infectious Diseases

MODULE II Life Processes (Functioning of Human Systems)

7 Hours

Muscular System; Nervous System; Special Senses; Sensory organs (eye, ear, smell, taste, touch); Cardiovascular System; Respiratory System; Renal System; Immune System; Endocrine System; Cancer and Life style diseases; Stem cells

MODULE III Biochips

10 Hours

Biochips -Introduction to Biochips, Its features, types and components. Advantages and Disadvantages, Applications of Biochips. Human-organs-on-chips; Applications; Challenges; Future scopes

MODULE IV Bioelectronics

10 Hours

Overview of bioelectronics – Electron Transfer through proteins – Electrochemical DNA Sensors – Interfacing Biological molecules with Group IV Semiconductors for Bioelectronics sensing – DNA Templated Electronics – Neuron semiconductor Interface - Medical applications of bioelectronics: ECG, EEG, etc.

MODULE V Bio-Sensors

10 Hours

Introduction – Basic Principle of Biosensor – Components of Biosensor: Bioreceptors : Enzyme bioreceptors, Antibody bioreceptors, Nucleic acid bioreceptors, Aptasensors, Microbial biosensors – Classification of biosensors based on transducers – Piezoelectric biosensors – Non-invasive biosensors – Electrochemical Biosensors – Biosensor electrode fabrication technique – Biomedical Applications

Total:

45 Hours

Further Reading:

Bio medical Instrumentation

References:

1. Biology for Engineers, Rajiv Singal , CBS Publishers and Distributors Pvt Ltd; First Edition edition (4 June 2019).
2. Biology for Engineers, Wiley Editorial, Wiley (2018).
3. Biosensors: An Introductory Textbook, Jagriti Narang, C.S. Pundir, Jenny Stanford Publishing; 1 edition (11 April 2017)
4. Biochips: Technology and Applications, Wan-Li Xing , Jing Cheng, Springer; 2003 edition (11 July 2003)
5. Biosensors and Bioelectronics, Chandran Karunakaran Kalpana Bhargava Robson Benjamin, Elsevier publications book series

1902CS306

OBJECT ORIENTED PROGRAMMING AND DATA STRUCTURES

L	T	P	C
3	0	0	3

MODULE I OBJECT ORIENTED PROGRAMMING 9Hours

Evolution of Programming methodologies- Introduction to OOP -Basic Concepts - Structure of C++ Program- Compiling and Executing C++ Program - Data types - Operators - Expressions - Control statements & Iteration statements in C++ - Arrays-Structures-Pointers

MODULE II FUNCTIONS& CONSTRUCTORS 9Hours

Functions - Passing Data to Functions - Scope and Visibility of variables in Functions - Dynamic Binding - data members - member functions - this Pointer - Friend Functions - Friend Classes - Constructors and Destructors.

MODULE III LINEAR DATA STRUCTURES 9 Hours

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists –Polynomial Manipulation - Stack ADT – Queue ADT - Evaluating arithmetic expressions

MODULE IV NON-LINEAR DATA STRUCTURES 9 Hours

Trees – Binary Tree-Binary search trees -Tree traversal -Expression manipulation -Symbol table construction - AVL trees: Rotation, Insertion, Deletion,–Red black tree – Graph and its representations – Graph Traversals – Representation of Graphs – Breadth-first search – Depth-first search - Connected components.

MODULE V SORTING AND SEARCHING 9 Hours

Sorting Techniques-Selection, Bubble, Insertion, Merge, Heap, Quick, and Radix sort -Address calculation - Linear search -Binary search -Hash table methods.

Total: 45 Hours

References:

1. Deitel and Deitel, “C++, How To Program”, Seventh Edition, Pearson Education, 2013.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Fourth Edition, Addison-Wesley, 2013.
3. Bhushan Trivedi, “Programming with ANSI C++, A Step-By-Step approach”, Oxford University Press, 2010.
4. Goodrich, Michael T., Roberto Tamassia, David Mount, “Data Structures and Algorithms in C++”, 7th Edition, Wiley. 2016.
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, Mc Graw Hill, 2009.
6. Bjarne Stroustrup, “The C++ Programming Language”, 3rd Edition, Pearson Education, 2007.
7. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, “Fundamentals of Data Structures in C++”, Galgotia Publications, 2007.

1902EC351		DEVICES AND CIRCUITS LABORATORY	L	T	P	C
			0	0	2	1
List of Experiments:						
1.Characteristics of PN Junction Diode and Zener diode						
2.Characteristic of Rectifiers, clippers and clampers						
3.Characteristics of BJT (common emitter configuration) and determination of h parameters						
4.Characteristics of JFET and MOSFET						
5.Characteristics of SCR and UJT						
6.Characteristics of TRIAC						
7. Verification of Ohm's Law and Kirchoff's Laws.						
8. Verification of Thevenin's and Norton's Theorem.						
9.Verification of Superposition Theorem, Maximum Power Transfer Theorem						
10.Simulation of Transient Response of RL and RC circuits using PSPICE						
Mini Project						
<ul style="list-style-type: none"> • Design of Power supply. • Design of Regulators using zener diode. 						
			Total:	45 Hours		

1902EC352

DIGITAL ELECTRONICS LABORATORY

L	T	P	C
0	0	2	1

List of Experiments:

1. Study and Verification of Boolean Theorems using basic gates
2. Design, Simulate and implementation of 4 bit code converters using logic gates
3. Design, Simulate and implementation of 4 bit binary Adder/ Subtractor and BCD adder
4. Design, Simulate and implementation of 4:1 Multiplexer and De-multiplexer using logic gates
5. Design, Simulate and implementation of 4 to 2 encoder and decoder using logic gates
6. Design, Simulate and implementation of 4 bit parity generator and checker
7. Design, Simulate and implementation of 2 bit Magnitude Comparator
8. Construction and verification of 4 bit synchronous up/down counter and Mod-9/Mod-14 Ripple counters (Both simulation and implementation)
9. Simulation and Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip-flops
10. Simulation of 4 bit multiplier and Random number generator using HDL

Total: 45 Hours

Additional Experiments:

1. Design and Implementation of seven segment display using basic logic gates
2. Simulation of 4 bit parallel divider and state machine problems

References:

1. Ronald J. Tocci, Neal S. Widmer & Gregory L. Moss, "Digital Systems: Principles and Applications", 10th Edition, Pearson Prentice Hall, 2007
2. M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003
3. Joseph Cavanagh, "Verilog HDL: Digital Design and Modeling", Taylor & Francis, 2007
4. John F. Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
5. John. Myarborough, "Digital Logic Applications and Design", Thomson Learning, 2006

1902CS354

**OBJECT ORIENTED PROGRAMMING AND DATA
STRUCTURES LABORATORY**

L	T	P	C
0	0	4	2

List of Experiments:

1. Basic Programs for C++ Concepts
2. Array implementation of List Abstract Data Type (ADT)
3. Linked list implementation of List ADT
4. Cursor implementation of List ADT
5. Stack ADT - Array and linked list implementations
6. Implementation of Stack ADT (by using files (i) and implementing file (iii))
7. Implement another Stack Application using array and linked list implementations of Stack ADT (by implementing files (iv) and using file (ii), and then by using files (iii) and (iv))
8. Queue ADT – Array and linked list implementations
9. Search Tree ADT - Binary Search Tree
10. Implement an interesting application as separate source files and using any of the searchable ADT files developed earlier. Replace the ADT file alone with other appropriate ADT files. Compare the performance.

Total: 45 Hours

Additional Experiments:

1. Hash table implementation
2. Graph traversals

References:

1. F.RichardGilberg, A.Behrouz. Forouzan, Data Structures, A Pseudocode Approach with C. Thomson, 2007.
2. M. A. Weiss, Data Structures and Algorithm Analysis in C, Pearson Education, 2009.
3. Y.Langsam, M. J.Augenstein and A. M.Tenenbaum, Data Structures using C, Pearson Education, 2004.
4. A. M.AhoHopcroft and J.D. Ullman, Data Structures and Algorithms, Pearson education, 2000.

1904GE351

LIFE SKILLS: VERBAL ABILITY

L	T	P	C
2	0	0	1

MODULE I VOCABULARY USAGE

6 Hours

Introduction - Synonyms and Antonyms based on Technical terms – Single word Substitution – Newspaper, Audio and video listening activity.

MODULE II COMPREHENSION ABILITY

6 Hours

Skimming and Scanning – Social Science passages – Business and Economics passages – latest political and current event based passages – Theme detection – Deriving conclusion from passages

MODULE III BASIC GRAMMAR AND ERROR DETECTION

6 Hours

Parallelism – Redundancy – Ambiguity – Concord - Common Errors – Spotting Errors – Sentence improvement – Error Detection FAQ in Competitive exams.

MODULE IV REARRANGEMENT AND GENERAL USAGE

6 Hours

Jumble Sentences – Cloze Test - Idioms and Phrases – Active and passive voice – Spelling test.

MODULE V APPLICATION OF VERBAL ABILITY

6 Hours

Business Writing - Business Vocabulary - Delivering Good / Bad News - Media Communication - Email Etiquette – Report Writing - Proposal writing – Essay writing – Indexing – Market surveying.

Total: 30 Hours

References:

1. Arun Sharma and Meenakshi Upadhyav, How to Prepare for Verbal Ability and Reading Comprehension for CAT, McGrawHill Publication, Seventh Edition 2017
2. R S Aggarwal and Vikas Aggarwal , Quick Learning Objective General English ,S.Chand Publishing House, 2017
3. Dr.K.Alex , Soft Skills, S.Chand Publishing House, Third Revise Edition, 2014
4. Raymond Murphy, Essential English Grammar in Use, Cambridge University press, New Delhi, Third Edition , 2007

1901MCX02

CONSTITUTION OF INDIA

L T P C
1 0 0 0

MODULE I INTRODUCTION

6 Hours

Historical Background - Constituent Assembly of India - Philosophical foundations of the Indian Constitution - Preamble - Fundamental Rights - Directive Principles of State Policy - Fundamental Duties - Citizenship - Constitutional Remedies for citizens.

MODULE II STRUCTURE AND FUNCTION OF CENTRAL GOVERNMENT

6 Hours

Union Government - Structures of the Union Government and Functions - President- Vice President- Prime Minister - Cabinet - Parliament - Supreme Court of India - Judiciary view.

MODULE III STRUCTURE AND FUNCTION OF STATE GOVERNMENT

6 Hours

State Government-Structure and Functions - Governor - Chief minister-Cabinet-State Legislature- Judicial System in States -High Courts and other sub ordinate Courts.

MODULE IV CONSTITUTION FUNCTIONS

6 Hours

Indian Federal System -Center -State Relations- Constitutional Amendments - Constitutional Functionaries - Assessment of working of Parliamentary System in India.

MODULE V INDIAN SOCIETY

6 Hours

Society: Nature, Meaning and definition; India Political Structure; Caste, Religion, Languages in India;Constitutional Remedies for citizens-Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections

Total: 30 Hours

References:

1. Durga Das Basli 'Introduction to the Constitution of India " Prentice Hall of India, New Delhi.
2. R.C.Agarwal, (1997) 'Indian Political System', S.Chand and Company, New Delhi.
3. Maciver and Page, • Society: An Introduction Analysis " Mac Milan India Ltd., New Delhi.
4. K.L.Sharma, (1997) 'Social Stratification in India: Issues and Themes', Jawaharlal NehruUniversity, New Delhi.