COURSE STRUCTURE
AND
DETAILED SYLLABUS

ELECTRONICS AND COMMUNICATION ENGINEERING

For
B.TECH FOUR YEAR DEGREE PROGRAMME
(Applicable for the batches admitted from 2022-2023)

VAAGDEVI COLLEGE OF ENGINEERING
(Autonomous)
Bollikunta, Warangal-506 005
Telangana State, India.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)
ELECTRONICS & COMMUNICATION ENGINEERING
COURSE STRUCTURE
(R22 Regulations applicable for the batches admitted from Academic Year 2022-23)

I YEAR I SEMESTER

S.No.	Course Code	Title of the Course	L	T	P	Credits
1	B22MA01	Matrices and Calculus	3	1	0	4
2	B22PH01	Applied Physics	3	1	0	4
3	B22CS08	C Programming for Engineers	3	0	0	3
4	B22ME01	Engineering Workshop	0	1	3	2.5
5	B22EN01	English for Skill Enhancement	2	0	0	2
6	B22EC01	Elements of Electronics and Communication Engineering	0	0	2	1
7	B22PH02	Applied Physics Laboratory	0	0	3	1.5
8	B22EN02	English Language and Communication Skills Laboratory	0	0	2	1
9	B22CS09	C Programming for Engineers Laboratory	0	0	2	1
10	B22CH03	Environmental Science	3	0	0	0
11		Induction Programme				
		Total Credits	**14**	**3**	**12**	**20**

I YEAR II SEMESTER

S.No	Course Code	Title of the Course	L	T	P	Credits
1	B22MA02	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	B22CH01	Engineering Chemistry	3	1	0	4
3	B22ME03	Computer Aided Engineering Graphics	1	0	4	3
4	B22EE03	Basic Electrical Engineering	2	0	0	2
5	B22EC02	Electronic Devices and Circuits	2	0	0	2
6	B22CS10	Applied Python Programming Laboratory	0	1	2	2
7	B22CH02	Engineering Chemistry Laboratory	0	0	2	1
8	B22EE04	Basic Electrical Engineering Laboratory	0	0	2	1
9	B22EC03	Electronic Devices and Circuits Laboratory	0	0	2	1
		Total Credits	**11**	**3**	**12**	**20**

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II YEAR I SEMESTER

S. No.	Course Code	Title of the Course	L	T	P	Credits
1	B22MA07	Numerical Methods and Complex Variables	3	1	0	4
2	B22EC04	Analog Circuits	3	0	0	3
3	B22EE12	Network analysis and Synthesis	3	0	0	3
4	B22EC05	Digital Logic Design	3	0	0	3
5	B22EC06	Signals and Systems	3	1	0	4
6	B22EC07	Analog Circuits Laboratory	0	0	2	1
7	B22EC08	Digital logic Design Laboratory	0	0	2	1
8	B22EC09	Basic Simulation Laboratory	0	0	2	1
9	B22MC08	Logical Reasoning & Quantitative Aptitude	3	0	0	0
		Total Credits	**18**	**2**	**6**	**20**

II YEAR II SEMESTER

S. No.	Course Code	Title of the Course	L	T	P	Credits
1	B22EC13	Probability Theory and Stochastic Processes	3	0	0	3
2	B22EC14	Electromagnetic Fields and Transmission Lines	3	0	0	3
3	B22EC15	Analog and Digital Communications	3	0	0	3
4	B22EC16	Linear and Digital IC Applications	3	0	0	3
5	B22EC17	Electronic Circuit Analysis	3	0	0	3
6	B22EC18	Analog and Digital Communications Laboratory	0	0	2	1
7	B22EC19	Linear and Digital IC Applications Laboratory	0	0	2	1
8	B22EC20	Electronic Circuit Analysis Laboratory	0	0	2	1
9	B22EC21	Real Time Project/ Field Based Project	0	0	4	2
10	B22MC07	Gender Sensitization Lab	0	0	2	0
		Total Credits	**15**	**0**	**12**	**20**

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III YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	B22EC24	Microcontrollers	3	1	0	4
2	B22EC25	IoT Architectures and Protocols	3	0	0	3
3	B22EC26	Control Systems	3	1	0	4
4	B22MB01	Business Economics & Financial Analysis	3	0	0	3
5	B22EC42 B22EC43 B22EC44	**Professional Elective – I** Computer Organization & Operating Systems Data Communications and Computer Networks Electronic Measurements and Instrumentation	3	0	0	3
6	B22EC27	Microcontrollers Laboratory	0	0	2	1
7	B22EC28	IoT Architectures and Protocols Laboratory	0	0	2	1
8	B22EN03	Advanced English Communication Skills Laboratory	0	0	2	1
9	B22MB06	Intellectual Property Rights	3	0	0	0
		Total Credits	**18**	**2**	**6**	**20**

III YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	B22EC29	Antennas and Wave Propagation	3	0	0	3
2	B22EC30	Digital Signal Processing	3	0	0	3
3	B22EC31	CMOS VLSI Design	3	0	0	3
4	B22EC45 B22EC46 B22EC47	**Professional Elective – II** Digital Image Processing Mobile Communications and Networks Embedded System Design	3	0	0	3
5		Open Elective – I	3	0	0	3
6	B22EC32	Digital Signal Processing Laboratory	0	0	2	1
7	B22EC33	CMOS VLSI Design Laboratory	0	0	2	1
8	B22EC34	Advanced Communication Laboratory	0	0	2	1
9	B22EC35	Industry Oriented Mini Project/ Internship	0	0	4	2
10	B22CH03	Environmental Science	3	0	0	0
		Total Credits	**18**	**0**	**10**	**20**

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IV YEAR I SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	B22EC38	Microwave and Optical Communications	3	1	0	4
2	B22EC48 B22EC49 B22EC50	**Professional Elective – III** Radar Systems CMOS Analog IC Design Artificial Neural Networks	3	0	0	3
3	B22EC51 B22EC52 B22EC53	**Professional Elective – IV** Network Security and Cryptography Satellite Communications Biomedical Instrumentation	3	0	0	3
4		Open Elective – II	3	0	0	3
5	B22MB10	Professional Practice, Law & Ethics	2	0	0	2
6	B22EC39	Microwave and Optical Communications Laboratory	0	0	4	2
7	B22EC40	Project Stage – I	0	0	6	3
		Total Credits	**15**	**1**	**10**	**20**

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	B22EC54 B22EC55 B22EC56	**Professional Elective – V** Artificial Intelligence 5G and beyond Communications Machine learning	3	0	0	3
2	B22EC57 B22EC58 B22EC59	**Professional Elective – VI** Multimedia Database Management Systems System on Chip Architecture Wireless sensor Networks	3	0	0	3
3		**Open Elective – III**	3	0	0	3
4	B22EC41	Project Stage – II including Seminar	0	0	22	11
		Total Credits	**9**	**0**	**22**	**20**

Open Electives

Open Elective (OE – I)	Open Elective (OE – II)	Open Elective (OE – III)
1. Fundamentals of Internet of Things 2. Principles of Signal Processing 3. Digital Electronics for Engineering	1. Electronic Sensors 2. Electronics for Health Care 3. Telecommunications for Society	1. Measuring Instruments 2. Communication Technologies 3. Fundamentals of Social Networks

VAAGDEVI COLLEGE OF ENGINEERING
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B22MA01: MATRICES AND CALCULUS

B.Tech -I Year I Semester **L T P C**
3 1 0 4

Course Objectives: To learn
1. Types of matrices and their properties.
2. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
3. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form
4. Geometrical approach to the mean value theorems and their application to the mathematical problems
5. Evaluation of surface areas and volumes of revolutions of curves.
6. Evaluation of improper integrals using Beta and Gamma functions.
7. Partial differentiation, concept of total derivative
8. Finding maxima and minima of function of two and three variables.
9. Evaluation of multiple integrals and their applications

UNIT - I: Matrices **10 L**

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method.

UNIT - II: Eigen values and Eigen vectors **10 L**

Linear Transformation and Orthogonal Transformation: Eigen values, Eigenvectors and their properties, Eigen values and Vectors with reference to Symmetric, Skew-symmetric, Hermitian, Skew- Hermitian, orthogonal and Unitary Matrices. Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, **Quadratic Forms**: Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms.

UNIT - III: Calculus **10 L**

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's mean value Theorem, Taylor's Series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates),

Beta and Gamma Functions: Introduction to Improper Integrals, Definition of Beta and Gamma functions, properties and other forms. Relation between Beta and Gamma functions. Evaluation of Improper integrals using Beta and Gamma functions

UNIT - IV: Multivariable Calculus (Partial Differentiation and applications) **10 L**

Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration) **8 L**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Course outcomes: After learning the contents of this paper the student must be able to
1. Write the matrix representation of a set of linear equations and to analyze the solution of the system equations.
2. Find the Eigen values and Eigen vectors. Reduce the quadratic form to canonical form using orthogonal transformations.
3. Solve the applications on the mean value theorems.
4. Evaluate the improper integrals using Beta and Gamma functions.
5. Find the extreme values of functions of two variables with/ without constraints. Evaluate the multiple integrals and apply the concept to find areas, volumes.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

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VAAGDEVI COLLEGE OF ENGINEERING
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B22PH01: APPLIED PHYSICS

B.Tech -I Year I Semester **L T P C**
3 1 0 4

Course Objectives: The objectives of this course for the student are to:
1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibres.

UNIT - I: Quantum Physics and Solids

Quantum Mechanics: Introduction To Quantum Physics, - Blackbody Radiation – Stefan-Boltzmann's Law, Wien's And Rayleigh-Jean's Law, Planck's Radiation Law- Photoelectric Effect-waves and particles – de Broglie hypothesis – properties of matter waves- Davisson And Germer Experiment –Heisenberg Uncertainty Principle - Born Interpretation Of The Wave Function – Time Independent Schrodinger Wave Equation - Particle In One Dimensional Potential Box .

Solids: Free Electron Theory (Drude & Lorentz, Somerfield) - Fermi-Dirac Distribution - Bloch's Theorem - Kronig-Penney Model – E-K Diagram- Effective Mass Of Electron- Origin Of Energy Bands- Classification Of Solids.

UNIT - II: Semiconductors and Devices

Intrinsic And Extrinsic Semiconductors – Hall Effect - Direct And Indirect Band Gap Semiconductors - Construction, Principle , Operation And Characteristics Of P-N Junction Diode, Zener Diode And Bipolar Junction Transistor (BJT)–LED, PIN Diode, Avalanche Photo Diode (APD) And Solar Cells, Their Structure, Materials, Working Principle And Characteristics.

UNIT - III: Dielectric, Magnetic and Energy Materials

Dielectric Materials: Basic Definitions- Types Of Polarizations (Qualitative) - Ferroelectric, Piezoelectric, And Pyroelectric Materials – Applications – Liquid Crystal Displays (LCD) And Crystal Oscillators.

Magnetic Materials: Hysteresis - Soft And Hard Magnetic Materials - Magnetostriction, Magneto resistance - Applications - Bubble Memory Devices, Magnetic Field Sensors And Multi-Ferroics.

Energy Materials: Conductivity of Liquid And Solid Electrolytes- Supersonic Conductors - Materials and electrolytes For Super Capacitors - Rechargeable Ion Batteries, Solid Fuel Cells.

UNIT - IV: Nanotechnology

Nanoscale, Quantum Confinement, Surface to Volume Ratio, Bottom-Up Fabrication: Sol-Gel, Precipitation, Combustion Methods – Top-Down Fabrication: Ball Milling -
Physical Vapor Deposition (PVD) - Chemical Vapor Deposition (CVD) – Characterization Techniques - XRD, SEM &TEM -Applications of Nano materials.

UNIT - V: Laser and Fiber Optics

Lasers: Laser Beam Characteristics-Three Quantum Processes-Einstein Coefficients And Their Relations-Lasing Action - Pumping Methods- Ruby Laser, He-Ne Laser, Nd: YAG Laser- Semiconductor Laser-Applications Of Laser.

Fiber Optics: Introduction To Optical Fiber- Advantages Of Optical Fibers - Total Internal Reflection construction of Optical Fiber - Acceptance Angle - Numerical Aperture- Classification Of Optical Fibers losses in Optical Fiber - Optical Fiber For Communication System - Applications.

Course Outcomes: At the end of the course the student will be able to:
1. Understand physical world from fundamental point of view by the concepts of Quantum Mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric, magnetic materials and energy for their applications.
4. Appreciate the features and applications of Nanomaterials.
5. Understand various aspects of Lasers and Optical fibre and their applications in diverse fields.

TEXT BOOKS:

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill,4thEdition,2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2ndEdition, 2022.
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.

REFERENCE BOOKS:

1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons, 11th Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007.
6. Energy Materials a Short Introduction to Functional Materials for Energy Conversion and Storage Aliaksandr S. Bandarenka, CRC Press Taylor & Francis Group
7. Energy Materials, Taylor & Francis Group, 1st Edition

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VAAGDEVI COLLEGE OF ENGINEERING
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B22CS08: C PROGRAMMING FOR ENGINEERS

B.Tech -I Year I Semester **L T P C**
3 0 0 3

Course Objectives:
1. To learn the fundamentals of computers.
2. To understand the various steps in Program development.
3. To learn the syntax and semantics of C Programming Language.
4. To learn the usage of structured programming approach in solving problems.

UNIT-I: Introduction to Computer Algorithms and Programming

Components of a computer system: Memory, processor, I/O devices, storage, operating system, the concept of assembler, compiler, interpreter, loader, and linker.

From algorithm to program: Representation of an algorithm, flowchart, Pseudo code with examples, converting algorithms to programs.

Programming Basics: Structure of C program, writing and executing the first C program, Syntax and logical errors in compilation, object, and executable code. Components of C language, standard I/O in C, data types, variables and constants, memory storage, and storage classes.

UNIT–II: Expressions and Statements

Expressions and their evaluation: Operands and Operators, formation of expressions usingarithmetic,relational,logical,andbitwiseoperators,precedence and associativity rules, mixed operands, type conversion, and evaluation of expressions.

Statements: Simple and compound statements, Conditional Branching: if and switch statements, nested if-else, dangling else problem, use of break and default with switch. Iteration and loops: use of while, do-while and for loops, nested loops, use of break and continue statements.

UNIT–III: Functions and Arrays

Designing Structured Programs: Introduction to functions, advantages of modularizing a program into functions, types of functions, passing parameters to functions: call by value, call by reference, passing arrays to functions, recursion with example programs.

Arrays: Array notation and representation, manipulating array elements, using multi-dimensional arrays, character arrays, C strings, string input/output functions, Array of strings, string manipulation functions with example programs.

UNIT–IV: Pointers and File handling:

Pointers: Introduction, declaration, applications, dynamic memory allocation (malloc, calloc, realloc ,free),use of pointers in self-referential structures.

File handling: File I/O functions, standard C pre-processors, defining and calling macros,
Command -line arguments.

UNIT–V: Derived types And Basic Algorithms:

Structures, Union, Enums

And Bit-fields: Defining, declaring, and usage of structures,

Unions, and their arrays, passing structures, and unions to functions, introduction to Enums and bit-fields.

Basic Algorithms: Searching and Sorting Algorithms (Bubble, Insertion, and Selection),
Finding roots of equations, notion of order of complexity through example programs.

Course Outcomes: Upon completing this course, the students will be able to

1. Draw flowcharts for solving arithmetic and logical problems
2. Explore the concepts of control statements in C Programming
3. Develop modular reusable code by understanding the concepts of functions.
4. Understand the concepts of pointers and files.
5. Analyze various searching and sorting algorithms.

TEXTBOOKS:

1. B.A.ForouzanandR.F.Gilberg-Programming&DataStructures,3rdEd.,CengageLearning`
2. Byron Gottfried-Schaum's Outline of Programming with C McGraw-Hill

REFERENCEBOOKS:

1. AjayMittal-ProgramminginC:Apracticalapproach,PearsonEducation,2010
2. Kernighan Brian W. and Ritchie Dennis M.-The C programming, Pearson Education.
3. J. R. Hanly and, E.B.Koffman- ProblemSolvingandProgramDesign,5thEd.,PearsonEducation.
4. H. Cheng- C for Engineers and Scientists, McGraw-Hill International Edition
5. V. Rajaraman- Computer Basics and C Programming, PHI Learning, 2015.

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VAAGDEVI COLLEGE OF ENGINEERING
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B22ME01: ENGINEERING WORKSHOP

B.Tech I Year I Semester **L T P C**
0 1 3 2.5

Pre-Requisites: Practical skill

Course Objectives:

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
2. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
3. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
4. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
5. Welding Practice – (Arc Welding & Gas Welding)
6. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
7. Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working.

Course Outcomes:

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

1. Study and practice on machine tools and their operations.
2. Practice on manufacturing of components using workshop trades including pluming fitting, Carpentry, foundry, house wiring and welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiselling.
4. Apply basic electrical engineering knowledge for house wiring practice.

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech
2. Workshop Manual / Venkat Reddy/ BSP

VAAGDEVI COLLEGE OF ENGINEERING
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B22EN01: ENGLISH FOR SKILL ENHANCEMENT

B.Tech- I Year I Semester **L T P C**
2 0 0 2

Course Objectives: This course will enable the students to:

1. Improve the language proficiency of students in English with an emphasis on Vocabulary,
2. Grammar, Reading and Writing skills.
3. Develop study skills and communication skills in various professional situations.
4. To study engineering subjects more effectively and critically using thetheoretical and practical components of the syllabus.

UNIT - I

Chapter entitled '***Toasted English*' by R. K. Narayan** from ***"English: Language, Contextand Culture"*** published by Orient Black Swan, Hyderabad.2022

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives -Synonyms and Antonyms
Grammar: Identifying Common Errors in Writing with Reference to Articles andPrepositions.
Reading: Reading and Its Importance- Techniques for Effective Reading.
Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Simple, Compound& Complex Sentences - Importance of Proper Punctuation- Techniques for writing precisely
– Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT - II

Chapter entitled **'Appro JRD' by Sudha Murthy** from ***"English: Language, Context andCulture" published*** by Orient Black Swan, Hyderabad. 2022. Print.
Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs **Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement, Collocations.
Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice **Writing:** Nature and Style of Writing- Defining /Describing People, Objects, Places andEvents – Classifying- Providing Examples or Evidence.

UNIT - III

Chapter entitled **'Lessons from Online Learning' by F. Haider Alvi, Deborah Hurst et al** from ***"English: Language, Context and Culture"*** published by Orient Black Swan, Hyderabad. 2022. Print.
Vocabulary: Words Often Confused - Words from Foreign Languages and their Use inEnglish.
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiersand tenses
Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises forPractice.
Writing: Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letterof Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT - IV

Chapter entitled **'Art and Literature' by Abdul Kalam** from ***"English: Language, Context and Culture"*** published by Orient Black Swan, Hyderabad. 2022. Print.
Vocabulary: Standard Abbreviations in English, Idioms & Phrasal Verbs.

Grammar: Redundancies and Clichés in Oral and Written Communication. **Reading**: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises forPractice
Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -PrécisWriting.

UNIT - V

Chapter entitled **'Go, Kiss the World' by Subroto Bagchi** from ***"English: Language, Context and Culture"*** published by Orient Black Swan, Hyderabad. 2022. Print.

Vocabulary: Technical Vocabulary and their Usage

Grammar: Common Errors in English (*Covering all the other aspects of grammar which were not covered in the previous units*)

Reading: Reading Comprehension-Exercises for Practice

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

Note: ***Listening and Speaking Skills which are given under Unit-6 in AICTE ModelCurriculum are covered in the syllabus of ELCS Lab Course.***

Note: 1. As the syllabus of English given in AICTE *Model Curriculum-2018 for B. Tech FirstYear is* ***Open-ended***, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

Note: **2**.Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach 40 percent of each topic from the syllabus in blended mode.

Course Outcomes: Students will be able to:

1. Understand the importance of vocabulary and sentence structures.
2. Choose appropriate vocabulary and sentence structures for their oral andwritten communication.
3. Demonstrate their understanding of the rules of functional grammar.
4. Develop comprehension skills using known and unknown passages.
5. Take an active part in drafting paragraphs, letters, essays, abstracts, précis andreports in various contexts

TEXTBOOK:

English: Language, Context and Culture by Orient Black Swan Pvt. Ltd, Hyderabad.2022. Print.

REFERENCE BOOKS:

1. Effective Academic Writing (Second Edition)by Rhonda Liss and Jason Davis OxfordUniversity Press
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1, 2, 3. CambridgeUniversity Press
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt.Ltd.
5. Technical Communication. Wiley India Pvt. Ltd, (2019).
6. Vishwamohan, Aysha. (2013). English for Technical Communication forEngineering Students. Mc Graw-Hill Education India Pvt. Ltd.
7. Swan, Michael.(2016).Practical English Usage. Oxford University Press.4th Edition.

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VAAGDEVI COLLEGE OF ENGINEERING
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B22EC01: ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING

B.Tech -I Year I Semester **L T P C**
0 0 2 1

Course objectives:
1. To study the electronics components.
2. Students will be introduced to all electronic equipment and measuring instruments used in Laboratories.
3. To acquaint students with various software tools used in laboratories.

List of Experiments:
1. Understand the significance of Electronics and communications subjects
2. Identify the different passive and active components
3. Color code of resistors, finding the types and values of capacitors
4. Measure the voltage and current using voltmeter and ammeter
5. Measure the voltage, current with Multimeter and study the other measurements usingMultimeter
6. Study the CRO and measure the frequency and phase of given signal
7. Draw the various Lissajous figures using CRO
8. Study the function generator for various signal generations
9. Study of Spectrum analyzer and measure the spectrum
10. Operate Regulated power supply for different supply voltages
11. Study the various gates module and write down the truth table of them
12. Identify various Digital and Analog ICs
    Observe the various types of modulated signals.
13. Know the available Softwares for Electronics and communication applications

Course outcomes: Students will be able to:
1. Identify the different components used for electronics applications.
2. Measure different parameters using various measuring instruments.
3. Distinguish various signal used for analog and digital communications.
4. Know the software's to be used in Electronics and communication and engineering.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B22PH02: APPLIED PHYSICS LABORATORY

B.Tech -I Year I Semester **L T P C**
0 0 3 1.5

Course Objectives: The objectives of this course for the student to

1. Capable of handling instruments related to the CR circuit and photoelectric effect experiments and their measurements.
2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fibre and measurement of energy gap and resistivity of semiconductor materials.
3. Able to measure the frequency of AC power supply by using sonometer characteristics of dielectric constant of a given material.
4. Study the behaviour of B-H curve of ferromagnetic materials. Understanding the method of least squares fitting.

LIST OF EXPERIMENTS:

1. Determination of work function and Planck's constant using photoelectric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode
5. Input and output characteristics of BJT (CE, CB & CC configurations)
6. a) V-I and L-I characteristics of light emitting diode (LED)
   b) V-I Characteristics of solar cell
7. Determination of Energy gap of a semiconductor.
8. Determination of the resistivity of semiconductor by two probe method.
9. Study B-H curve of a magnetic material.
10. Determination of dielectric constant of a given material
11. a) Determination of the beam divergence of the given LASER beam
    b) Determination of Acceptance Angle and Numerical Aperture of an optical fibre.
12. Study of Decay Charge and Determination Of Time Constant Of RC Circuit.

Note: *Any 8 experiments are to be performed.*

Course Outcomes: The students will be able to:

1. Know the determination of the Planck's constant using Photo electric effect and time constant of RC circuit experiment.
2. Appreciate quantum physics in semiconductor devices and optoelectronics.
3. Gain the knowledge about frequency of AC power supply.
4. Understand the variation of magnetic field and behaviour of hysteresis curve.
5. Able to measure the time Constant of RC Circuit.

REFERENCE BOOK:

S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B22EN02: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

B.Tech -I Year I Semester

L	**T**	**P**	**C**
0	0	2	1

The **English Language and Communication Skills (ELCS) Lab** focuses on the Production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

1. To facilitate computer-assisted multi-media instruction enabling individualized andindependent language learning.
2. To sensitize the students to the nuances of English speech sounds, word accent, intonationand rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation ofEnglish by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize the impact of dialects.
5. To train students to use language appropriately for public speaking, group discussions andinterviews.
   Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

   a. **Computer Assisted Language Learning (CALL) Lab**
   b. **Interactive Communication Skills (ICS) Lab**

Listening Skills:

Objectives

1 To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation

2 To equip students with necessary training in listening, so that they can comprehend thespeech of people of different backgrounds and regions
Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts.

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities
- Just A Minute (JAM) Session

English Language and Communication SkillsLab.

Exercise –I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. *Practice*: Introduction to Phonetics – Speech Sounds – Vowels and Consonants –Minimal Pairs-Consonant Clusters- Past Tense Marker and Plural Marker- *Testing Exercises* **ICS Lab**:

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – TakingLeave –Introducing Oneself and Others.

Exercise – II

CALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms Stress Pattern insentences – Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms-Stress patternin sentences – Intonation - *Testing Exercises*

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III

CALL Lab:

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -*Testing Exercises*

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing *Practice:* Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – MakingSuggestions.

Exercise – IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests - *Testing Exercises*

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication-Presentation Skills.

Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -*Testing Exercises*

ICS Lab:

Understand: Introduction to Group Discussion, Interview Skills.

Practice: Group Discussion/Mock Interview.

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 30 students with 30 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 30 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration

ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, LCD and camcorder.

Course Outcomes: Students will be able to:

1. Understand the nuances of English language through audio- visual experience and groupactivities.
2. Neutralize their accent for intelligibility.
3. Develop their listening skills so that they may appreciate its role in developing LSRW skills oflanguage and improve their pronunciation.
4. Involve in speaking activities in various contexts.
5. Speak with clarity and confidence which in turn enhance their employability skills.

REFERENCE BOOKS:

1. *English Language Communication Skills – Lab Manual cum Workbook.* CengageLearning India Pvt. Ltd, (2022).
2. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). *Communication Skills: A Workbook.* OxfordUniversity Press
4. *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities.* Orient Black SwanPvt. Ltd, (2016).
5. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach.* Cambridge University Press.
6. https://www.wix.com//

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VAAGDEVI COLLEGE OF ENGINEERING
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B22CS09: C PROGRAMMING FOR ENGINEERS LABORATORY

B.Tech- I Year I Semester **L T P C**
0 0 2 1

Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in Program development.
3. To learn the syntax and semantics of C Programming Language.
4. To learn the usage of structured programming approach in solving problems.

List of Experiments:

1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in these quenceare0 and 1.Subsequenttermsarefound by adding the preceding two terms in the sequence.
3. Write a C program to generate the first n terms of the sequence.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a values applied by the user.
5. Write a C program to find the roots of a quadratic equation.
6. Write a C program to find the factorial of a given integer.
7. Write a C program to find the GCD (greatest common divisor) of two given integers.
8. Write a C program to solve Towers of Hanoi problem.
9. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
10. i).Write a C program to find both the largest and smallest number in a list of integers.
    ii). Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
11. Write a C program that uses functions to perform the following:
    i) Addition of Two Matrices ii)Multiplication of Two Matrices
12. Write a C program that uses functions to perform the following operations:
    i) To insert a sub-string in to a given main string from a given position.
    ii) To delete n Characters from a given position in a given string.
13. i).Write a C program to determine if the given string is a palindrome or not
    ii).Write a program to sort the strings in order.
14. Write a C program that displays the position or index in the string S where the string T begins, or–1 if S doesn't containT.
15. Write a C program to count the lines, words and characters in a given text.
16. Write a C program to generate Pascal's triangle.
17. Write a C program to construct a pyramid of numbers
18. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+\ldots\ldots +x^n$
    For example: if n is 3 and x is 5,then the program computes 1+5+25+125.Printx,n,the sum Perform error checking. For example, the formula does not make sense for negative exponents– if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.
19. 2'scomplement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
20. Write a C program to convert a Roman numeral to its decimal equivalent.

21. Write a C program that uses functions to perform the following operations:
    i) Reading a complex number
    ii) Writing a complex number
    iii) Addition of two complex numbers
    iv) Multiplication of two complex numbers
    (Note: represent complex number using a structure.)
22.
    i. Write a C program which copies on e file to another.
    ii. Write a C program to reverse the first n characters in a file.(Note: The file name and are specified on the command line.)
23.
    i. Write a C program to display the contents of a file.
    ii. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)
24. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii)Insertion sort
25. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
    i) Linear search ii) Binary search

Course Outcomes: Upon completing this course, the students will be able to

1. Write algorithms and to draw flowcharts for solving problems and translate the algorithms/flow charts to programs (in C language) Use functions to develop modular reusable code.
2. Use arrays, pointers, strings and structures to formulate algorithms and programs.
3. Understand Searching and sorting algorithms

TEXTBOOKS:

1. B.A.ForouzanandR.F.Gilberg-Programming&DataStructures,3rdEd.,CengageLearning`
2. Byron Gottfried-Schaum's Outline of Programming with C, McGraw-Hill

REFERENCE BOOKS:

1. AjayMittal-ProgramminginC:Apracticalapproach,PearsonEducation,2010
2. Kernighan Brian W. and Ritchie Dennis M.-The C programming, Pearson Education.
3. J. R. Hanly and, E.B. Koffman-Problem Solving and Program Design, 5th Ed., Pearson Education.
4. H. Cheng- C for Engineers and Scientists, McGraw-Hill International Edition
5. V. Rajaraman- Computer Basics and C Programming, PHI Learning, 2015.

VAAGDEVI COLLEGE OF ENGINEERING
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B22CH03: ENVIRONMENTAL SCIENCE

B.Tech -I Year I Semester **L T P C**
3 0 0 0

Course Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

UNIT - I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnifications, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and usingmineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT - III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In- Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects
Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste
management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards**

Sustainable
Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy
Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

Course Outcomes:

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha forUniversity Grants Commission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHLLearning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BSPublications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

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VAAGDEVI COLLEGE OF ENGINEERING
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B22MA02: ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

B.Tech -I Year II Semester **L T P C**
3 1 0 4

Course Objectives: To learn
1. Methods of solving the differential equations of first and higher order.
2. Concept, properties of Laplace transforms
3. Solving ordinary differential equations using Laplace transforms techniques.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

UNIT-I: First Order ODE **8 L**
Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order **10 L**
Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type $e^{ax}, \sin ax, \cos ax$, polynomials in $x, e^{axy}V(x)$ and $xV(x)$ method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electrical Circuits (Both first and second order).

UNIT-III: Laplace transforms **10 L**
Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving differential equations with constant coefficients with give conditions by Laplace Transform method.

UNIT-IV: Vector Differentiation **10 L**
Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, , Vector Identities(without proofs) Tangent plane and normal line, Scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration **10 L**
Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Course outcomes: After learning the contents of this paper the student must be able to
1. Identify whether the given differential equation of first order is exact or not
2. Solve higher differential equation and apply the concept of differential equation to real world problems.
3. Extend the basic concepts of differential calculus to vector functions in a simple and natural fashion.
4. Extend the basic concepts of differential calculus to vector functions in a simple and natural fashion.
5. Evaluate the line, surface and volume integrals and converting them from one to another

TEXT BOOKS:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. R.K. Jain and S.R.K. Iyengar Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

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VAAGDEVI COLLEGE OF ENGINEERING
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B22CH01: ENGINEERING CHEMISTRY

B.Tech -I Year II Semester **L T P C**
3 1 0 4

Pre-requisites: Chemistry Knowledge at pre-university level

Course Objectives:

1. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
2. To include the importance of water in industrial usage, fundamental aspects of batterychemistry, significance of corrosion it's control to protect the structures.
3. To imbibe the basic concepts of petroleum and its products.
4. To acquire required knowledge about engineering materials like cement, smart materials andLubricants.

UNIT - I: Water and its treatment: [8]

Introduction to hardness of water – Estimation of hardness of water by complexometric method and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break - point chlorination. Defluoridation of water by Nalgonda technique.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning,

External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

UNIT – II Battery Chemistry & Corrosion [8]

Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Characteristics of batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion: Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

UNIT - III: Polymeric materials: [8]

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene.

Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, Preparation, Properties and engineering applications of PVC and Bakelite, Teflon.

Rubbers: Natural rubber and its vulcanization.

Elastomers: Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokolrubber.

Conducting polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

UNIT - IV: Energy Sources: [8]

Introduction, Calorific value of fuel – HCV, LCV- Dulongs formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages.

UNIT - V: Engineering Materials: [8]

Cement: Portland cement, its composition, setting and hardening.

Smart materials and their engineering applications

Shape memory materials- Poly L- Lactic acid. Thermo response materials- Polyacryl amides, Poly vinyl amides

Lubricants: Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

Course Outcomes:

1. Students will acquire the basic knowledge of electrochemical procedures related to corrosionand its control.
2. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
3. They can learn the fundamentals and general properties of polymers and other engineeringmaterials.
4. They can predict potential applications of chemistry and practical utility in order to becomegood engineers and entrepreneurs.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage learning,2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi

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VAAGDEVI COLLEGE OF ENGINEERING
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B22ME03: COMPUTER AIDED ENGINEERING GRAPHICS

B.Tech -I Year II Semester **L T P C**
1 0 4 3

Course Objectives:

1. To develop the ability of visualization of different objects through technical drawings.
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products.

UNIT - I:
Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics.

UNIT- II:
Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.. Computer aided orthographic projections – points, lines and planes.

UNIT – III:
Projections of Regular Solids - Sections or Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, and Cone – Computer aided projections of solids – sectional views.

UNIT – IV:
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting.

UNIT – V:
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

Course Outcomes: At the end of the course, the student will be able to:
1. Apply computer aided drafting tools to create 2D and 3D objects sketch conics and different types of solids
2. Appreciate the need of Sectional views of solids and Development of surfaces of solids
3. Read and interpret engineering drawings
4. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

TEXT BOOKS:
1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S.Chand and company Ltd.

REFERENCE BOOKS:
1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
2. Engineering Graphics and Design, WILEY, Edition 2020
3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

ONLINE RESOURCES:
1. NPTEL Course on "Engineering Graphics and Design" by Prof. Naresh Varma Datla, Prof. S. R. Kale, IIT Delhi.
2. NPTEL Course on "Engineering Drawing and Computer Graphics" by Prof. Rajaram Lakkaraju, IIT Kharagpur.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EE03: BASIC ELECTRICAL ENGINEERING

B.Tech -I Year II Semester **L T P C**
2 0 0 2

Prerequisites: Mathematics

Course Objectives:

1. To understand DC and Single & Three phase AC circuits
2. To study and understand the different types of DC, AC machines and Transformers.
3. To import the knowledge of various electrical installations and the concept of power, powerfactor and its improvement.

UNIT-I:

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysisof simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II:

A.C. Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit.Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III:

Transformers: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation andefficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV:

Electrical Machines: Construction and working principle of dc machine, performance characteristics of dc shunt machine. Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics. Single-phase induction motor, Construction and working. Construction and working of synchronous generator.

UNIT-V:

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB,Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Course Outcomes:

After learning the contents of this paper the student must be able to

1. Analyze circuit theorems, mesh and nodal analysis, series and parallel networks, Electrical power
2. Gain knowledge on AC circuits, reactance, Impedance, Susceptance and Admittance and Power Factor
3. Learn the working principle of DC motors, Transformers
4. Understand the construction and performance characteristics of Electrical Machines
5. Introduce components of Low Voltage Electrical Installations

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition,2008.

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand,2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1stEdition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

ONLINE RESOURCES

1. Basic Electrical Circuits - Course (nptel.ac.in)
2. https://nptel.ac.in/courses/108105155

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B22EC02: ELECTRONIC DEVICES AND CIRCUITS

B.Tech -I Year II Semester **L T P C**
2 0 0 2

Course Objectives:

1. To familiarize the student with the principle of operation of Junction diode, BJT and FET.
2. To know the applications of devices.
3. To know the switching characteristics of devices.
4. To understand the characteristics and operation of various special purpose devices.

UNIT - I

Diodes: Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

UNIT - II

Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT - III

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times

UNIT - IV

Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

UNIT – V

Special Purpose Devices: Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

Course Outcomes:

Upon completion of the Course, the students will be able to:

1. Acquire the knowledge of PN diode and its characteristics.
2. Design the rectifiers with and without filters for specified DC voltage.
3. Illustrate the voltage- current characteristics of Junction Transistor and different configurations of transistor
4. Acquire knowledge about the construction, theory and characteristics of FET and MOSFET
5. Acquire the knowledge about the role of special purpose devices and their applications.

TEXT BOOKS:

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky,9 Ed., 2006, PEI/PHI.

REFERENCE BOOKS:

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5th Edition, Oxford.
2. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles andApplications, Cambridge, 2018.
3. Electronic Devices and Circuits – S.Salivahanan, N.Suresh Kumar, A.Vallavaraj, 2 Ed., 2008, TMH.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B22CS10: APPLIED PYTHON PROGRAMMING LABORATORY

B.Tech I Year II Semester **L T P C**
0 1 2 2

Lecture- 1: Introduction to Python, Write and Execute a simple python Program, Basic Commands, Variables, Statements, Input /Output, Keywords, Standard DataTypes, Strings, Operands and operators.

Lecture- 2: Understanding the Decision Control Structures: The if Statement, A Word on Indentation, The if … else Statement, The if … else if … else Statement.

Lecture- 3: Loop Control Statements: The while Loop, the for Loop, Infinite Loops, Nested Loops. The break Statement, The continue Statement.

Lecture- 4: Function Definition and Execution, Scoping, Arguments, Argument Calling by Keywords, Default Arguments, Function Rules, Return Values.

Lecture- 5: **Lists**: List, Creating List, Updating the Elements of a List, Sorting the List Elements. Storing Different
Types of Data in a List, Nested Lists, Nested Lists as Matrices.

Lecture- 6: **Files**: Working with Files and Directories, File Processing, reading from files, writing to files, merging file contents, Controlling File I/O.

Lecture- 7: **Numpy**, Plotpy and Scipy libraries of python and their functionalities. Basic GUI Programming using these libraries: text labels and buttons.

Lecture- 8: **Explanation** on Raspberry pi device and exploring various parts of raspberry .

Lecture- 9: **GPIO** pins layout on raspberry pi, its classification and installation, configuration of required packages to access the GPIO pins through python code.

Lecture- 10: Different types of sensors with its required libraries to access through python code.

LISTOF EXPERIMENTS:

Cycle -1

1. **(Lecture- 1,2&3)** Downloading and Installing Python and Modules
   a) Python3 on Linux
   FollowtheinstructionsgivenintheURLhttps://docs.python-guide.org/starting/install3/linux/
   b) Python3onWindows
   FollowtheinstructionsgivenintheURLhttps://docs.python.org/3/using/windows.html
   (Please remember that Windows installation of Python is harder!)
   c) pip3onWindowsand Linux
   Install the Python package installer by following the instructions given in the
   URLhttps://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/
   d) Installing numpy and scipy
   Youcaninstallanypython3packageusingthecommandpip3install<packagename>
   e) Installing jupyter lab
   Install from pip using the command pip install jupyter lab
2. **(Lecture-1, 2&3)**Introduction toPython3
   a) Printing your Biodata on the screen
   b) Printing all the primes less than a given number
   c) Finding all the factors of a number and show whether it is a *perfect* number,i.e.,thesumofall its factors(excluding the number itself) is equal to the number itself
3. **(Lecture- 4)** Defining and Using Functions
   a) Write a function to read data from a file and display it on the screen

b) Define a Boolean function *is palindrome*(<input>)
c) Write a function *collatz(x)* which does the following: if *x* is odd, $x = 3x + 1$; if *x* is even, then $x=x/2$.Returnthe number of steps it takes for $x=1$
d) Writeafunction$N(m,s)=exp(-(x-m)^2/(2s^2))/sqrt(2\pi)s$thatcomputestheNormaldistribution

4. **(Lecture- 5)**The package numpy
a) Creating a matrix of given order *m x n* containing *random numbers* in the range 1 to99999
b) Write a program that adds, subtracts and multiplies two matrices. Provide an interface such that, based on the prompt, the function (addition, subtraction, multiplication)should be performed
c) Write a program to solve a system of *n* linear equations in *n* variables using matrix inverse

5. **(Lecture- 7)**The package scipy and pyplot
a) Finding if two sets of data have the same *mean* value
b) Plotting data read from a file
c) Fitting a function through has et a data points using *poly fit* function
d) Plotting a histogram of a given dataset

6. **(Lecture- 6)**The strings package
a) Read text from a file and print the number of lines, words and characters
b) Read text from a file and return a list of all *n* letter words beginning with a vowel
c) Finding a secret message hidden in a paragraph of text
d) Plot a histogram of words according to their length from text read from a file

Cycle -2

7. Installing OS on Raspberry Pi
a) Installation using Pi Imager
b) Installation using image file
- Downloading an Image
- Writing the image to an SD card
- Using Linux
- Using Windows
- Booting up

Follow the instructions given in the URLhttps://www.raspberrypi.com/documentation/computers/getting-started.html

8. Accessing GPIO pins using Python
c) Installing GPIO Zero library.
First, update your repositories list:
Sudo apt update
Then install the package for Python 3:
Sudo apt install python3-gpiozero
d) Blinking an LED connected to one of the GPIO pin
e) Adjusting the brightness of an LED
f) Adjust the brightness of an LED(0to100,where100meansmaximumbrightness) using the in-built PWM wavelength.

9. Collecting Sensor Data
g) DHT Sensor interface
- Connect the terminals of DHT GPIO pins of Raspberry Pi.
- Import the DHT library using *import Ada fruit _DHT*
- Read sens or data and display it on screen.

Course Outcomes: Upon completing this course, the students will be able to

1. Install Python in Linux and windows, Installing OS on Raspberry Pi
2. Build basic programs using fundamental programming constructs
3. Write and execute python codes for different applications
4. Capable to implement on hard ware boards

TEXTBOOKS:

1. Super charged Python: Take your code to the next level, Over land
2. Learning Python, Mark Lutz, O' reilly

REFERENCEBOOKS:

1. Python for Data Science, Dr.Mohd. Abdul Hameed, Wiley Publications-1st Ed.2021.
2. Python Programming : A Modern Approach, Vamsi Kurama, Pearson
3. PythonProgrammingAModularApproachwithGraphics,Database,Mobile,andWebApplications,SheetalTaneja, aveen Kumar, Pearson
4. ProgrammingwithPython,AUser'sBook,MichaelDawson,CengageLearning,IndiaEdition
5. Think Python, Allen Downey, Green Tea Press
6. Core Python Programming, W. Chun, Pearson
7. Introduction to Python ,Kenneth A. Lambert, Cengage

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VAAGDEVI COLLEGE OF ENGINEERING
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B22CH02: ENGINEERING CHEMISTRY LABORATORY

B.Tech I Year II Semester **L T P C**

0 0 2 1

Course Objectives: The course consists of experiments related to the principles of chemistryrequired for engineering student. The student will learn:

1. Estimation of hardness and chloride content of water to check its suitability for drinking purpose.
2. Students are able to perform estimations of acids and bases using conductometry,potentiometry methods.
3. Students will learn to prepare polymers such as Bakelite and nylon-6,6 in the laboratory.
4. Students will learn skills related to the lubricant properties such as saponification value and viscosity of oils.

List of Experiments:

I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.

II. Conductometry: Estimation of the concentration of an acid by Conductometry.

III. Potentiometry: Estimation of the amount of Fe^{+2} by Potentiomentry.

IV. Determination of P^H: Determination of P^H of unknown acid solution by using Quinhydrone electrode.

V. Preparations:

1. Preparation of Bakelite.
2. Preparation Nylon - 6, 6.

VI. Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

VII. Determination of surface tension of a given liquid using Stalagmometer.

VIII. Virtual lab experiments

1. Construction of Fuel cell and it's working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

Course Outcomes: The experiments will make the student gain skills on:

1. Able to determine the hardness of water
2. Able to perform methods such as conductometry, and potentiometry in order to find out the concentrations or equivalence points of acid, and P^H of unknown solutions..
3. Students are able to prepare polymers like Bakelite and nylon-6,6.
4. Estimations saponification value and viscosity of lubricant oils.

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications,New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition

VAAGDEVI COLLEGE OF ENGINEERING
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B22EE04: BASIC ELECTRICAL ENGINEERING LABORATORY

B.Tech I Year II Semester **L T P C**

0 0 2 1

Prerequisites: Basic Electrical Engineering

Course Objectives:

1. To measure the electrical parameters for different types of DC and AC circuits usingconventional and theorems approach.
2. To study the transient response of various R, L and C circuits using different excitations.
3. To determine the performance of different types of DC, AC machines and Transformers.

List of experiments/demonstrations:

1. Verification of KVL and KCL
2. Verification of The venins's and Norton's theorem
3. Transient Response of Series RL and RC circuits for DC excitation
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC seriescircuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of aSingle-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.
9. Verification of Superposition theorem.
10. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)

Course Outcomes:

After learning the contents of this paper the student must be able to

1. Verify the basic electrical circuits through different laws and theorems
2. Analyze the transient responses of R, L and C circuits for DC excitation
3. Create resonance condition in series R-L-C circuit
4. Analyze the performance of DC shunt motor, single phase transformer and three Phase Induction Motor

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition,2008.

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker,"Basic Electrical Engineering", S. Chand,2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1stEdition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic ElectricalEngineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC03: ELECTRONIC DEVICES AND CIRCUITS LABORATORY

B.Tech- I Year II Semester **L T P C**

0 0 2 1

Course objectives:

1. This course intends to provide an overview of the principles and operation of electronic components.
2. To understand the operation of power supply circuits, rectifiers and voltage regulators.
3. To understand the characteristics of the active devices.
4. To understand the construction of simple electronic circuits.

List of Experiments (Twelve experiments to be done):

Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Full Wave Rectifier with & without filters
3. Types of Clippers at different reference voltages
4. Types of Clampers at different reference voltages
5. The steady state output waveform of clampers for a square wave input
6. Input and output characteristics of BJT in CB Configuration
7. Input and output characteristics of BJT in CE Configuration
8. Input and output characteristics of BJT in CC Configuration
9. Input and output characteristics of MOSFET in CS Configuration
10. Input and output characteristics of MOSFET in CD Configuration
11. Switching characteristics of a transistor
12. Zener diode characteristics and Zener as voltage Regulator
13. SCR Characteristics.
14. UJT Characteristics and identify negative region
15. Photo diode characteristics
16. Solar cell characteristics
17. LED Characteristics

***Design a circuit to switch on and off LED using diode/BJT/FET as a switch.**

Course Outcomes: Students will be able to

1. Acquire the knowledge of various semiconductor devices and their use in real life.
2. Design aspects of biasing and keep them in active region of the device for Functionalcircuits
3. Acquire the knowledge about the role of special purpose devices and their applications.
4. Design simple electronic circuits.

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters, voltmeters and Ammeters
5. Electronic Components and devices

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VAAGDEVI COLLEGE OF ENGINEERING
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B22MA07: NUMERICAL METHODS AND COMPLEX VARIABLES

B.Tech- II Year I Semester. **L T P C**
3 1 0 4

Pre-requisites: Mathematics courses of first year of study.

Course Objectives: To learn

1. Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms
2. Various numerical methods to find roots of polynomial and transcendental equations.
3. Concept of finite differences and to estimate the value for the given data using interpolation.
4. Evaluation of integrals using numerical techniques
5. Solving ordinary differential equations of first order using numerical techniques.
6. Differentiation and integration of complex valued functions.
7. Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
8. Expansion of complex functions using Taylor's and Laurent's series.

UNIT-I: Fourier Series & Fourier Transforms: **10 L**

Fourier series - Dirichlet Conditions - Half-range Fourier series - Fourier Transforms: Fourier Sine and cosine transforms - Inverse Fourier transforms.

UNIT-II: Numerical Methods-I **10 L**

Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton-Raphson's method and Regula-Falsi method. Jacobi and Gauss-Seidal iteration methods for solving linear systems of equations. Finite differences: forward differences, backward differences, central differences, symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae, Lagrange's method of interpolation.

UNIT-III: Numerical Methods-II **8 L**

Numerical integration: Trapezoidal rule and Simpson's $1/3^{rd}$ and $3/8^{th}$ rules. Ordinary differential equations: Taylor's series, Picard's method, Euler and Modified Euler's methods, Runge-Kutta method of fourth order for first order ODE

UNIT-IV: Complex Differentiation **10 L**

Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne- Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate, elementary analytic functions (exponential, trigonometric, logarithm) and their properties. (All theorems without Proofs), Conformal mappings, Mobius transformations.

UNIT-V: Complex Integration: **10 L**

Line integrals, Cauchy's theorem, Cauchy's Integral formula, zeros of analytic functions, singularities, Taylor's series, Laurent's series, Residues, Cauchy Residue theorem and their properties. (All theorems without Proofs)

Course outcomes: After learning the contents of this paper the student must be able to

1. Express any periodic function in terms of sine and cosine
2. Find the root of a given polynomial and transcendental equations.
3. Estimate the value for the given data using interpolation
4. Find the numerical solutions for a given first order ODE's
5. Analyze the complex function with reference to their analyticity, integration using Cauchy'sintegral and residue theorems Taylor's and Laurent's series expansions in complex function

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

REFERENCE BOOKS:

1. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc-GrawHill, 2004.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC04: ANALOG CIRCUITS

B.Tech-II Year I Semester. **L T P C**
3 0 0 3

Pre-requisite: Electronic Devices and Circuits

Course Objectives:

1. Learn the concepts of, load line analysis and biasing techniques
2. Learn the concepts of high frequency analysis of transistors.
3. To give understanding of various types of amplifier circuits
4. Learn the concepts of small signal analysis of BJT and FET
5. To familiarize the Concept of feedback in amplifiers so as to differentiate betweennegative and positive feedback.

UNIT - I

BJT Biasing: Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, and Bias Compensation using Diode

Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Transistor Hybrid model, Determination of h-parameters from transistor characteristics, Typical values of h- parameters in CE, CB and CC configurations, Transistor amplifying action, Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

UNIT - II

FET- Biasing Techniques

FET Amplifiers: Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOSFET Amplifiers, MOS Small signal model, Common source amplifier with resistive, Diode connected and Current source loads, Source follower, Common Gate Stage, Cascode and Folded Cascode Amplifier – frequency response.

UNIT - III

Multistage Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascade RC Coupled amplifiers, Cascode amplifier, Darlington pair.

Transistor at High Frequency: Hybrid -πmodel of Common Emitter transistor model, fα, fβ and unitygain bandwidth, Gain-bandwidth product.

UNIT - IV

Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

UNIT - V

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.

Course Outcomes: Upon completing this course, the students will be able to

1. Design the amplifiers with various biasing techniques.
2. Design single stage amplifiers using BJT and FET
3. Design multistage amplifiers and understand the concepts of High Frequency Analysis of BJT.
4. Utilize the Concept of negative feedback to improve the characteristics of amplifiers.
5. Utilize the concept of Barkhausen criterion to design various oscillators

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2	-	-	-	-	-	-	-	1			
CO2	2	3	3	2	-	-	-	-	-	-	-	1			
CO3	2	3	3	2	-	-	-	-	-	-	-	1			
CO4	2	3	3	2	-	-	-	-	-	-	-	1			
CO5	2	3	3	2	-	-	-	-	-	-	-	1			

TEXT BOOKS:

1. Jacob Millman, Christos C Halkias -Integrated Electronics, McGraw Hill Education.
2. Robert L. Boylestad, Louis Nashelsky -Electronic Devices and Circuits theory, 11th Edition,2009, Pearson

REFERENCE BOOKS:

1. David A. Bell – Electronic Devices and Circuits, 5th Edition, Oxford.
2. Adel S. Sedra, Kenneth C. Smith- Microelectronic Circuits- Theory and Applications, Oxford.
3. Chinmoy Saha, Arindam Halder, Debaati Ganguly -Basic Electronics-Principles andApplications, 2018, Cambridge.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B22EE12: NETWORK ANALYSIS AND SYNTHESIS

B.Tech-II Year I Semester.

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand the basic concepts on RLC circuits.
2. To know the behavior of the steady state and transient states in RLC circuits.
3. To understand the two port network parameters.
4. Learn the design concepts of various filters and attenuators

UNIT - I

Network Topology: Basic cutest and tie set matrices for planar networks, Magnetic Circuits, Self andMutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT - II

Transient and Steady state analysis: RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. RC Circuits as integrator and differentiators. 2^{nd} order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

UNIT - III

Two port network parameters: Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros. Standard T, □, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

UNIT-IV

Filters: Classification of Filters, Filter Networks, Constant-K Filters-Low pass, high pass, Band pass, band-stop filters, M-derived Filters- T and π filters- Low pass, high pass

Attenuators: Types – T, π , L, Bridge T and lattice ,Asymmetrical Attenuators T, π , L Equalizers- Types-Series, Shunt, Constant resistance, bridge T attenuation, bridge T phase, Lattice attenuation, lattice Phase equalizers

UNIT – V

Network Synthesis: Driving point impedance and admittance, transfer impedance and admittance, network functions of Ladder and non ladder networks, Poles, Zeros analysis of network functions**,** Hurwitz polynomials, Positive Real Functions, synthesis of LC, RC and RL Functions by foster and causer methods.

Course Outcomes: Upon successful completion of the course, students will be able to:

1. Gain the knowledge on basic RLC circuits behavior.
2. Analyze the Steady state and transient analysis of RLC Circuits.
3. Characterization of two port network parameters.
4. Analyze the Design aspect of various filters and attenuators

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	1	-	-	-	-	1			
CO2	2	3	2	-	-	-	1	-	-	-	-	1			
CO3	3	2	1	-	-	-	-	-	-	-	-	1			
CO4	2	3	3	-	-	-	1	-	-	-	-	1			
CO5															

TEXT BOOKS:

1. Van Valkenberg -Network Analysis, 3rd Ed., Pearson, 216.
2. JD Ryder - Networks, Lines and Fields, 2nd Ed., PHI, 1999.

REFERENCE BOOKS:

1. J. Edminister and M. Nahvi - Electric Circuits, Schaum's Outlines, Mc Graw Hills Education,1999.
2. A. Sudhakar and Shyammohan S Palli - Networks & Circuits, 4th Ed., Tata McGraw- Hill Publications
3. William Hayt and Jack E. Kimmerley - Engineering Circuit Analysis, 6th Ed., William Hayt andJack E. Kimmerley, McGraw Hill Company

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC05: DIGITAL LOGIC DESIGN

B.Tech- II Year I Semester.

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand common forms of number representation in logic circuits.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used inthe design of digital systems.
3. To understand the concepts of combinational logic circuits and sequential circuits.
4. To understand the Realization of Logic Gates Using Diodes & Transistors.

UNIT - I

Number Systems: Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.

Boolean algebra: Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations.

UNIT - II

Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method

Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL, CML and CMOS Logic Families and its Comparison, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs,IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT – III

Combinational Logic Circuits: Adders, Subtractors, Comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.

Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

UNIT - IV

Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

Sequential Machines: Finite State Machines, Synthesis of Synchronous Sequential Circuits- Serial Binary Adder, Sequence Detector, Parity-bit Generator, Synchronous Modulo N –Counters.

UNIT – V

Finite state machine: capabilities and limitations, Mealy and Moore models, State equivalence and machine minimization, simplification of incompletely specified machines, Merger graphs. Asynchronous design-modes of operation, Hazards, synthesis of SIC fundamental mode circuits, synthesis of burst mode circuits. Introduction to ASM Charts

Course Outcomes: Upon completing this course, the students will be able to

1. Acquire the knowledge on numerical information in different forms and Boolean Algebratheorems for Combinational function minimization
2. Design logic circuits by applying minimization techniques and also able to characterize the various logic families for their AC and DC parameter's
3. Design and analyze various combination logic circuits and understand the fundamental's of sequential circuits
4. Design and analyze sequential circuits for various cyclic functions
5. Acquire the knowledge on concepts of FSM and ASM charts.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	2	1	-	-	-	-	-	2			
CO2	2	3	3	2	2	1	-	-	-	-	-	1			
CO3	3	2	2	1	2	1	-	-	-	-	-	2			
CO4	3	2	1	1	1	-	-	-	-	-	-	-			
CO5	2	3	3	2	2	1	-	-	-	-	-	1			

TEXT BOOKS

1. Zvi Kohavi &Niraj K. Jha, - Switching and Finite Automata Theory, 3rd Ed., Cambridge, 2010.
2. R. P. Jain - Modern Digital Electronics, 3rd Edition, 2007- Tata McGraw-Hill

REFERENCE BOOKS

1. Morris Mano, Fredriac J. Hill, Gerald R. Peterson - Introduction to Switching Theory and LogicDesign –3rd Ed., John Wiley & Sons Inc.
2. Charles H. Roth - Fundamentals of Logic Design, 5th ED., Cengage Learning, 2004.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B22EC06: SIGNALS AND SYSTEMS

B.Tech-II Year I Semester.

L	T	P	C
3	1	0	4

Course Objectives: The objectives of this subject are to:

1. Classify signals and systems and their analysis in time and frequency domains.
2. Study the concepts of distortion less transmission through LTI systems, convolution and correlation properties.
3. Understand Laplace and Z-transforms their properties for analysis of signals and systems.
4. Identify the need for sampling of CT signals, types and merits and demerits of each type.

UNIT - I

Signal Analysis: Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT – II

Fourier series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

UNIT - III

Signal Transmission through Linear Systems: Linear System, Impulse response, Response of a Linear System, Linear Time Invariant(LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and rise time, Convolution and Correlation of Signals, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.

UNIT – IV

Laplace Transforms: Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Z–Transforms: Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

UNIT - V

Sampling theorem: Graphical and analytical proof for Band Limited Signals, Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass Sampling.

Correlation: Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Energy Density Spectrum, Parsevals Theorem, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Relation between Convolution and Correlation, Detection of Periodic Signals in the presence of Noise by Correlation, Extraction of Signal from Noise by Filtering.

Course Outcomes: Upon completing this course the students able to:

1. Apply the knowledge of various signals, and systems.
2. Analyze the transform techniques in time and frequency domain.
3. Identify the conditions for transmission of signals through systems and conditions for physical realization of systems.
4. Analyze the concept of Region of Convergence for different Transformation techniques.
5. Use sampling theorem for baseband and band pass signals for various types of sampling and apply the correlation and PSD functions for various applications

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	1			
CO2	3	3	2	2	1	-	-	-	-	-	-	1			
CO3	3	3	2	-	-	-	-	-	-	-	-	1			
CO4	3	3	2	2	-	-	-	-	-	-	-	1			
CO5	3	3	2	2	-	-	-	-	-	-	-	1			

TEXT BOOKS

1. B.P. Lathi -Signals, Systems & Communications, BSP, 2013.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawabi -Signals and Systems, 2nd Ed., Prentice Hall

REFERENCE BOOKS

1. Simon Haykin and Van Veen, A. Rama Krishna Rao, -Signals and Systems, TMH, 2008.
2. Michel J. Robert - Fundamentals of Signals and Systems, MGH International Edition, 2008.
3. C. L. Philips, J. M. Parr and Eve A. Riskin -Signals, Systems and Transforms, 3rd Ed., PE,2004.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC07: ANALOG CIRCUITS LABORATORY

B.Tech-II Year I Semester.

L	T	P	C
0	0	2	1

Course Objectives:

1. The goal of this course is to verify practically basic principles, operation and applications of the various amplifier circuits and devices like: BJT and JFET for various functions.
2. To make students understand the design and operation of Oscillator circuits.

List of Experiments :

Verify any twelve experiments in H/W Laboratory

1. Design a Self bias Circuit and determine the Q-point of the Transistor and its Stability factor.
2. Obtain the I/O Characteristics of CE, CB, CC amplifiers. Calculate h-parameters from theCharacteristics.
3. Obtain the Drain and Transfer characteristics of CD, CS amplifiers of JFET. Calculate gm, rdfrom the Characteristics.
4. By experiment prove that the voltage gain of Emitter Follower Circuit is one.
5. Design a Common Emitter Amplifier with a gain of 30db and Bandwidth of 10KHZ and plot the frequency response practically.
6. Design a two stage RC Coupled amplifier and prove that gain is increased and analyze theeffects of coupling capacitance.
7. Practically prove that the Darlington pair has high input impedance.
8. Draw the high frequency response of common emitter transistor amplifier and calculate fα, fβ and gain bandwidth product.
9. Design a Cascode amplifier for a given specifications
10. Design four topologies of feedback amplifiers and draw the frequency response of them with and without feedback.
11. Design an RC phase shift oscillator circuit and derive the gain condition for oscillationspractically for given frequency.
12. Design a Colpitts oscillator circuit for the given frequency and draw the output waveform.

Beyond syllabus:

13 Determination of f_T of given transistor.
14 Design of wein Bridge oscillator

Course Outcomes: Upon completing this course the students will be able to

1. Design amplifiers with required Q point and analyze amplifier characteristics
2. Examine the effect multistage amplification on frequency response
3. Investigate various feedback topologies and their frequency responses.
4. Design various oscillator circuits.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	2	-	3	-	-	3	3	-	-	1			
CO2	1	-	2	-	3	-	-	3	3	-	-	1			
CO3	1	-	2	-	3	-	-	3	3	-	-	1			
CO4	1	-	2	-	3	-	-	3	3	-	-	1			

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters

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B22EC08: DIGITAL LOGIC DESIGN LABORATORY

B.Tech-II Year I Semester. **LTPC**
0 0 2 1

List of Experiments

1. Realization of Logic circuit to generate r's Compliment using Logic Gates.
2. Realization of given Boolean function using universal gates and minimizing the same. Compare thegate count before and after minimization.
3. Design and realize Full Adder circuit using gates/universal gates. Implement Full Subtractor usingfull adder.
4. Designing a 2 – bit Comparator using AND, OR and NOT gates. Realize 4 – bit Comparator using 2– bit Comparators.
5. Realize 2:1 MUX using the given gates and Design 8:1 using 2:1 MUX.
6. Realize a 2x4 Decoder using logic gates and implement 3x8 Decoder using 2x4 Decoder.
7. Convert Demultiplexer to Decoder and vice versa.
8. Designing of Universal n-bit shift register using flip flops and Multiplexers. Draw the timing diagramof the Shift Register.
9. Design a Synchronous binary counter using D-flip flop/given flip flop.
10. Design a asynchronous counter for the given sequence using given flip flops.
11. Designing of MOD 8 Counter using JK flip flops.
12. Designing of sequence detecting State Machine with minimal states using the given flip flops.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	2	1	-	-	1	-	-	2			
CO2	3	2	2	1	2	1	-	-	1	-	-	2			
CO3	2	3	3	2	2	1	-	-	1	-	-	1			
CO4	3	2	1	1	1	-	-	-	-	-	-	-			

Course Outcomes: Upon completing this course, the students will be able to

1. Acquire the knowledge on numerical information in different forms and Boolean algebratheorems.
2. Define Postulates of Boolean algebra and to minimize combinational functions, and designthe combinational circuits.
3. Design and analyze sequential circuits for various cyclic functions.
4. Characterize logic families and analyze them for the purpose of AC and DC parameters.

Beyond Syllabus:

1. Realize all logic gates with TTL logic.
2. Realize all logic gates with DTL logic.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC09: BASIC SIMULATION LABORATORY

B.Tech-II Year I Semester.

L	T	P	C
0	0	2	1

Note:
- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 15 experiment are to be completed

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Periodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting,Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/DiscreteSystem.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system andverifying its physical realiazability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for thegiven transfer function.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value andits Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Verification of Sampling Theorem.
15. Verification of Weiner – Khinchine Relations
16. Verification of convolution property of Fourier transform- beyond syllabus
17. Solution of differential equations- beyond syllabus

Course Outcomes: Upon completing this course, the students will be able to

1. Generate, analyze and perform various operations on Signals/Sequences both in time andFrequency domain
2. Analyze and Characterize Continuous and Discrete Time Systems both in Time and Frequency domain along with the concept of Sampling
3. Generate different Random Signals and capable to analyze their Characteristics
4. Apply the Concepts of Deterministic and Random Signals for Noise removal Applications andon other Real Time Signals

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	3	2	-	-	3	1	-	1			
CO2	3	2	3	3	3	2	-	-	3	1	-	1			
CO3	3	2	3	3	3	2	-	-	3	1	-	1			
CO4	3	2	3	3	3	2	-	-	3	1	-	1			

Major Equipment required for Laboratories:

1. Computer System with latest specifications connected
2. Window XP or equivalent
3. Simulation software-MAT Lab or any equivalent simulation software

VAAGDEVI COLLEGE OF ENGINEERING
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B22MC08: LOGICAL REASONING AND QUANTITATIVE APTITUDE

B.Tech-II Year I Semester.

L	T	P	C
3	0	0	0

Course Objectives: Upon completing this course, the students will be able to:

1. To improve logical thinking with general applications using mathematical concepts like Sequences, series, number theory and probability.
2. It also features students to analyze data interpretation and able of improve their mathematical Skills in various general aspects like coding and decoding, Time and Work puzzles solving blood relations etc.

Unit – I: Logical Reasoning

1. Coding and Decoding
2. Distance and Directions
3. Classifications
4. Odd man out and series
5. Clocks and Calendars etc.

Unit – II: Logical ability

1. Blood relations
2. Seating Arrangements
3. Figure Analysis
4. Puzzles etc.

Unit – III: Number systems

1. LCM and HCF
2. Ratio and proportion
3. Simple interest and compound interest
4. Profit and Loss etc.

Unit – IV: Arithmetic ability

1. Time and work
2. Partnerships
3. Time speed and distance
4. Problems on Trains etc.

Unit – V: Mathematical ability

1. Sequence and series
2. Permutations and combination
3. General probability etc.

Course Outcomes: Upon completion of this course, students will be able to:

1. Improve their logical thinking in terms of general and mathematical concepts.
2. Compete in academic as well as competitive levels through which students are able to solve the real world problems.
3. Analyze the number systems
4. Make quick decisions to face the critical arithmetic problems.
5. Analyze the mathematical problems

Text Books:

1. A modern approach to verbal and non-verbal reasoning by Dr. R.S. Aggarwal.
2. Quantitative Aptitude by Abhijit Guha Tata McGraw-Hill Company Limited.

Reference Books:

1. Quantitative Aptitude by P.A. Anand (Wiley)
2. Quantitative Aptitude by Dr. R.S. Agarwal.
3. Objective Arithmetic by S.L. Gulati.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC13: PROBABILITY THEORY AND STOCHASTIC PROCESSES

B.Tech. II Year II Semester.

L	T	P	C
3	0	0	3

Pre-requisite: Mathematics

Course Objectives:

1. This gives basic understanding of random variables and operations that can be performed onthem.
2. To known the Spectral and temporal characteristics of Random Process.
3. To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics.

UNIT - I

Probability & Random Variable: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events, *Random Variable*-Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

UNIT - II

Operations on Single & Multiple Random Variables – Expectations: Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic and Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence.

Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions. Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT - III

Random Processes – Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

UNIT - IV

Random Processes – Spectral Characteristics: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

UNIT - V

Noise Sources & Information Theory: Resistive/Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties. Entropy, Information rate, Source coding: Huffman coding, Shannon Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade -off between bandwidth and SNR.

Course Outcomes: Upon completing this course, the students will be able to:

1. Understand the concepts of Probability, random variables, density and distribution functions
2. Perform operations on single and multiple Random variables.
3. Determine the temporal characteristics of Random Signals.
4. Understand the concepts of spectral characteristics of Random processes and Characterize LTI systems driven by stationary random process by using ACFs and PSDs.
5. Understand the concepts of Noise and Information theory in Communication systems.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	2	-	-	-	-	-	-	-	-			
CO2	3	3	-	2	-	-	-	-	-	-	-	-			
CO3	3	3	3	2	-	-	-	-	-	-	-	-			
CO4	3	3	3	2	-	-	-	-	-	-	-	-			
CO5	3	3	3	2	-	-	-	-	-	-	-	-			

TEXT BOOKS:

1. Peyton Z. Peebles - Probability, Random Variables & Random Signal Principles, 4th Ed, TMH,2001.
2. Taub and Schilling - Principles of Communication systems, TMH, 2008

REFERENCE BOOKS:

1. Bruce Hajck - Random Processes for Engineers, Cambridge unipress, 2015
2. Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and StochasticProcesses, 4th Ed., PHI, 2002.
3. B.P. Lathi - Signals, Systems & Communications, B.S. Publications, 2003.
4. S.P Eugene Xavier -Statistical Theory of Communication, New Age Publications, 2003

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC14: ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES

B.Tech-II Year II Semester.

L	T	P	C
3	0	0	3

Pre-requisite: Mathematics

Course Objectives: Upon completing this course, the students will be able to

1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields, and apply them to solve physics and engineering problems.
2. To distinguish between static and time-varying fields, and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions tocommunication engineering problems.
3. To study the propagation, reflection and transmission of plane waves inbounded and unbounded media.

UNIT – I

Electrostatics: Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Energy Density. Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors.

UNIT – II

Magnetostatics: Biot-Savart's Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.

UNIT – III

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Two Equations for Magnetostatic Fields, Maxwell's Two Equations for Electrostatic Fields Maxwell's Equations in Different Forms, Conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces.

UNIT – IV

EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definitions, Relation between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization. Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem.

UNIT – V

Transmission Lines: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Equivalent Circuit, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading.SC and OC Lines, $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines, Reflection Coefficient, VSWR Smith Chart – Configuration and Applications, Single Stub Matching.

Course Outcomes: **Upon completing this course, the student able to**

1. Acquire the knowledge of Basic Laws, Concept sand proofs related to Electrostatic Fields
2. Acquire the knowledge of Basic Laws related to Magneto static Fields..
3. Characterize the static and time-varying fields; establish the corresponding sets of Maxwell'sEquations and Boundary Conditions.
4. Analyze the Wave Equations and classify conductors, dielectrics and evaluate the UPWCharacteristics for several practical media of interest.
5. Analyze the Design aspect of transmission line parameters and configurations.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	1	-	-	-	1	-	-			
CO2	3	3	2	1	-	1	-	-	-	1	-	-			
CO3	3	3	2	1	-	1	-	-	-	1	-	-			
CO4	3	3	2	1	-	1	-	-	-	1	-	-			
CO5	3	3	2	1	-	1	-	-	-	1	-	-			

TEXT BOOKS:

1. William H. Hayt Jr. and John A. Buck- Engineering Electromagnetics, 8th Ed., McGraw Hill,2014
2. Matthew N.O. Sadiku and S.V. Kulkarni - Principles of Electromagnetics, 6th Ed., Oxford University Press, Asian Edition, 2015.

REFERENCE BOOKS:

1. JD. Kraus -Electromagnetics with Applications ,5th Ed., TMH
2. Umesh Sinha, Satya Prakashan -Transmission Lines and Networks, (Tech. IndiaPublications), New Delhi, 2001.
3. JD Ryder -Networks, Lines and Fields, 2nd Ed., PHI, 1999

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC15: ANALOG AND DIGITAL COMMUNICATIONS

B.Tech- II Year II Semester.

L	T	P	C
3	0	0	3

Prerequisite: Probability theory and Stochastic Processes, Signal and system

Course Objectives:

1. To develop ability to analyze system requirements of Analog and digital communicationsystems.
2. To understand the generation, detection of various Analog and digital modulation techniques.
3. To acquire the vertical knowledge of each block in AM, FM transmitters and receivers.
4. To understand the concepts of baseband transmissions.

UNIT - I

Amplitude Modulation: Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, principle of Vestigial side band modulation.

UNIT - II

Angle Modulation: Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Signal-Armstrong Method, Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis.

UNIT - III

Transmitters: Classification of Transmitters, AM Transmitters, FM Transmitters
Receivers: Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison of AM and FM Receivers.

UNIT - IV

Pulse Modulation: Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM.
Pulse Code Modulation: PCM Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

UNIT - V

Digital Modulation Techniques: ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non-Coherent FSK Detector, and BPSK- Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK and QAM.
Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception, ISI, Eye Diagrams.

Course Outcomes: Upon completing this course, the student able to

1. Design and analyze various Amplitude Modulation and Demodulation techniques.
2. Interpret different angle modulation and demodulation systems.
3. Assess the performance of various transmitters and receivers.
4. Analyze various pulse modulation and demodulation techniques.
5. Develop skills in analyzing digital modulation schemes.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	-	3	2	-	-	-	-	1			
CO2	3	3	3	1	-	2	2	-	-	-	-	1			
CO3	3	3	3	1	-	2	2	-	-	-	-	1			
CO4	3	3	3	1	-	3	2	-	-	-	-	1			
CO5															

TEXT BOOKS

1. Simon Haykin -Analog and Digital Communications, John Wiley, 2005.
2. Wayne Tomasi - Electronics Communication Systems-Fundamentals through Advanced, 5th Ed., PHI, 2009.

REFERENCE BOOKS

1. Herbert Taub, Donald L Schilling, Goutam Saha, -Principles of Communication Systems, 3rd Ed., McGraw-Hill, 2008.
2. Dennis Roddy and John Coolean - Electronic Communications, 4th Ed., PEA, 2004
3. George Kennedy and Bernard Davis - Electronics & Communication System, TMH, 2004
4. K. Sam Shanmugam - Analog and Digital Communication, Willey, 2005

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B22EC16: LINEAR AND DIGITAL IC APPLICATIONS

B.Tech- II Year II Semester.

L	T	P	C
3	0	0	3

Course Objectives: The main objectives of the course are:

1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce the theory and applications of Analog multipliers and PLL.
3. To introduce the concept sine waveform generation and introduce some special function ICs.
4. To understand and implement the working of basic digital circuits.

UNIT - I

Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation-Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT - II

Op-Amp, IC-555 & IC565 Applications: Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Saw tooth, Square Wave, IC555 Timer-Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL-Block Schematic, principle and Applications.

UNIT - III

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs – Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT - IV

Combinational Logic ICs: Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT - V

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS40XX Series ICs - All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers. Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

Course Outcomes: Upon completing this course, the students will be able to

1. A thorough understanding of operational amplifiers with linear integrated circuits.
2. Attain the knowledge of functional diagrams and design applications of IC555 and IC565.
3. Acquire the knowledge and design the Data converters.
4. Choose the proper digital integrated circuits by knowing their characteristics.
5. Attain the knowledge about 74xx and CMOS 40xx series integrated circuits for sequential logic and memories.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	-	-			
CO2	3	3	3	1	-	-	-	-	-	-	-	-			
CO3	3	3	3	1	-	-	-	-	-	-	-	-			
CO4	3	3	2	1	-	-	-	-	-	-	-	-			
CO5	3	3	2	1	-	-	-	-	-	-	-	-			

TEXT BOOKS:

1. Ramakanth A. Gayakwad - Op-Amps & Linear ICs, PHI, 2003.
2. Floyd and Jain- Digital Fundamentals, 8th Ed., PearsonEducation,2005.

REFERENCE BOOKS:

1. D. Roy Chowdhary – Linear Integrated Circuits, New Age International(p)Ltd,2nd Ed., 2003.
2. John. F. Wakerly – Digital Design Principles and Practices, 3rd Ed., Pearson, ,2009.
3. Salivahanan -Linear Integrated Circuits and Applications, TMH, 2008.
4. William D.Stanley- Operational Amplifiers with Linear Integrated Circuits, 4th Ed., Pearson Education India, 2009.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC17: ELECTRONIC CIRCUIT ANALYSIS

B.Tech- II Year II Semester. **L T P C**
3 0 0 3

Pre-requisite: Analog Circuits
Course Objectives: The student will be able to
1. Learn the concepts of Power Amplifiers.
2. To give understanding of tuned amplifier circuits
3. Understand various multivibrators using transistors and sweep circuits.

UNIT - I

Large Signal Amplifiers: Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class –C and D Amplifiers.

UNIT- II

Tuned Amplifiers: Introduction, single Tuned Amplifiers – Q-factor, frequency response, Double Tuned Amplifiers – Q-factor, frequency response, Concept of stagger tuning and synchronous tuning

UNIT - III

Multivibrators: Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

UNIT - IV

Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, concepts of Transistor Miller and Bootstrap Time Base Generator, Methods of Linearity improvement.

UNIT - V

Synchronization and Frequency Division: Pulse Synchronization of Relaxation Devices, Frequency division in Sweep Circuits, Stability of Relaxation Devices, Astable Relaxation Circuits, Monostable Relaxation Circuits, Synchronization of a Sweep Circuit with Symmetrical Signals, Sine wave frequency division with a Sweep Circuit, A Sinusoidal Divider using Regeneration and Modulation.
Sampling Gates: Basic operating principles of Sampling Gates, Unidirectional and Bi-directional Sampling Gates, Four Diode Sampling Gate, Reduction of pedestal in Gate Circuits

Course Outcomes: Upon completing this course, the student will be able to
1. Design the power amplifiers
2. Design the tuned amplifiers and analyze is frequency response
3. Design Multivibrators for various applications.
4. Analyze different sweep generator circuits.
5. Utilize the concepts of synchronization, frequency division and sampling gates

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	-	3	2	-	-	-	-	1			
CO2	3	3	3	1	-	2	2	-	-	-	-	1			
CO3	3	3	3	1	-	2	2	-	-	-	-	1			
CO4	3	3	3	1	-	3	2	-	-	-	-	1			
CO5	3	3	3	1	-	3	2	-	-	-	-	1			

TEXT BOOKS:

1. Jacob Millman, Christos C Halkias - Integrated Electronics, , McGraw Hill Education.
2. J. Millman, H. Taub and Mothiki S. PrakashRao - Pulse, Digital and Switching Waveforms –2nd Ed., TMH, 2008,

REFERENCE BOOKS:

1. David A. Bell - Electronic Devices and Circuits, 5th Ed., Oxford.
2. Robert L. Boylestad, Louis Nashelsky - Electronic Devices and Circuits theory, 11th Ed.,Pearson, 2009
3. Ronald J. Tocci - Fundamentals of Pulse and Digital Circuits, 3rd Ed., 2008.
4. David A. Bell - Pulse, Switching and Digital Circuits, 5th Ed., Oxford, 2015.

. **VAAGDEVI COLLEGE OF ENGINEERING**
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B22EC18: ANALOG AND DIGITAL COMMUNICATIONS LABORATORY

B.Tech- II Year II Semester.

Course Objectives:

1. The purpose of this course is to introduce the fundamental principles of continuous wave (CW) modulation and pulse modulation, as required for Electronics Engineering students.
2. To learn the fundamental concepts of various digital modulation schemes.

Note:

- Minimum 12 experiments should be conducted:
- All these experiments are to be simulated first either using MATLAB, COMSIM or any other simulation package and then to be realized in hardware

List of Experiments:

1. (i) Amplitude modulation and demodulation (ii) Spectrum analysis of AM
2. (i) Frequency modulation and demodulation (ii) Spectrum analysis of FM
3. DSB-SC Modulator & Detector
4. SSB-SC Modulator & Detector (Phase Shift Method)
5. Frequency Division Multiplexing & De multiplexing
6. Pulse Amplitude Modulation & Demodulation
7. Pulse Width Modulation & Demodulation
8. Pulse Position Modulation & Demodulation
9. PCM Generation and Detection
10. Delta Modulation
11. DPCM Generation and Detection
12. Frequency Shift Keying: Generation and Detection

Course Outcomes: Upon completing this course, the student able to:

1. Design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics
2. Design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics
3. Apply different types of Sampling with various Sampling rates and duty Cycles
4. Design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	3	1	2	2	-	2	3	2	-	1			
CO2	1	-	3	1	2	2	-	2	3	2	-	1			
CO3	1	-	3	1	2	2	-	2	3	2	-	1			
CO4	1	-	3	1	2	2	-	2	3	2	-	1			

Beyond Syllabus

1 Pre- emphasis & De-emphasis
2 Convolution encoder & Decoder
*Prove practically the Figure of Merit of DSB-SC is unity for single tone modulation

Major Equipment required for Laboratories:

1. CROs: 20MHz
2. Function Generators: 2MHz
3. Spectrum Analyzer
4. Regulated Power Supplies: 0-30V
5. MAT Lab/Equivalent Simulation Package with Communication tool box

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC19: LINEAR AND DIGITAL IC APPLICATIONS LABORATORY

B.Tech. II Year II Semester.

L	T	P	C
0	0	2	1

Course Objectives:

1. To learn about the linear and digital applications of integrated circuits.
2. To familiarize students, design the application circuitry using basic integrated circuits.

Note:

- Minimum 12 experiments should be conducted.
- Verify the functionality of the IC in the given application.

Design and Implementation of:

1. Design an Inverting and Non-inverting Amplifier using Op Amp and calculate gain.
2. Design Adder and Subtractor using Op Amp and verify addition and subtraction process.
3. Design a Integrator and Differentiator Circuits using IC741 and derive the required conditionpractically.
4. Design a Active LPF, HPF cutoff frequency of 2 KHZ and find the roll off of it.
5. Design a Circuit using IC741 to generate sine/square/triangular wave with period of 1KHZ and draw the output waveform.
6. Construct Mono-stable Multivibrator using IC555 and draw its output waveform.
7. Construct Astable Multivibrator using IC555 and draw its output waveform and also find its duty cycle.
8. Design a Schmitt Trigger Circuit and find its LTP and UTP.
9. Design Voltage Regulator using IC723, IC 7805/7809/7912 and find its load regulation factor.
10. Design R-2R ladder DAC and find its resolution and write a truth table with respective voltages.
11. Design Parallel comparator type/ counter type/ successive approximation ADC and find its efficiency.
12. Design an even priority encoder using IC 74xx and verify its truth table.
13. Design a 8x1 multiplexer using digital ICs.
14. Design a 4-bit Adder/Subtractor using digital ICs and Add/Sub the following

Bits	(i) 1010	(ii) 0101	(iii) 1011
	0100	0010	1001.

15. Design a Up/down counter usingIC74163 and draw read/write waveforms.
16. Design a Universal shift register using IC 74194/195 and verify its shifting operation.
17. Design a 16x4 RAM using 74189 and draw its read/write operation.
18. Design a 8x3 encoder/3x8 decoder and verify its truth table.

Major Equipment required for Laboratories:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply; Multimeter
2. 20 MHz Oscilloscope with Dual Channel; Bread board and components/Trainer Kit;

Course Outcomes: Upon completing this course, the student able to

1. Design and implementation of various analog circuits using 741 ICs.
2. Design and implementation of various Multivibrators using 555 timer.
3. Design and implement various circuits using digital ICs.
4. Design and implement ADC, DAC and voltage regulators.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	0	3	3	3	-	-	-	3	3	-	1			
CO2	1	0	3	3	3	-	-	-	3	3	-	1			
CO3	1	0	3	3	3	-	-	-	3	3	-	1			
CO4	1	0	3	3	3	-	-	-	3	3	-	1			

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC20: ELECTRONIC CIRCUIT ANALYSIS LABORATORY

B.Tech-II Year II Semester.

L	T	P	C
0	0	2	1

Course Objectives:

1. To understand the design concepts of various power amplifier, tuned amplifier circuits.
2. To understand principle and operation of various multivibrators and sweep circuits based on transistors.
3. To introduce the concepts of sampling gates.

Note:

- Experiments marked with ***** has to be designed, simulated and verified in hardware.
- Minimum of 9 experiments to be done in hardware.

Hardware Testing in Laboratory:

1. Design transformer coupled class A power amplifier and draw the input and output waveforms find its efficiency.*
2. Design class B power amplifier and draw the input and output waveforms, and show that the crossover distortion occurs in class B amplifier.
3. Prove that the complementary symmetry pushpull amplifier eliminate cross over distortion.
4. Design class C power amplifier and draw the input and output waveforms.*
5. Design a single tuned amplifier and determine the Q of its tuned circuit practically.*
6. Design a Bistable Multivibrator and analyze the effect of commutating capacitors anddraw the wave forms at base and collector of transistors.
7. Design an Astable Multivibrator and draw the wave forms at base and collector oftransistors.
8. Design a Monostable Multivibrator and draw the input and output waveforms
9. Design a Bootstrap sweep circuit using BJT and draw its output time base waveform
10. Design a constant current sweep generator and draw input and output waveforms
11. Design unidirectional and bidirectional sampling gates.*
12. Prove practically Schmitt Trigger generates square wave

Beyond Syllabus:

1. Street light controller
2. UJT relaxation oscillator

Major Equipment required for Laboratories:

1. Computer System with latest specifications connected
2. Window XP or equivalent
3. Simulation software-Multisim or any equivalent simulation software
4. Regulated Power Suppliers, 0-30V
5. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
6. Functions Generators-Sine and Square wave signals
7. Multimeters
8. Electronic Components

Course Outcomes: Upon completing this course, the students will be able to

1. Design power amplifiers and find its efficiency
2. Design tuned amplifiers and find its Q-factor
3. Design various multivibrators and sweep circuits. Understand the necessity of linearity
4. Design sampling gates.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	3	3	3	-	-	-	3	3	-	1			
CO2	1	-	3	3	3	-	-	-	3	3	-	1			
CO3	1	-	3	3	3	-	-	-	3	3	-	1			
CO4	1	-	3	3	3	-	-	-	3	3	-	1			

VAAGDEVI COLLEGE OF ENGINEERING
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B22MC07: GENDER SENSITIZATION LAB

B.Tech- II Year II Semester.

L	T	P	C
0	0	2	0

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Course Objectives

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

Unit-I: Understanding Gender

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes Towards Gender-Construction of Gender-Socialization: Making Women, Making Men -Preparing for Womanhood. Growing up Male. First lessons in Caste.

Unit – II: Gender Roles And Relations

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences- Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit – III: Gender And Labour

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and unaccounted work.-Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit – IV: Gender - Based Violence

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*

Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Unit – V: Gender And Culture

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Course Outcomes

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter them. Students will acquire insight into the gendered division of labor and its relation to politics and economics.
4. Students will develop a sense of appreciation of women in all walks of life. Men and women students and professionals will be better equipped to work and live in harmony
5. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

- Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".

- **Essential Reading**: The Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

Assessment And Grading:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC24: MICROCONTROLLERS

B.Tech. III Year I Semester

L	T	P	C
3	1	0	4

Prerequisite: Nil

Course Objectives:

1. To familiarize the architecture of microprocessors and micro controllers
2. To provide the knowledge about interfacing techniques of bus & memory.
3. To understand the concepts of ARM architecture
4. To study the basic concepts of Advanced ARM processors

UNIT -I

8086 Architecture: 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architectureof 8086, Signal descriptions of 8086, interrupts of 8086.

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT -II

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, MemoryOrganization, Addressing Modes and Instruction set of 8051.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

UNIT –III

I/O And Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

UNIT –IV

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set — Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

UNIT – V

Advanced ARM Processors: Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

Course Outcomes: Upon completing this course, the student will be able to

1. Known the internal architecture, organization and assembly language programming of 8086processors.
2. Known the internal architecture, organization and assembly language programming of 8051/controllers
3. Learn the interfacing techniques to 8086 and 8051 based systems.
4. Known the internal architecture of ARM processors
5. Learn the basic concepts of advanced ARM-processors

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	2	1	-	-	-	1	1	2	3	-
CO2	3	3	3	2	2	2	1	-	-	-	1	1	2	3	-
CO3	3	3	3	2	2	2	1	-	-	-	1	1	2	3	-
CO4	3	3	3	2	2	2	1	-	-	-	2	2	2	3	-
CO5	3	3	3	2	2	2	1	-	-	-	1	2	2	3	

TEXT BOOKS:

1. A. K. Ray and K. M. Bhurchandani -Advanced Microprocessors and Peripherals, TMH, 2nd Edition 2006.
2. Andrew N SLOSS, Dominic SYMES, Chris WRIGHT -ARM System Developers guide, Elsevier,2012

REFERENCE BOOKS:

1. Kenneth. J. Ayala-The 8051 Microcontroller, Cengage Learning, 3rd Ed, 2004.
2. D. V. Hall -Microprocessors and Interfacing, TMGH, 2nd Edition, 2006.
3. K. Uma Rao, Andhe Pallavi-The 8051 Microcontrollers, Architecture and Programming andApplications, Pearson, 2009.
4. Donald Reay-Digital Signal Processing and Applications with the OMAP- L138 Experimenter,WILEY 2012.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC24: IOT ARCHITECTURES AND PROTOCOLS

B.Tech. III Year I Semester **L T P C**
3 0 0 3

Course Objectives:

1. To provide the basic knowledge on IoT.
2. To explain the different components and Architectures from M2M to IoT.
3. To provide knowledge on different protocols of IoT.
4. To impart knowledge on implementations of different protocols of IoT.

UNIT- I

IOT introduction:

Introduction and definition of IoT, Evolution of IoT, IoT growth, Application areas of IoT, Characteristics of IoT, IoT stack, Enabling technologies, IoT levels, IoT sensing and actuation, Sensing types, Actuatortypes.

UNIT - II

IOT and M2M:

M2M to IoT — A Basic Perspective– Introduction, Differences and similarities between M2M and IoT, SDN and NFV for IoT,M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, international driven global value chain and global information monopolies.

IOT Architecture:

IoT Architecture components, Comparing IoT Architectures, A simplified IoT Architecture, core IoT functional stack, IoT data management and compute stack

UNIT- III

IOT Data link layer and Network layer protocols:

PHY/MAC Layer (3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, Z Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH, ND, DHCP, ICMP, RPL, CORPL, CARP

UNIT- IV

Transport and Session layer protocols:

Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer HTTP, CoAP, XMPP, AMQP, MQTT

UNIT- V

Service layer protocols and Security:

Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 6LoWPAN,RPL, Application Layer.

Course Outcomes: After completion of this course the student will able to

1. Explore the Evolution of IoT, its Growth and Applications.
2. Know the components of IoT and Compare the various architectures of IoT.
3. Establish the knowledge on various IoT protocols like Data link, Network etc.,
4. Establish the knowledge on various IoT protocols like like Transport, Session etc.,
5. Establish the knowledge on various IoT protocols like Service layers, security etc.,.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	3	2	2	2	1	-	-	-	1	1	-	2	2
CO2	3	1	3	2	2	2	1	-	-	-	1	1	-	2	2
CO3	3	1	3	2	2	2	1	-	-	-	1	1	-	2	2
CO4	3	1	3	2	2	2	1	-	-	-	2	2	-	2	2
CO5	3	1	3	2	2	2	1	-	-	-	2	2	-	2	2

TEXT BOOKS:

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy -Introduction to IOT, Cambridge University Press.
2. David Hanes, Gonzalo salgueiro, Patrick Grossetete, Rob barton, Jerome henry-IoT Fundamentals Networking Technologies, Protocols and Usecases for IoT", Cisco Press.

REFERENCE BOOKS:

1. Cunopfister-Getting started with the internet of things, O Reilly Media, 2011
2. Francis daCosta,-Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 st Edition, Apress Publications.
3. Arshdeep Bahga, Vijay Madisetti -Internet of Things A Hands-on approach, Universities Press
4. Shriram K Vasudevan, RMD Sundaram, Abhishek S Nagarajan-Internet of things, John Wileyand Sons.
5. Massimo Banzi, Michael Shiloh Make: Getting Started with the Arduino, Shroff Publisher/Maker Media Publishers

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B22EC26: CONTROL SYSTEMS

B.Tech. III Year I Semester

L	T	P	C
3	1	0	4

Prerequisite: Linear Algebra and Calculus, Ordinary Differential Equations and Multivariable CalculusLaplace Transforms, Numerical Methods and Complex variables

Course objectives:

1. To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
2. To assess the system performance using time domain analysis and methods for improving it
3. To assess the system performance using frequency domain analysis and techniques for improving the performance
4. To design various controllers and compensators to improve system performance

UNIT - I

Introduction to Control Problem: Industrial Control examples. Mathematical models of physical systems. Control hardware and their models. Transfer function models of linear time-invariant systems. Feedback Control: Open-Loop and Closed-loop systems. Benefits of Feedback. Block diagram algebra.

UNIT - II

Time Response Analysis of Standard Test Signals: Time response of first and second order systems for standard test inputs. Application of initial and final value theorem. Design specifications for second- order systems based on the time-response. Concept of Stability. Routh-Hurwitz Criteria. Relative Stability analysis. Root-Locus technique. Construction of Root-loci.

UNIT - III

Frequency-Response Analysis: Relationship between time and frequency response, Polar plots, Bode plots. Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin.Closed-loop frequency response.

UNIT - IV

Introduction to Controller Design: Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness of control systems. Root-loci method of feedback controller design. Design specifications in frequency-domain. Frequency-domain methods of design. Applicationof Proportional, Integral and Derivative Controllers, Lead and Lag compensation in designs. Analog and Digital implementation of controllers.

UNIT - V

State Variable Analysis and Concepts of State Variables: State space model. Diagonalization of State Matrix. Solution of state equations. Eigen values and Stability Analysis. Concept of controllability and observability. Pole-placement by state feedback. Discrete-time systems. Difference Equations. State-space models of linear discrete-time systems. Stability of linear discrete-time systems.

Course Outcomes: At the end of this course, students will demonstrate the ability to

1. Understand the concept of feedback and analyze the control system components by their Mathematical modeling.
2. Estimate the time domain specification s and steady state error.
3. Apply various time domain techniques to assess the system performance.
4. Formulate different types of analysis in frequency domain to explain the nature of stability of the system for different types of controllers
5. Test system controllability and observability using state space representation and applications of state space representation to various systems.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	2	1	-	-	1	-	-	1	-	1	-	1	3	2	-
CO2	3	2	1	1	1	-	-	1	-	1	-	1	3	2	-
CO3	3	2	1	1	1	-	-	1	-	1	-	1	3	2	-
CO4	3	2	1	1	1	-	-	1	-	1	-	1	3	2	-
CO5	3	3	3	3	1	-	-	1	-	1	-	1	3	2	-

TEXT BOOKS:

1. M. Gopal, -Control Systems: Principles and Design, McGraw Hill Education, 1997.
2. B. C. Kuo, -Automatic Control System, Prentice Hall, 1995.

REFERENCE BOOKS:

1. K. Ogata=Modern Control Engineering, Prentice Hall, 1991.
2. I. J. Nagrath and M. Gopal-Control Systems Engineering, New Age International, 2009.

VAAGDEVI COLLEGE OF ENGINEERING
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B22MB01: BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech. III Year I Semester

L	T	P	C
3	0	0	3

Course Objective:

1. To learn the basic business types, impact of the economy on Business and Firms specifically.
2. To analyze the Business from the Financial Perspective.

UNIT – I

Introduction to Business and Economics:

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT - II

Demand and Supply Analysis:

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT - III

Production, Cost, Market Structures & Pricing:

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT - IV

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT - V

Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

Introduction to Fund Flow and Cash Flow Analysis (simple problems).

Course Outcome: Upon completion of the course, the student will bo able to

1. Understand the various Forms of Business and the impact of economic variables on the Business.
2. Know what is Demand, Supply, Production, Cost, Market Structure, Pricing aspects.
3. Know how production function is carried out to achieve least cost combination of Inputs and how to analyze cost.
4. Understand the firm's financial position by analyzing the Financial Statements of a Company.
5. Analyze and interpret financial statements using ratio analysis

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	2	1	1	-	2	3	1	-	-	1
CO2	2	1	-	-	-	2	1	1	-	2	3	1	-	-	1
CO3	3	2	1	1	-	2	1	1	-	2	3	1	-	-	1
CO4	2	1	-	-	-	2	1	1	-	2	3	1	-	-	1
CO5	3	2	1	1	-	2	1	1	-	2	3	1	-	-	1

TEXT BOOKS:

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, InternationalBook House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

REFERENCE BOOKS:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, VikasPublications, 2013.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC42: COMPUTER ORGANIZATION & OPERATING SYSTEMS (PE-I)

B.Tech. III Year I Semester

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand the structure of a computer and its operations.
2. To understand the RTL and Micro-level operations and control in a computer.
3. Understanding the concepts of I/O and memory organization and operating systems.

UNIT - I

Basic Structure of Computers: Computer Types, Functional Unit, Basic operational Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi Computers, Data Representation, FixedPoint Representation, Floating Point Representation.

Register Transfer Language and Micro Operations: Register Transfer Language, Register Transfer Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit, Instruction Codes, Computer Registers, Computer Instructions, Instruction Cycle, Memory – Reference Instructions, Input – Output and Interrupt, STACK Organization, Instruction Formats, Addressing Modes, DATA Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

UNIT - II

Micro Programmed Control: Control Memory, Address Sequencing, Microprogram Examples, Design of Control Unit, Hard Wired Control, Micro programmed Control

The Memory System: Basic Concepts of Semiconductor RAM Memories, Read-Only Memories, Cache Memories, Performance Considerations, Virtual Memory.

UNIT - III

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer Modes, Priority Interrupt, Direct Memory Access, Input –Output Processor (IOP), Serial Communication; Introduction to Peripheral Components, Interconnect (PCI) Bus, Introduction to Standard Serial Communication Protocols like RS232, USB, IEEE 1394.

UNIT - IV

Operating Systems Overview: Overview of Computer Operating Systems, Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating Systems Structures-Operating System Services and Systems Calls, System Programs, Operating Systems Generation

Memory Management: Swapping, Contiguous Memory Allocation, Paging, Structure of The Page Table, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Allocation of Frames, Thrashing Case Studies - UNIX, Linux, Windows

Principles of Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detectionand Avoidance, Recovery from Deadlock.

UNIT - V

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection.

File System Implementation: File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free-Space Management.

Course Outcomes: After completion of this course the student will able to

1. Demonstrate and understanding of the functional units of digital computer, instruction sets and their impact on processor design.
2. Utilize the micro-level operations to control different units in a computer.
3. Illustrate the concepts of I/O Organization.
4. Implement operating systems in a computer.
5. Apply File Management concepts in operating systems and familiarize the directory structure.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	1	1	-	-	-	1	1	2	2	-
CO2	3	2	1	1	2	1	1	-	-	-	1	1	2	2	-
CO3	3	3	2	2	2	1	1	-	-	-	1	1	2	2	-
CO4	3	2	1	1	2	1	1	-	-	-	1	1	2	2	-
CO5	3	2	1	1	2	1	1	-	-	-	1	1	2	2	-

TEXT BOOKS:

1. Carl Hamacher, Zvonks Vranesic, Safea Zaky - Computer Organization, 5th Edition, McGrawHill.
2. M. Moris Mano -Computer Systems Architecture, 3rd Edition, Pearson
3. Abraham Silberchatz, Peter B. Galvin, Greg Gagne -Operating System Concepts, 8th Edition,John Wiley.

REFERENCE BOOKS:

1. William Stallings- Computer Organization and Architecture, 6th Edition, Pearson
2. Andrew S. Tanenbaum -Structured Computer Organization, 4th Edition, PHI
3. Sivaraama Dandamudi - Fundamentals of Computer Organization and Design, Springer Int.Edition.
4. Stallings -Operating Systems – Internals and Design Principles, 6th Edition, Pearson Education,2009.
5. Modern Operating Systems, Andrew S Tanenbaum 2nd Edition, PHI.
6. Principles of Operating Systems, B.L. Stuart, Cengage Learning, India Edition.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC43: DATA COMMUNICATIONS AND COMPUTER NETWORKS (PE-I)

B.Tech. III Year I Semester

L	T	P	C
3	0	0	3

Pre-requisite: Digital Communications

Course Objectives:

1. To introduce the Fundamentals of data communication networks
2. To demonstrate the Functions of various protocols of Data link layer.
3. To demonstrate Functioning of various Routing protocols.
4. To introduce the Functions of various Transport layer protocols.
5. To understand the significance of application layer protocols

UNIT - I

Introduction to Data Communications: Components, Data Representation, Data Flow, Networks-Distributed Processing, Network Criteria, Physical Structures, Network Models, Categories of Networks Interconnection of Networks, The Internet - A Brief History, The Internet Today, Protocol and Standards Protocols, Standards, Standards Organizations, Internet Standards. Network Models, Layered Tasks, OSI model, Layers in OSI model, TCP/IP Protocol Suite, Addressing Introduction, Wireless Links and Network Characteristics, WiFi: 802.11 Wireless LANs -The 802.11 Architecture,

UNIT - II

Data Link Layer: Links, Access Networks, and LANs- Introduction to the Link Layer, The Services Provided by the Link Layer, Types of errors, Redundancy, Detection vs Correction, Forward error correction Versus Retransmission Error-Detection and Correction Techniques, Parity Checks, Check summing Methods, Cyclic Redundancy Check (CRC) , Framing, Flow Control and Error Control protocols , Noisy less Channels and Noisy Channels, HDLC, Multiple Access Protocols, Random Access ,ALOHA, Controlled access, Channelization Protocols. 802.11 MAC Protocol, IEEE 802.11 Frame

UNIT - III

The Network Layer: Introduction, Forwarding and Routing, Network Service Models, Virtual Circuit and Datagram Networks-Virtual-Circuit Networks, Datagram Networks, Origins of VC and Datagram Networks, Inside a Router-Input Processing, Switching, Output Processing, Queuing, The Routing Control Plane, The Internet Protocol (IP):Forwarding and Addressing in the Internet-Datagram format,Ipv4 Addressing, Internet Control Message Protocol(ICMP), IPv6

UNIT - IV

Transport Layer: Introduction and Transport Layer Services : Relationship Between Transport and Network Layers, Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing, Connectionless Transport: UDP -UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer-Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go- Back-N(GBN), Selective Repeat(SR), Connection Oriented Transport: TCP - The TCP Connection, TCP Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control - The Cause and the Costs ofCongestion, Approaches to Congestion Control

UNIT - V

Application Layer:

Principles of Networking Applications – Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the File Transfer: FTP,- FTP Commands and Replies, Electronic Mail in the Internet- STMP, Comparison with HTTP, DNS-The Internet's Directory Service – Service Provided by DNS, Overview of How DNS Works, DNS Records and messages.

Course Outcomes: Upon completing this course, the student will be able to

1. Know the Categories and functions of various Data communication Networks
2. Design and analyze various error detection techniques.
3. Demonstrate the mechanism of routing the data in network layer
4. Know the significance of various Flow control and Congestion control Mechanisms
5. Know the Functioning of various Application layer Protocols.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	1	1	1	-	-	-	1	1	2	-
CO2	3	2	2	1	2	1	1	1	-	-	-	1	1	2	-
CO3	3	2	2	1	2	1	1	1	-	-	-	1	1	2	--
CO4	3	2	2	1	1	1	1	1	-	-	-	1	1	2	-
CO5	3	2	2	1	1	1	1	1	-	-	-	1	1	2	-

TEXT BOOKS:

1. Kurose James F, Keith W- Computer Networking A Top-Down Approach, 6th Edition, Pearson.
2. Behrouz A. Forouzan - Data Communications and Networking, 4th Edition, McGraw-Hill Education

REFERENCE BOOKS:

1. Bhusan Trivedi - Data communication and Networks, Oxford university press, 2016
2. Andrew S Tanenbaum - Computer Networks, 4th Edition, Pearson Education
3. W. A. Shay - Understanding Communications and Networks, 3rd Edition, Cengage Learning.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC44: ELECTRONIC MEASUREMENTS AND INSTRUMENTATION (PE-I)

B.Tech. III Year I Semester

L	T	P	C
3	0	0	3

Prerequisite: Basic Electrical and Electronics Engineering

Course Objectives:

1. It provides an understanding of various measuring system functioning and metrics for performance analysis.
2. Provides understanding of principle of operation, working of different electronic instruments viz.signal generators, signal analyzers, recorders and measuring equipment.
3. Understanding the concepts of various measuring bridges and their balancing conditions.
4. Provides understanding of use of various measuring techniques for measurement of differentphysical parameters using different classes of transducers.

UNIT - I

Block Schematics of Measuring Systems: Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

UNIT - II

Signal Analyzers: AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, Video Signal Generators, and Specifications

UNIT - III

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period and Frequency Specifications.

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

UNIT - IV

Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Strictive Transducers, gyroscopes, accelerometers.

UNIT - V

Bridges: Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge.

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure – High Pressure, Vacuum level, Temperature -Measurements, Data Acquisition Systems.

Course Outcomes: Upon completing this course, the student will be able to

1. Measure electrical parameters with different meters and understand the basic definition ofmeasuring parameters.
2. Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.
3. Select specific Oscilloscope to measure various signals in practical fields.
4. Explain the operations of various transducers required in measurements.
5. Measure various physical parameters by appropriately selecting the transducers.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	-	-	-	-	-	-	1	3	2	-
CO2	3	2	1	1	-	-	-	-	-	-	-	1	3	2	-
CO3	3	3	3	3	-	-	-	-	-	-	-	1	3	2	-
CO4	3	3	3	3	-	-	-	-	-	-	-	1	3	2	-
CO5	3	3	3	3	-	-	-	-	-	-	-	1	3	2	-

TEXT BOOKS:

1. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W. D. Cooper: PHI 5th Edition 2003.
2. Electronic Instrumentation: H. S. Kalsi – TMH, 2nd Edition 2004.

REFERENCE BOOKS:

1. Electrical and Electronic Measurement and Measuring Instruments – A K Sawhney, DhanpatRai & Sons, 2013.
2. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ. Press, 1997.
3. Industrial Instrumentation: T.R. Padmanabham Springer 2009.
4. Electronic Measurements and Instrumentation – K. Lal Kishore, Pearson Education 2010.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC27: MICROCONTROLLERS LABORATORY

B.Tech. III Year I Semester

L	T	P	C
0	0	2	1

Cycle 1: Using 8086 Processor Kits and/or Assembler

- Assembly Language Programs to 8086 to Perform
  1. Arithmetic, Logical, String Operations on 16 Bit and 32-Bit Data.
  2. Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

Cycle 2: Using 8051 Microcontroller Kit

- Introduction to IDE
  1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swapand Branch Instructions
  2. Time delay Generation Using Timers of 8051.
  3. Serial Communication from / to 8051 to / from I/O devices.
  4. Program Using Interrupts to Generate Square Wave 10 KHZ Frequency on P2.1 Using Timer 0 8051 in 8 bit Auto reload Mode and Connect a 1 HZ Pulse to INT1 pin and Displayon Port 0. Assume Crystal Frequency as 11.0592 MHZ

Cycle 3: Interfacing I/O Devices to 8051

1. 7 Segment Display to 8051.
2. Matrix Keypad to 8051.
3. 8-bit ADC Interface to 8051.
4. Triangular Wave Generator through DAC interfaces to 8051.

Cycle 4: Experiments to be carried out on Cortex-M3 development boards and using GNU tool-chain

1. Blink an LED with software delay, delay generated using the SysTick timer.
2. System clock real time alteration using the PLL modules.
3. Control intensity of an LED using PWM implemented in software and hardware.
4. Control an LED using switch by polling method, by interrupt method and flash the LED onceevery five switch presses.

Course Outcomes: Upon completing this course, the students will be able to:

1. Write assembly language programs and implement on 8086.
2. Write assembly language programs and implement on 8051
3. Interface the I/O devices with 8051 micro controllers
4. Perform experiments on Cortex-M3 development boards using GNU tool-chain

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	-	-	-	-	-	-	1	-	2	2
CO2	3	3	3	3	3	-	-	-	-	-	-	1	-	3	2
CO3	3	3	3	3	3	-	-	-	-	-	-	1	-	3	2
CO4	3	3	3	3	3	-	-	-	-	-	-	1	-	2	3

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC28: IOT ARCHITECTURE AND PROTOCOLS LABORATORY

B.Tech. III Year I Semester

L	T	P	C
0	0	2	1

List of Experiments:

1. Demonstrate blinking of an LED at every 5 seconds and to control the brightness of an LED.
2. Read Humidity and Room Temperature using DHT sensor and display the readings.
3. Send the recorded values of Temperature/Humidity to the Internet via GSM module usingArduino/NodeMCU/Raspberry Pi.
4. Demonstrate Interfacing NodeMCU/Raspberry Pi with the Cloud using REST API and MQTTprotocol.
5. Demonstrate Switching lights on /off remotely using Arduino/NodeMCU/Raspberry Pi.
6. Voice-based Home Automation for switching lights on/off using Google Assistant, IFTTT andMQTT.
7. Interfacing DHT11 sensor with Raspberry pi/equivalent and upload temperature and humidityvalues to the cloud.
8. Design an obstacle detection unit using ultrasonic sensor.
9. Capture images from web camera using Raspberry Pi/equivalent and apply filters in increaseimage quality.
10. Access a remote computer from Raspberry Pi and display the remote screen.
11. Design an automatic water sprinkler based on soil moisture using Arduino/NodeMCU/Raspberry Pi.
12. Design an RFID based attendance system using Arduino/NodeMCU/Raspberry Pi.
13. Write an arduino program to demonstrate interrupts
14. Write an arduino program to demonstrate UART communication protocol
15. Write an arduino program to demonstrate I2C communication protocol
16. Write an arduino program to demonstrate SPI communication protocol

Course Outcomes: Upon completing this course the students will be able to:

1. Utilize the different sensors like room temperature, DHT, Humidity etc.,
2. Interface the sensors and processor for transmission of data.
3. Capture the images and process it on Arduino/NodeMCU/Raspberry Pi.
4. know the utilization of various protocols like I2c, UART communication etc.,

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	3	1	1	-	-	-	-	1	-	2	3
CO2	3	2	3	3	3	1	1	-	-	-	-	1	-	2	3
CO3	3	2	3	3	3	1	1	-	-	-	-	1	-	2	3
CO4	3	2	3	3	3	1	1	-	-	-	-	1	-	2	3

VAAGDEVI COLLEGE OF ENGINEERING
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B22EN03: ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY

B.Tech. III Year I Semester	**L**	**T**	**P**	**C**
	0	**0**	**2**	**1**

Prerequisite: English Language and Interactive Communication Skills Lab

Introduction

The introduction of the Advanced English Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen, speak, read, and write in English both for their professional and interpersonal communication in the globalised context.

The proposed lab should be a laboratory course to enable students to use 'good' English and perform the following:

- Gather ideas and information to organize ideas relevantly and coherently.
- Engage in debates.
- Participate in group discussions.
- Face interviews.
- Write project/research reports/technical reports.
- Make oral presentations.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice-versa.
- Take part in social and professional communication.

Course Objectives

This Lab focuses on using multi-media instruction for language development to meet the following targets:By the end of the course the students will be able

1. To prepare the students for their placements by improving communicative skills.
2. To familiarize and train students with the types and elements of Résumé/ Curriculum Vitae.
3. To acquaint students with the concepts of report writing. familiarize and train students to write technical reports.
4. To practice interview skillsas an observer, an interviewer, or an interviewee.

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Syllabus

Module 1: Fundamentals of Inter-personal Communication

- Listen to process information- give information, as part of a simple explanation – conversation starters: **small talk**-exposure to functional aspects of intonation- accent- tone- pauses for practice – compare information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.
- Lexical chunks for accuracy and fluency- factors influencing the fluency, **Role play**-deliver a five-minute formal / informal talk – greetings – respond to greetings – invite and offer – accept – decline – take leave-making a request-apology etc.
- Listen for and follow the gist- listening for details.Being an active listener: giving verbal and non-verbal feedback – Summarizing academic readings and lectures - conversational speech listening to and participating in conversation – persuasion.

Module 2: Effective Writing Skills

- Résumé Writing-Concept of RésuméWriting -Professional career objective-Resume-Curriculum vitae, Biodata: Difference-Format of Résumé and Types of Résumés -Tips to build a winning Résumé-Tips to write effective cover letter-Statement of Purpose-Letters of Recommendation.
- Report Writing-Elements of Report Writing- Significance, format, layout, and mechanism- types of Reports-Newspaper Reports-Technical reports -Special reports-Report in manuscript format.

Module 3: Presentation Skills

Oral presentations - individual and group through JAMsessions/seminars/**PPTs** and Written presentations through posters/projects/reports.

Module 4: Group Discussion

Concept and process of Group Discussion-Importance of Group Discussion-Do's and Don'ts of Group Discussion-Group Discussion for placements-Practice on topics–Current affairs, Abstract topics, General awareness, Business and economy, Education and Social issues.

Module 5: Interview Skills

Interview Skills: Meaning and Purpose of an Interview-Types of interviews-telephonic interview, video conference-(n)etiquette; Interview preparation techniques-Dress code at an interview-Types of interview questions-FAQs in HR Interview.

Minimum Requirement of infrastructural facilities for Advanced English Communication Skills Lab:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo
- Headphones of High quality
- Forty movable chairs and Eight round tables to accommodate 5 students per each table

Course Outcomes

After completing this course, students will be able to :

1.Participate in group discussion to present their viewpoints briefly and effectively.

2.Inculcate flair for writing and felicity in written expression in Resume / Curriculum vVitae/Reports.

3. Participate confidently with appropriate body language in interviews.

4. Enhance their team building skills and capabilities for effective decision making.

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B22MB06: INTELLECTUAL PROPERTY RIGHTS

B.Tech. III Year I Semester

L	T	P	C
3	0	0	0

Course Objectives

In the interest of the national economic growth the innovations and improvements are to be owned and used for the production and distribution process. The students of technology will be benefited by knowing the process of obtaining recognition of their innovations. This course will enable them to know the legal process of registering the innovations.

Learning Outcome

The students get the knowledge about Intellectual Property, trademarks and copy rights. They also know the rules and regulations related to copy rights. The student will understand the new development in different areas of Intellectual property, trade and copy rights.

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter,selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rightsto perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, International copyright law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copyright law, patent law, intellectual property audits. International overview on intellectual property, international — trade mark law, copyright law, international patent law, and international development in trade secrets law.

TEXT BOOK:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning. REFERENCE BOOK:
1. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

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B22EC29: ANTENNAS AND WAVE PROPAGATION

B.Tech. III Year II Semester

L	T	P	C
3	0	0	3

Pre-requisite: Electromagnetic Theory and Transmission Lines

Course Objectives: The course objectives are:

1. To understand the concept of radiation, antenna definitions and significance of antenna parameters, to derive and analyze the radiation characteristics of thin wire dipole antennas and solve numerical problems.
2. To analyze the characteristics and design relations of UHF, VHF and Microwave Antennas.
3. To identify the antenna array requirements, to determine the characteristics of ULAs and estimate the patterns of BSA, EFA, and Binomial Arrays.
4. To understand the concepts and set-up requirements for microwave measurements and familiarize with the procedure to enable antenna measurements.
5. To define and distinguish between different phenomenon of wave propagation (ground wave, space wave and sky wave), their frequency dependence and estimate their characteristics, identifying their profiles and parameters involved.

UNIT - I

Antenna Basics: Basic Antenna Parameters — Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height.

Fields from Oscillating Dipole, Field Zones, Front - to-back Ratio, Antenna Theorems, Radiation, Retarded Potentials — Helmholtz Theorem

Thin Linear Wire Antennas – Radiation from Small Electric Dipole, Quarter Wave Monopole and HalfWave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area and Effective Height, Natural Current Distributions, Far Fields and Patterns of Thin Linear Centre-fed Antennas of Different Lengths. Loop Antennas - Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small Loops (Qualitative Treatment).

UNIT - II

Antenna Arrays: Point Sources – Definition, Patterns**,** arrays of 2 Isotropic Sources **-** Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Non-uniform Amplitude Distributions – General Considerations and Binomial Arrays.

Antenna Measurements: Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods)

UNIT - III:

VHF, UHF and Microwave Antennas - I: Arrays with Parasitic Elements, Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas – Helical Geometry, Helix Modes, Practical DesignConsiderations for Monofilar Helical Antenna in Axial and Normal Modes, Horn Antennas – Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns.

UNIT - IV

VHF, UHF and Microwave Antennas - II: Microstrip Antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry and Parameters, Characteristics of Microstrip Antennas. Reflector Antennas – Introduction, Flat Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, Reflector Types – Related Features.

UNIT - V

Wave Propagation - Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts,

Ground Wave Propagation –Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections.

Space Wave Propagation –Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super Refraction, M-Curves and Duct Propagation, Scattering Phenomena, Troposphere Propagation.

Sky Wave Propagation –Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and Skip Distance, Multi-hop Propagation.

Course Outcomes: Upon completing this course, the student will be able to

1. Explain the mechanism of radiation, definitions of different antenna characteristic parametersand establish their mathematical relations.
2. Estimate the array factor and characteristics of Linear Arrays, Binomial array and sketch their pattern. Illustrate antenna measurements.
3. Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of various Antennas and to acquire the knowledge of their analysis, design and development.
4. Analyze a Microstrip, rectangular patch antenna and a parabolic reflector antenna, identify the requirements and relevant feed structure, carry out the design and establish their patterns.
5. Classify the different wave propagation mechanisms, determine the characteristic features ofdifferent wave propagations, and estimate the parameters involved.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	-	1	1	-	-	-	-	1	2	3	-
CO2	3	2	3	3	1	1	1	-	-	-	-	1	2	3	-
CO3	3	3	2	2	1	1	1	-	-	-	-	1	2	3	-
CO4	3	3	2	2	1	1	1	-	-	-	-	1	2	3	-
CO5	3	3	2	2	1	1	1	-	-	-	-	1	2	3	-

TEXT BOOKS:

1. J.D. Kraus, R.J. Marhefka and Ahmad S. Khan -Antennas and Wave Propagation, 4th ed., (Special Indian Edition), TMH, New Delhi, 2010.
2. E.C. Jordan and K.G. Balmain -Electromagnetic Waves and Radiating Systems, PHI, 2nd d., 2000.

REFERENCE BOOKS:

1. C.A. Balanis - Antenna Theory, 3rd Edition. John Wiley & Sons, 2005.
2. K.D. Prasad, Satya Prakashan - Antennas and Wave Propagation, Tech India Publications, New Delhi, 2001.
3. Keith henney - Radio Engineering Handbook, 3rd edition TMH.
4. John Leonidas Volakis -Antenna Engineering Handbook, 3rd edition, 2007

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B22EC30: DIGITAL SIGNAL PROCESSING

B.Tech. III Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: Signals and Systems

Course Objectives:

1. To provide background and fundamental material for the analysis and processing of digitalsignals.
2. To understand the fast computation of DFT and appreciate the FFT processing.
3. To study the designs and structures of digital (IIR and FIR) filters and analyze and synthesizefor a given specifications.
4. To acquaint in Multi-rate signal processing techniques and finite word length effects.

UNIT - I

Introduction: Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Linear Shift Invariant Systems,Stability, and Causality, Frequency Domain Representation of Discrete Time Signals and Systems

Multirate Digital Signal Processing: Introduction, Down Sampling, Decimation, Up sampling, Interpolation, Sampling Rate Conversion.

UNIT - II

Discrete Fourier transform: Fourier Transform, Laplace Transform and Z-Transform relation**,** Discrete Fourier Transform: Properties of Discrete Fourier Transform, Computation of DFT, Relation between DTFT, DFT and Z- Transform, Linear Convolution of Sequences: Over-Lap Add Method, Over-Lap Save Method.

Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT.

UNIT - III

IIR Digital Filters: Analog filter approximations – Butterworth, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

UNIT - IV

FIR Digital Filters: Characteristics of FIR Digital Filters, Frequency Response. Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

UNIT - V

Realization of Digital Filters: Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms.

Course Outcomes: Upon completing this course, the student will be able to

1. Outline the properties of systems and signals
2. Identify the various important characteristics of different transform techniques used in digital signal processing.
3. Design IIR filters based on the specifications given
4. Design FIR filters for given specifications
5. Demonstrate different realizations of digital filters

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	1	-	-	1	-	1	-	1	2	2	-
CO2	3	2	1	1	1	-	-	1	-	1	-	1	2	2	-
CO3	3	3	3	3	1	-	-	1	-	1	-	1	2	2	-
CO4	3	3	3	3	1	-	-	1	-	1	-	1	2	2	-
CO5	3	2	1	1	1	-	-	1	-	1	-	1	2	2	-

TEXT BOOKS:

1. A. V. Oppenheim and R.W. Schaffer - Discrete Time Signal Processing, PHI, 2009
2. John G. Proakis, Dimitris G. Manolakis - Digital Signal Processing, Principles, Algorithms, andApplications, Pearson Education / PHI, 2007.

REFERENCE BOOKS:

1. Li Tan - Digital Signal Processing – Fundamentals and Applications, Elsevier, 2008
2. Robert J. Schilling, Sandra L. Harris - Fundamentals of Digital Signal Processing usingMATLAB, Thomson, 2007
3. S. Salivahanan, A. Vallavaraj and C. Gnanapriya - Digital Signal Processing, TMH, 2009
4. Emmanuel C. Ifeachor and Barrie W. Jervis - Digital Signal Processing - A Practical approach,2^{nd} Edition, Pearson Education, 2009

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B22EC31: CMOS VLSI DESIGN

B.Tech. III Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: Electronic Circuit Analysis; Switching Theory and Logic Design

Course Objectives: The objectives of the course are to:

1. Give exposure to different steps involved in the fabrication of ICs.
2. Explain electrical properties of MOS and BiCMOS devices to analyze the behavior of invertersdesigned with various loads.
3. Give exposure to the design rules to be followed to draw the layout of any logic circuit.
4. Provide design concepts to design building blocks of data path of any system using gates.
5. Understand basic programmable logic devices and testing of CMOS circuits.

UNIT - I

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS &BiCMOS

Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, g_m, g_{ds}, Figure of merit; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT - II

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

UNIT - III

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Timedelays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out.

UNIT - IV

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT - V

Programmable Logic Devices: Design Approach – PLA, PAL, Standard Cells FPGAs, CPLDs.

CMOS Testing: CMOS Testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

Course Outcomes: Upon successfully completing the Course, the student should be able to

1. Understand IC technology and basic electrical properties of MOS and BiCMOS.
2. Design the layout of circuits using various design rules.
3. Develop and design the gate level circuits
4. Gain the knowledge to design data path subsystems like Adders, Shifters, ALUs etc.
5. Illustrate different programmable logic devices and CMOS testing.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO	PSO3
CO1	2	1	-	-	1	-	-	1	-	2	-	1	2	3	2
CO2	3	2	1	1	1	-	-	1	-	2	-	1	2	3	2
CO3	3	3	2	2	1	-	-	1	-	2	-	1	2	3	2
CO4	2	1	-	-	1	-	-	1	-	2	-	1	2	3	2
CO5	2	1	-	-	1	-	-	1	-	2	-	1	2	3	2

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell - Essentials of VLSI circuits andsystems, PHI, 2005
2. Neil H. E Weste, David Harris, Ayan Banerjee - CMOS VLSI Design – A Circuits and SystemsPerspective, 3rd Edition, Pearson, 2009.

REFERENCE BOOKS:

1. Ming-BO Lin - Introduction to VLSI Systems: A Logic, Circuit and System Perspective, CRCPress, 2011
2. John. P. Uyemura - CMOS logic circuit Design, Springer, 2007.
3. Wayne Wolf - Modern VLSI Design, 3rd Edition, Pearson Education, 1997.
4. K. Lal Kishore, V. S. V. Prabhakar -VLSI Design, I.K International, 2009.

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B22EC45: DIGITAL IMAGE PROCESSING (PE – II)

B.Tech. III Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: Digital Signal Processing

Course Objectives:

1. To provide a approach towards image processing and introduction about 2D transforms
2. To expertise about enhancement methods in time and frequency domain
3. To expertise about segmentation and compression techniques
4. To understand the Morphological operations on an image

UNIT - I

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels.

Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT - II

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram Manipulation, Linear and Non — Linear Gray Level Transformation, Local or Neighborhood criterion, Median Filter, Spatial Domain High-Pass Filtering.

Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

UNIT - III

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT - IV

Image Segmentation: Detection of Discontinuities, Edge Linking And Boundary Detection, thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation.

UNIT - V

Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

Course Outcomes: Upon completing this course, the student will be able to

1. Explore the fundamental relations between pixels and utility of 2-D transforms in imageprocessing.
2. Inspect image enhancement in both the spatial and frequency domain.
3. Evaluate various image restoration techniques.
4. Explain various image segmentation techniques and morphological operations..
5. Analyze the different image compression techniques.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	-	1	1	1	-	1	-	1	-	1	2
CO2	3	3	2	2	-	1	1	1	-	1	-	1	-	1	2
CO3	3	3	3	3	-	1	1	1	-	1	-	1	-	1	2
CO4	3	3	3	3	-	1	1	1	-	1	-	1	-	1	2
CO5	3	3	3	3	-	1	1	1	-	1	-	1	-	1	2

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods -Digital Image Processing, 3rd Edition, Pearson, 2008
2. S Jayaraman, S Esakkirajan, T Veerakumar - Digital Image Processing- - TMH, 2010.

REFERENCE BOOKS:

1. Scotte Umbaugh- Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools, 2nd Ed, CRC Press, 2011
2. Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings - Digital Image Processing usingMATLAB, 2nd Edition, TMH, 2010.
3. Somka, Hlavac, Boyle-Digital Image Processing and Computer Vision –Cengage Learning(Indian edition) 2008.
4. Adrian low- Introductory Computer Vision Imaging Techniques and Solutions-,2nd Edition, BSPublication, 2008.

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B22EC46: MOBILE COMMUNICATIONS AND NETWORKS (PE-II)

B.Tech. III Year II Semester

L	T	P	C
3	0	0	3

Prerequisites: Analog and Digital Communications

Course Objectives:

1. To provide the student with an understanding of the cellular concept, frequency reuse, hand-off strategies.
2. To provide the student with an understanding of Co-channel and Non-Co-Channel interferences.
3. To give the student an understanding of cell coverage for signal and traffic, diversity techniques and channel assignment
4. To give the student an understanding types of handoff.
5. To understand challenges and application of Adhoc wireless Networks.

UNIT - I

Introduction to Cellular Mobile Radio Systems: Limitations of Conventional Mobile Telephone Systems. Basic Cellular Mobile System, First, Second, Third and Fourth Generation Cellular Wireless Systems. Uniqueness of Mobile Radio Environment-Fading-Tie Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time.

Fundamentals of Cellular Radio System Design: Concept of Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I from a Normal Case in a Omni Directional Antenna System, System Capacity Improving Coverage and Capacity in Cellular Systems-Cell Splitting, Sectoring, Microcell Zone Concept.

UNIT – II

Co-Channel Interference: Measurement of Real Time Co-Channel Interference, Design of Antenna System, Antenna Parameters and their effects, diversity techniques-space diversity, polarization diversity, frequency diversity, time diversity.

Non Co-Channel Interference: Adjacent Channel Interference, Near end far end interference, cross talk, effects on coverage and interference by power decrease, antenna height decrease, effects of cell site components.

UNIT – III

Cell Coverage for Signal and Traffic: Signal Reflections in flat and Hilly Terrain, effects of Human Made Structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long-distance propagation, path loss from a point to point prediction model in different conditions,merits of lee model.

Frequency Management and Channel Assignment: Numbering and Grouping, Setup Access and Paging Channels, Channel Assignments to Cell Sites and Mobile Units.

UNIT - IV

Handoffs and Dropped Calls: Handoff Initiation, types of Handoff, Delaying Handoff, advantages of Handoff, Power Difference Handoff, Forced Handoff, Mobile Assisted and Soft Handoff, Intersystem handoff, Introduction to Dropped Call Rates and their Evaluation.

UNIT - V

Ad Hoc Wireless Networks: Introduction, Cellular and Ad Hoc wireless Networks, Applications and Ad Hoc Wireless Networks, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet, MAC Protocols for Ad Hoc Wireless, Introduction, issues in designing AMAC Protocol for Ad Hoc wireless Networks, Design Goals of AMAC protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols.

Course Outcomes: Upon completing this course, the student will be able to

1. Known the evolution of cellular and mobile communication system.
2. Explore the Co-Channel and Non-Co-Channel interferences.
3. Known how to overcome the different fading effects?
4. Familiar with cell coverage for signal and traffic, diversity, techniques, frequency management, Channel assignment and types of handoff.
5. Demonstrate the difference between cellular and Adhoc Networks and design goals of MACLayer protocol.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	1	-	-	-	-	1	-	3	2
CO2	3	3	2	2	1	1	1	-	-	-	-	1	-	3	2
CO3	3	3	2	2	1	1	1	-	-	-	-	1	-	3	2
CO4	3	3	2	2	1	1	1	-	-	-	-	1	-	3	2
CO5	3	3	2	2	1	1	1	-	-	-	-	1	-	3	2

TEXT BOOKS:

1. W.C.Y. Lee - Mobile Cellular Telecommunications, 2nd edition, Mc Graw Hill, 1989.
2. Theodore. S. Rapport - Wireless Communications, 2nd edition, Pearson Education, 2002.

REFERENCE BOOKS:

1. C. Siva ram Murthy and B.S. Manoj - Ad Hoc Wireless Networks: Architectures and Protocols, PHI, 2004.
2. Simon Haykin, Michael Moher - Modern Wireless Communications, Pearson Education, 2005.
3. Vijay Garg - Wireless Communications and Networking, Elsevier Publications, 2007.
4. Andrea Goldsmith -Wireless Communications-, Cambridge University Press, 2005.

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B22EC47: EMBEDDED SYSTEM DESIGN (PE-II)

B.Tech. III Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: Microprocessors and Microcontrollers; Computer Organization and Operating Systems

Course Objectives:

1. To provide an overview of Design Principles of Embedded System.
2. To provide clear understanding about the role of firmware.
3. To understand the necessity of operating systems in correlation with hardware systems.
4. To learn the methods of interfacing and synchronization for tasking.

UNIT - I

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT - II

Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT - III

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT - IV

RTOS Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT - V

Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets,
Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, Methods to Choose an RTOS.

Course Outcomes: Upon completing this course, the student will be able to

1. Familiarize the selection procedure of Processors in the embedded domain.
2. Understand different components required to develop a embedded systems
3. Design Procedure for Embedded Firmware.
4. Visualize the role of Real time Operating Systems in Embedded Systems.
5. Evaluate the Correlation between task synchronization and latency issues

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	1	1	-	-	-	-	1	-	3	2
CO2	3	3	2	2	3	1	1	-	-	-	-	1	-	3	2
CO3	3	3	2	2	3	1	1	-	-	-	-	1	-	3	2
CO4	3	3	2	2	3	1	1	-	-	-	-	1	-	3	2
CO5	3	3	2	2	3	1	1	-	-	-	-	1	-	3	2

TEXT BOOK

1. Shibu K.V - Introduction to Embedded Systems, Mc Graw Hill.

REFERENCE BOOKS:

1. Raj Kamal - Embedded Systems, TMH.
2. Frank Vahid, Tony Givargis - Embedded System Design, John Wiley.
3. Lyla - Embedded Systems, Pearson, 2013
4. David E. Simon - An Embedded Software Primer, Pearson Education.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC32: DIGITAL SIGNAL PROCESSING LABORATORY

B.Tech. III Year II Semester

L	T	P	C
0	0	2	1

The Programs shall be implemented using MATLAB Software.

Note: - Minimum of 12 experiments has to be conducted.

List of Experiments:

1. Generation of Sinusoidal Waveform / Signal based on Recursive Difference Equations
2. To find DFT / IDFT of given DT Signal
3. To find Frequency Response of a given System given in Transfer Function/ Differential equationform.
4. Implementation of FFT of given Sequence
5. Determination of Power Spectrum of a given Signal(s).
6. Implementation of LP FIR Filter for a given Sequence.
7. Implementation of HP FIR Filter for a given Sequence.
8. Implementation of LP IIR Filter for a given Sequence.
9. Implementation of HP IIR Filter for a given Sequence.
10. Generation of Narrow Band Signal through Filtering
11. Generation of DTMF Signals
12. Implementation of Decimation Process
13. Implementation of Interpolation Process
14. Implementation of I/D Sampling Rate Converters
15. Impulse Response of First order and Second Order Systems.

Course Outcomes: Upon completion of this Lab, the student will be able to
1: Analyze signals using the discrete Fourier transform (DFT).
2: Understand FFT algorithm for efficient computation of DFT.
3: Design IIR & FIR filters.
4: Design multi rate signal processing of signals through systems.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	-	2	2	2	1	-	2	2	3	-
CO2	2	1	-	-	3	-	2	2	2	1	-	2	2	3	-
CO3	3	3	3	3	3	-	2	2	2	1	-	2	2	3	-
CO4	3	3	3	3	3	-	2	2	2	1	-	2	2	3	-

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC33: CMOS VLSI DESIGN LABORATORY

B.Tech. III Year II Semester

L	T	P	C
0	0	2	1

Note: Any **SIX of** the following experiments from each part are to be conducted (Total 12)

Part - I

All the following experiments have to be implemented using HDL

1. Realize all the logic gates
2. Design of 8-to-3 encoder (without and with priority) and 2-to-4 decoder
3. Design of 8-to-1 multiplexer and 1-to-8 demultiplexer
4. Design of 4 bit binary to gray code converter
5. Design of 4 bit comparator
6. Design of Full adder using 3 modeling styles
7. Design of flip flops: SR, D, JK, T
8. Design of 4-bit binary, BCD counters (synchronous/ asynchronous reset) or any sequencecounter
9. Finite State Machine Design

Part - II

Layout, physical verification, placement & route for complex design, static timing analysis, IR drop analysis and crosstalk analysis for the following:

1. Basic logic gates
2. CMOS inverter
3. CMOS NOR/ NAND gates
4. CMOS XOR and MUX gates
5. Static / Dynamic logic circuit (register cell)
6. Latch
7. Pass transistor
8. Layout of any combinational circuit (complex CMOS logic gate).

Course Outcomes: Upon completion of this Lab, the student will be able to

1. Acquire knowledge on High end Simulation tools like Mentor Graphics, Tanner EDA etc.
2. Design digital circuits at different levels using programming concepts.
3. Implement any type of digital systems.
4. Program any available FPGA and CPLD using implementation tool.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	3	-	2	2	2	1	-	2	2	3	-
CO2	3	2	1	1	3	-	2	2	2	1	-	2	2	3	-
CO3	3	2	1	1	3	-	2	2	2	1	-	2	2	3	-
CO4	2	1	-	-	3	-	2	2	2	1	-	2	2	3	-

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B22EC34: ADVANCED COMMUNICATIONS LABORATORY

B.Tech. III Year II Semester

L	T	P	C
0	0	2	1

Note: Minimum of Ten experiments should be conducted using MATLAB / Any Open Source Software:

1. Determination of the convolution Encoder's output for a given sequence.
2. Determination of the convolution Decoder's output for a given sequence.
3. Implementation of Matched Filters.
4. Optimum receiver for the AWGN channel
5. Simulation of ASK system
6. BPSK Modulation and Demodulation techniques
7. QPSK Modulation and Demodulation techniques
8. Simulation of DPSK system
9. DQPSK Modulation and Demodulation techniques
10. Simulation of MSK.
11. QAM Modulation and Demodulation techniques
12. Simulation of OFDM generation and detection

Course Outcomes: Upon completion of this Lab, the student will be able to

1. Understand the features of Spectrum Analyzer.
2. Analyze to select coding techniques for efficient transmission & reception.
3. Demonstrate and simulate various modulation and demodulation techniques.
4. Simulate the Multiplexing technique.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	1	-	-	-	-	-	-	1	2	2	-
CO2	3	3	2	2	2	-	-	-	-	-	-	1	2	2	-
CO3	3	2	1	1	2	-	-	-	-	-	-	1	2	2	-
CO4	3	2	1	1	1	-	-	-	-	-	-	1	2	2	-

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B22CH03: ENVIRONMENTAL SCIENCE

B.Tech. III Year II Semester

L	T	P	C
3	0	0	0

Course Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures
3. Understanding the environmental policies and regulations

UNIT - I

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure, and function ofan ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefitsand problems. **Mineral resources:** use and exploitation, environmental effects of extracting and usingmineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT - III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situconservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.
Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol, and Montréal Protocol NAPCC-Gol Initiatives

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio- economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

Towards Sustainable Future: Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

Course Outcomes: Based on this course, the Engineering graduate will

1. Based on this course, the Engineering graduate will understand/evaluate/develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL LearningPrivate Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

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B22EC38: MICROWAVE AND OPTICAL COMMUNICATIONS (PC)

B.Tech. IV Year I Semester

L	T	P	C
3	1	0	4

Prerequisite: Antennas and Propagation

Course Objectives:

1. To get familiarized with microwave frequency bands, their applications and to understand thelimitations and losses of conventional tubes at these frequencies.
2. To distinguish between different types of microwave tubes, their structures and principles ofmicrowave power generation.
3. To impart the knowledge of Scattering Matrix, its formulation and utility, and establish the S-Matrix for various types of microwave junctions.
4. Understand the utility of Optical Fibres in Communications.

UNIT - I

Microwave Tubes: Limitations and Losses of conventional Tubes at Microwave Frequencies, Microwave Tubes – O Type and M Type Classifications, O-type Tubes: 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and SmallSignal Theory — Expressions for O/P Power and Efficiency, Reflex Klystrons — Structure, Velocity Modulation and Applegate Diagram, Mathematical Theory of Bunching, Power Output, Efficiency, Oscillating Modes and O/P Characteristics.

Helix TWTs: Types and Characteristics of Slow Wave Structures; Structure of TWT and AmplificationProcess (qualitative treatment), Suppression of Oscillations, Gain Considerations.

UNIT - II

M-Type Tubes:

Introduction, Cross-field Effects, Magnetrons – Different Types, Cylindrical Travelling Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics,

Microwave Solid State Devices: Introduction, Classification, Applications, TEDs – Introduction, GunnDiodes – Principle, RWH Theory, Characteristics, Modes of Operation - Gunn Oscillation Modes, Principle of operation of IMPATT and TRAPATT Devices.

UNIT - III

Waveguide Components: Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide Windows, Tuning Screws and Posts, Matched Loads, Waveguide Attenuators – Different Types, Resistive Card and Rotary Vane Attenuators; Waveguide Phase Shifters – Types, Dielectric and Rotary Vane Phase Shifters, Waveguide Multiport Junctions - E plane and H plane Tees, Ferrites– Composition and Characteristics, Faraday Rotation, Ferrite Components — Gyrator, Isolator.

UNIT - IV

Scattering matrix: Scattering Matrix Properties, Directional Couplers – 2 Hole, Bethe Hole, [s] matrix of Magic Tee and Circulator.

Microwave Measurements: Description of Microwave Bench – Different Blocks and their Features, Errors and Precautions, Measurement of Attenuation, Frequency, Standing Wave Measurements, measurement of Low and High VSWR, Cavity Q, Impedance Measurements.

UNIT - V

Optical Fiber Transmission Media: Optical Fiber types, Light Propagation, Optical fiber Configurations, Optical fiber classifications, Losses in Optical Fiber cables, Light Sources, Optical Sources, Light Detectors, LASERS, WDM Concepts.

Course Outcomes: Upon completing this course, the student will be able to

1. Compare the Power generation of Microwave Tubes and derive the performance characteristics.
2. Illustrate the concepts, principles of microwave solid-state devices.
3. Distinguish between the different types of waveguide, ferrite components and select proper components for engineering applications
4. Measure the S-parameters in microwave component design.
5. Demonstrate the mechanism of light propagation through Optical Fibres.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	-	-	-	-	-	1	2	3	-
CO2	3	2	1	1	1	1	-	-	-	-	-	1	2	3	-
CO3	3	3	3	3	1	1	-	-	-	-	-	1	2	3	-
CO4	3	3	3	3	1	1	-	-	-	-	-	1	2	3	-
CO5	3	2	1	1	1	1	-	-	-	-	-	1	2	3	-

TEXT BOOKS:

1. Samuel Y. Liao -Microwave Devices and Circuits, 3rd Edition, Pearson, 2003.
2. Wayne Tomasi- Electronic Communications Systems, 5th Edition, Pearson,

REFERENCE BOOKS:

1. Gerd Keiser - Optical Fiber Communication, 4th Edition, TMH, 2008.
2. David M. Pozar - Microwave Engineering – 3rd edition, John Wiley & Sons (Asia) Pvt Ltd., 2011Reprint.
3. G.S. Raghuvanshi - Microwave Engineering, Cengage Learning India Pvt. Ltd., 2012.
4. George Kennedy - Electronic Communication System, 6th Edition, McGraw Hill.

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B22EC48: RADAR SYSTEMS (PE – III)

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Prerequisite: Analog and Digital Communications

Course Objectives:

1. To explore the concepts of radar and its frequency bands.
2. To understand Doppler effect and get acquainted with the working principles of CW radar, FM-CW radar.
3. To impart the knowledge of functioning of MTI and Tracking Radars.
4. To explain the designing of a Matched Filter in radar receivers.

UNIT - I

Basics of Radar: Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation.

Radar Equation: SNR, Envelope Detector – False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets, Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment).

UNIT - II

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar.

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics, FM-CW altimeter.

UNIT - III

MTI and Pulse Doppler Radar: Principle, MTI Radar - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers — Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.

UNIT - IV

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT - V

Detection of Radar Signals in Noise Matched Filter Receiver — Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

Radar Receivers – Noise Figure and Noise Temperature, Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Applications, Advantages and Limitations.

Course Outcomes: Upon completing this course, the student will be able to

1. Illustrate the importance of Radar Fundamentals and analysis of Radar equation.
2. Compare the functioning of CW and FM-CW Radars.
3. Distinguish the working principle of MTI with Pulse Doppler Radar.
4. Evaluate different Radar Tracking Methods.
5. Perceive detection of Radar signals in Noise and Radar receivers.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	2	1	1	1	-	-	-	-	1	-	2	2
CO2	3	2	3	3	1	1	1	-	-	-	-	1	-	2	2
CO3	3	3	2	2	1	1	1	-	-	-	-	1	-	2	2
CO4	3	3	3	3	1	1	1	-	-	-	-	1	-	1	1
CO5	3	3	3	3	1	1	1	-	-	-	-	1	-	1	1

TEXT BOOKS:

1. Merrill I. Skolnik- Introduction to Radar Systems, 2nd Edition, TMH Special Indian Edition, 2007.

REFERENCE BOOKS:

1. Byron Edde - Radar: Principles, Technology, Applications, Pearson Education, 2004.
2. Peebles, Jr., P.Z., Wiley - Radar Principles, New York, 1998.
3. Mark A. Richards, James A. Scheer, William A. Holm, Yesdee - Principles of Modern Radar:Basic Principles, 2013
4. Merrill I. Skolnik -Radar Handbook, 3rd Edition., McGraw-Hill Education, 2008.

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B22EC49: CMOS ANALOG IC DESIGN (PE - III)

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Pre-Requisite: Analog Electronics

Course Objectives: Analog circuits play a very crucial role in all electronic systems and due to continued miniaturization, many of the analog blocks are not getting realized in CMOS technology.

1. To understand most important building blocks of all CMOS Analog ICs.
2. To study the basic principle of operation, the circuit choices and the trade-offs involved inthe MOS transistor level design common to all Analog CMOS ICs.
3. To understand specific design issues related to single and multistage voltage, current and differential amplifiers, their output and impedance issues, bandwidth, feedback andstability.
4. To understand the design of differential amplifiers, current amplifiers and OPAMPs.

UNIT - I

MOS Devices and Modeling

The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model forthe MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

UNIT - II

Analog CMOS Sub-Circuits

MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current andVoltage References, Bandgap Reference.

UNIT- III

CMOS Amplifiers

Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High GainAmplifiers Architectures.

UNIT-IV

CMOS Operational Amplifiers

Design of CMOS Op-Amps, Compensation of Op-Amps, Design of Two-Stage Op-Amps, Power-Supply, Rejection Ratio of Two-Stage Op-Amps, Cascode Op-Amps, Measurement Techniques of OP-Amp.

UNIT - V

Comparators

Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.

Course Outcomes: After studying the course, each student is expected to be able to

1. Understand the basic concepts of MOS devices and their models.
2. Design basic building blocks of CMOS Analog ICs.
3. Design various amplifiers like differential, current and operational amplifiers
4. Carryout the design of single and two stage operational amplifiers.
5. Understand the characteristics of comparator's and their design.

CO-PO/PSO Mapping :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02	PS03
CO1	2	1	0	0	1	-	-	1	-	2	-	1	-	2	2
CO2	3	2	1	1	1	-	-	1	-	2	-	1	-	2	1
CO3	3	2	1	1	1	-	-	1	-	2	-	1	-	2	2
CO4	3	2	1	1	1	-	-	1	-	2	-	1	-	2	1
CO5	2	1	0	0	1	-	-	1		2	-	1	-	2	2

TEXT BOOKS:

1. Philip E. Allenand Douglas, R. Holberg – CMOS Analog Circuit Design, OxfordUniversity Press, International Second Edition/Indian Edition, 2010.
2. Paul R. Gray, Paul J. Hurst, S. Lewis and R.G. Meyer -Analysis and Design of AnalogIntegrated Circuits, 5^{th} edition, Wiley India, 2010.

REFERENCE BOOKS:

1. David A. Johns, Ken Martin- Analog Integrated Circuit Design, Wiley Student Edn, 2013.
2. Behzad Razavi – Design of Analog CMOS Integrated Circuits, TMH.
3. Baker, Liand Boyce - CMOS: Circuit Design, Layout and Simulation, PHI.

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B22EC50: ARTIFICIAL NEURAL NETWORKS (PE – III)

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Prerequisite: Nil

Course Objectives:

1. To understand the biological neural network and to model equivalent neuron models.
2. To understand the architecture, learning algorithms
3. To know the issues of various feed forward and feedback neural networks.
4. To explore the Neuro dynamic models for various problems.

UNIT - I

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and NeuralNetworks

Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Natureof the Learning Process

UNIT - II

Single Layer Perceptrons: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate AnnealingTechniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment

Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representationand Decision Rule, Computer Experiment, Feature Detection

UNIT - III

Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT - IV

Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, AdaptivePatter Classification

UNIT - V

Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm

Hopfield Models – Hopfield Models, restricted boltzmen machine.

Course Outcomes: Upon completing this course, the student will be able to

1. Explore the basic elements of Artificial Neural networks and learning process.
2. Develop different single layer / multilayer perceptron learning algorithms.
3. Demonstrate the concepts of back propagation.
4. Explain the concepts of self organizing maps.
5. Construct the Hopfield models.

CO-PO/PSO Mapping :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	1	-	-	-	-	1	-	2	1
CO2	3	3	3	3	1	1	1	-	-	-	-	1	-	2	1
CO3	3	2	2	2	1	1	1	-	-	-	-	1	-	2	1
CO4	3	3	2	2	1	1	1	-	-	-	-	1	-	2	1
CO5	3	3	3	3	1	1	1	-	-	-	-	1	-	2	1

TEXT BOOKS:

1. Simon S Haykin - Neural Networks a Comprehensive Foundations, PHI
2. Jacek M. Zurada - Introduction to Artificial Neural Systems, JAICO Publishing House, 2006.

REFERENCE BOOKS:

1. Li Min Fu - Neural Networks in Computer Intelligence, TMH 2003
2. James A Freeman David M S Kapura - Neural Networks, Pearson, 2004.
3. B. Vegnanarayana -Artificial Neural Networks, Prentice Hall of India P Ltd, 2005

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC51: NETWORK SECURITY AND CRYPTOGRAPHY(PE – IV)

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Prerequisite: Nil

Course Objectives:

1. Understand the basic concept of Cryptography and Network Security, their mathematicalmodels
2. To understand the necessity of network security, threats/vulnerabilities to networks andcountermeasures
3. To understand Authentication functions with Message Authentication Codes and HashFunctions.
4. To provide familiarity in Intrusion detection and Firewall Design Principles

UNIT - I

Security Services, Mechanisms and Attacks, A Model for Internetwork security, Classical Techniques:Conventional Encryption model, Steganography, Classical Encryption Techniques.

Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength ofDES, Block Cipher Design Principles.

UNIT - II

Encryption: Triple DES, International Data Encryption algorithm, Blowfish, RC5, Characteristics of Advanced Symmetric block Ciphers. Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT - III

Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

Number Theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT - IV

Message Authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

Hash and Mac Algorithms: MD-5, Message digest Algorithm, Secure Hash Algorithm.

Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digitalsignature standards.

Authentication Applications: Kerberos, Electronic Mail Security: Pretty Good Privacy, SIME/MIME.

UNIT - V

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction.

Intruders, Viruses and Worms: Intruders, Viruses and Related threats.

Fire Walls: Fire wall Design Principles, Trusted systems.

Course Outcomes: Upon completing this course, the student will be able to

1. Describe network security fundamental concepts and principles
2. Encrypt and decrypt messages using block ciphers and network security technology and protocols
3. Ability to apply cryptographic algorithms, and understand the concepts of number the 27
4. Analyze key agreement algorithms to identify their weaknesses
5. Identify and assess different types of threats, malware, spyware, viruses, vulnerabilities

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	1	-	-	1	-	1	1	2	3
CO2	3	1	1	1	1	1	1	-	-	1	-	1	1	2	3
CO3	3	1	1	1	1	1	1	-	-	1	-	1	1	2	3
CO4	3	1	1	1	1	1	1	-	-	1	-	1	1	2	3
CO5	3	1	1	1	1	1	1	-	-	1	-	1	1	2	3

TEXT BOOKS:

1. William Stallings-Cryptography and Network Security: Principles and Practice, Pearson Education.
2. Robert Bragg, Mark Rhodes -Network Security: The complete reference, TMH, 2004.

REFERENCE BOOKS:

1. William Stallings - Network Security Essentials (Applications and Standards), Pearson Education.
2. Eric Maiwald - Fundamentals of Network Security, Dreamtech press
3. Whitman - Principles of Information Security, Thomson.
4. Buchmann - Introduction to Cryptography, Springer.

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B22EC52 : SATELLITE COMMUNICATIONS (PE – IV)

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Prerequisite: Analog and Digital Communications

Course Objectives :

1. To acquired foundation in orbital mechanics and launch vehicles for the satellites.
2. To provide basic knowledge of link design of satellite.
3. To understand multiple access systems and earth station technology
4. To understand the concepts of satellite navigation and GPS.

UNIT - I

Introduction: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency Allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

Orbital Mechanics and Launchers: Orbital Mechanics, Look Angle determination, Orbital Perturbations, Orbit determination, Launches and Launch vehicles, Orbital Effects in Communication Systems Performance.

UNIT - II

Satellite Subsystems: Attitude and Orbit Control System, Telemetry, Tracking, Command And Monitoring, Power Systems, Communication Subsystems, Satellite Antennas, Equipment Reliability and Space Qualification.

UNIT - III

Satellite Link Design: Basic Transmission Theory, System Noise Temperature and G/T Ratio, Design of Down Links, Up Link Design, Design Of Satellite Links For Specified C/N, System Design Examples.

Multiple Access: Frequency Division Multiple Access (FDMA), Inter modulation, Calculation of C/N, Time Division Multiple Access (TDMA), Frame Structure, Examples, Satellite Switched TDMA Onboard Processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.

UNIT - IV

Earth Station Technology: Introduction, Transmitters, Receivers, Tracking Systems, Terrestrial Interface, Primary Power Test Methods.

UNIT - V

Low Earth Orbit and Geo-Stationary Satellite Systems: Orbit Considerations, Coverage and Frequency Consideration, Delay & Throughput Considerations, System Considerations, Operational NGSO Constellation Designs.

Satellite Navigation & Global Positioning System: Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, GPS Receiver Operation, GPS C/A Code Accuracy, Differential GPS.

Course Outcomes: Upon completing this course, the student will be able to

1. Explore the basic concepts and frequency allocations for satellite communication, orbitalmechanics and launch vehicles.
2. Explain the satellite sub systems and satellite Antennas.
3. Compare various multiple access techniques and design Satellite Link for specified C/N.
4. Illustrate the earth station technology and Tracking system.
5. Relate the concepts of LEO and GEO Stationary Satellite Systems, satellite navigation.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	1	-	-	-	-	1	2	1	-
CO2	2	2	1	1	1	1	1	-	-	-	-	1	2	2	2
CO3	3	3	3	3	1	1	1	-	-	-	-	1	2	1	1
CO4	3	3	2	2	1	1	1	-	-	-	-	1	2	2	2
CO5	2	1	1	1	1	1	1	-	-	-	-	1	2	3	3

TEXT BOOKS:

1. Timothy Pratt, Charles Bostian and Jeremy Allnutt - Satellite Communications, WSE, WileyPublications, 2nd Edition, 2003.
2. Wilbur L. Pritchard, Robert A Nelson and Henri G. Suyderhoud - Satellite CommunicationsEngineering, 2nd Edition, Pearson Publications, 2003.

REFERENCE BOOKS:

1. M. Richharia - Satellite Communications : Design Principles, 2nd Edition, BS Publications, 2003.
2. D.C Agarwal - Satellite Communication, 5th Edition, Khanna Publications,
3. K.N. Raja Rao - Fundamentals of Satellite Communications, PHI, 2004
4. Dennis Roddy - Satellite Communications, 4th Edition, McGraw Hill, 2009.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B22EC53: BIOMEDICAL INSTRUMENTATION (PE – IV)

B.Tech. IV Year I Semester

L	T	P	C
3	0	0	3

Course Objectives

1. **Identify** significant biological variables at cellular level and ways to acquire different bio-signals.
2. **Elucidate** the methods to monitor the activity of the heart,brain, eyes and muscles.
3. **Introduce** therapeutic equipment for intensive and critical care.
4. **Outline** medical imaging techniques and equipment for certain diagnosis and therapies.

UNIT - I

Bio-Potential Signals and Electrodes: Bio-signals and their characteristics, Organization of cell, Nernst equation of membrane, Resting and Action potentials. Bio-amplifiers, characteristics of medical instruments, problems encountered with measurements from living systems. Bio-potential electrodes – Body surface recording electrodes, Internal electrodes, micro electrodes. Bio-chemical transducers – reference electrode, the pH electrodes, Blood gas electrodes.

UNIT - II

Cardiovascular Instrumentation: Heart and cardiovascular system Heart electrical activity, blood pressure and heart sounds. Cardiovascular measurements electro cardiography — electrocardiogram, ECG Amplifier, Electrodes and leads, ECG recorder principles. Types of ECG recorders. Principles ofblood pressure and blood flow measurement.

UNIT - III

Neurological Instrumentation: Neuronal communication, electro encephalogram (EEG), EEG Measurements EEG electrode-placement system, interpretation of EEG, EEG system Block diagram, preamplifiers and amplifiers. EMG block diagram and Stimulators

UNIT - IV

Equipment for Critical Care: Therapeutic equipment - Pacemaker, Defibrillator, Shortwave diathermy, Hemodialysis machine. Respiratory Instrumentation - Mechanism of respiration, Spirometry, Pneumotachograph, Ventilators.

UNIT - V

Principles of Medical Imaging: Radiography, computed Radiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Nuclear Medicine, Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Ultrasonography, Introduction to Telemedicine.

Course Outcomes: After completion of the course the student is able to:

1. Explore bio-systems and medical systems from an engineering perspective.
2. Identify the techniques to acquire record and primarily understand physiological activity of thehuman body through cell potential, ECG, EEG, BP and blood flow measurement.
3. Acquires knowledge about Neurological Instrumentation.
4. Articulate the working of various medical instruments and critical care equipment.
5. Explain the imaging techniques including CT,PET, SPECT and MRI used in diagnosis of variousmedical conditions.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	1	-	-	1	-	1	3	-	1
CO2	3	2	1	1	1	1	1	-	-	1	-	1	3	-	1
CO3	3	2	1	1	1	1	1	-	-	1	-	1	3	-	1
CO4	3	2	1	1	1	1	1	-	-	1	-	1	3	-	1
CO5	3	3	2	2	1	1	1	-	-	1	-	1	3	-	1

TEXT BOOKS:

1. R.S. Khandpur - Hand-book of Biomedical Instrumentation, McGraw-Hill, 2003.
2. John G. Webster = Medical Instrumentation, Application and Design, John Wiley.

REFERENCE BOOKS:

1. Leslie Cromwell, F.J. Weibell, E.A. Pfeiffer - Biomedical Instrumentation and Measurements, PHI.
2. L.A. Geoddes and L.E. Baker - Principles of Applied Biomedical Instrumentation, John Wiley andSons.
3. Joseph Carr and Brown - Introduction to Biomedical equipment technology.

VAAGDEVI COLLEGE OF ENGINEERING
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B22MB10: PROFESSIONAL PRACTICE, LAW AND ETHICS

B.Tech. IV Year I Semester

L	T	P	C
2	0	0	2

Course Objectives:

1. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
2. To develop some ideas of the legal and practical aspects of their profession.

UNIT- I

Professional Practice and Ethics: Definition of Ethics, Professional Ethics - Engineering Ethics, Personal Ethics; Code of Ethics - Profession, Professionalism, Professional Responsibility, Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistle blowing, protected disclosures. Introduction to GST- Various Roles of Various Stake holders

UNIT - II

Law of Contract: Nature of Contract and Essential elements of valid contract, Offer and Acceptance, Consideration, Capacity to contract and Free Consent, Legality of Object. Unlawful and illegal agreements, Contingent Contracts, Performance and discharge of Contracts, Remedies for breach of contract. Contracts-II: Indemnity and guarantee, Contract of Agency, Sale of goods Act -1930: GeneralPrinciples, Conditions & Warranties, Performance of Contract of Sale.

UNIT- III

Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system: Arbitration – meaning, scopeand types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal
– appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats.

UNIT- IV

Engagement of Labour and Labour & other construction-related Laws: Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923; Building & Other - Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017.

UNIT- V

Law relating to Intellectual property: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and proceduresin India; Law relating to Patents under Patents Act, 1970.

Course Outcome: The students will

1. understand the importance of professional practice, Law and Ethics in their personal lives andprofessional careers.
2. learn the rights and responsibilities as an employee, team member and a global citizen

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	1	2	1	3	3	1
CO2	-	-	-	-	-	1	1	2	1	3	3	1

TEXT BOOKS:

1. R. Subramanian - Professional Ethics, Oxford University Press, 2015.
2. Ravinder Kaur - Legal Aspects of Business, 4th edition, Cengage Learning, 2016.

REFERENCE BOOKS:

1. RERA Act, 2017.
2. Wadhera - Intellectual Property Rights, Universal Law Publishing Co., 2004.
3. T. Ramappa - Intellectual Property Rights Law in India, Asia Law House, 2010.
4. O.P. Malhotra - Law of Industrial Disputes, N.M. Tripathi Publishers.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC39: MICROWAVE AND OPTICAL COMMUNICATIONS LABORATORY

B.Tech IV Year I Semester

L	T	P	C
0	0	4	2

Note: Any **ten** of the following experiments

List of Experiments:

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation measurement
4. Directional coupler Characteristics.
5. Scattering parameters of wave guide components
6. Frequency measurement.
7. Impedance measurement
8. VSWR measurement
9. Characterization of LED.
10. Characterization of Laser Diode.
11. Measurement of losses for Optical link
12. Study of fiber optic communication link.

Course Outcomes: After completion of the course the student is able to:

1. Demonstrate a microwave bench for measuring microwave parameters
2. Measure parameters like attenuation, VSWR etc.
3. Analyze the characteristics of all microwave engineering components
4. Demonstrate the mechanism of light propagation through optical fibres

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	2	-	-	2	2	1	-	-	1	2	2	-
CO2	3	3	3	2	-	-	2	2	1	-	-	1	2	2	-
CO3	3	3	2	2	-	-	2	2	1	-	-	1	2	2	-
CO4	2	1	-	2	-	-	2	2	1	-	-	1	2	2	-

R22 Regulation

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC54: ARTIFICIAL INTELLIGENCE (PE – V)

B.Tech. ECE IV Year II Semester

L	T	P	C
3	**0**	**0**	**3**

Course Objectives: The objectives of the course are to:

1. To impart knowledge about Artificial Intelligence.
2. To give understanding of the main abstractions and reasoning for intelligent systems.
3. To enable the students to understand the basic principles of Artificial Intelligence in variousapplications.

UNIT- I: Introduction

Introduction–Definition – foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation

UNIT- II: Problem Solving Methods

Problem solving Methods – Search Strategies- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

UNIT- III: Knowledge Representation

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects
– Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning withDefault Information

UNIT- IV: Knowledge Acquisition

Introduction to Learning, Rule Induction, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning. Learning Using neural Networks, Probabilistic Learning Natural Language Processing.

UNIT- V: Expert systems

Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.

Course Outcomes: Upon completing this course, the students will be able to

1. Understand the basics of the theory and about intelligent agents.
2. Capable of using heuristic searches, aware of knowledge based systems and expert systems.
3. Apply AI techniques to real-world problems to develop intelligent systems.
4. Ability to apply knowledge learning techniques to develop intelligent systems.
5. Select appropriately from a range of techniques when implementing intelligent systems.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	-	3	-	-	-	2	2	3	-	2	2
CO2	3	2	3	1	-	3	-	-	-	2	2	3	-	2	2
CO3	3	2	3	1	-	3	-	-	-	2	2	3	-	1	2
CO4	3	2	3	1	-	3	-	-	-	2	2	3	-	2	2
CO5	3	2	3	1	-	3	-	-	-	2	2	3	-	2	2

TEXT BOOKS:

1. S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, PearsonEducation
2. David Poole, Alan Mackworth, Randy Goebel,” Computational Intelligence: a logical approach”, Oxford University Press.

REFERENCE BOOKS:

1. G. Luger, “Artificial Intelligence: Structures and Strategies for complex problem solving”, FourthEdition, Pearson Education.
2. J. Nilsson, “Artificial Intelligence: A new Synthesis”, Elsevier Publishers.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC55: 5G AND BEYOND COMMUNICATIONS (PE-V)

B.Tech. IV Year II Semester

L	T	P	C
3	0	0	3

Course objectives

1. Learning the basics of 5G and beyond wireless communication
2. Providing a basic understanding of the key technologies and enablers of 5G and beyond communications systems
3. Study of 5G wireless channel models
4. Learning 5G techniques e.g massive MIMO Mm wave etc

UNIT - I: Multiple Input Multiple Output (MIMO) Communications:

Spatial Multiplexing, Spatial Diversity, Beamforming in MIMO systems, Hybrid Precoding, 5G Communication Landscape, Related work on 5G.

UNIT - II:

Introduction to Mobile Wireless Technology Generations:

5G, WISDOM, GIMVC, Requirements of 5G, standardization of WISDOM, Vision of 5G, WISDOM Concept and Challenges, Cellular D2D Communication, D2D Using Physical Layer Network Coding, Using FFR and Using Cognitive Radio.

SMNAT: Introduction, Network Architecture and the Process, Implementation of SMNAT for In-Band- D2D and Interoperability with WISDOM, Description of Network elements of SMNAT and Call Flow forSession Establishment.

UNIT - III: Radio Wave Propagation for Mm Wave:

Introduction, Large-scale Propagation Channel Effects, Small-Scale Channel Effects, Spatial Characterization of Multipath and Beam Combing, Outdoor Channel Models, Indoor Channel Models.

UNIT - IV: Higher layer Design Considerations for Mm Wave:

Challenges when Networking Mm Wave Devices, Beam Adaptation Protocols, Relaying for CoverageExtension, Support for Multimedia Transmission, Multiband considerations, Performance of Cellular networks, Mm Wave Standardization: ECMA-387, IEEE 802.11ad.

UNIT - V: BEYOND 2020

Major Challenges Surrounding Future Cyber Security, Users Awareness, Spectrum Related Security Issues in CRNs. Challenges for 2020 and beyond, Future Mobile Technologies, High Altitude Stratospheric Platform Station Systems, Human Bond Communications, CONASENSE.

Course Outcomes: Upon completing this course, the students will be able to

1. Describe the concept of massive MIMO communications
2. Illustrate mobile wireless technology generations and define SMNAT
3. Analyze wireless communication channel and channel models for radio wave propagation
4. Understand device to device (D2D) communication and standardization
5. Create interference management, mobility management and security issues in 5G

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	1	1	-	-	1	-	1	-	3	3
CO2	3	3	2	2	3	1	1	-	-	1	-	1	-	3	3
CO3	3	3	3	3	3	1	1	-	-	1	-	1	-	3	3
CO4	3	3	1	1	3	1	1	-	-	1	-	1	-	3	3
CO5	3	3	-	-	3	1	1	-	-	1	-	1	-	3	3

TEXT BOOKS:

1. Ramjee Prasad, 5G: 2020 and Beyond, River Publishers
2. T. S. Rappaport, R. W. Heath Jr., R. C. Daniels, and J. M. Murdock, Millimetre Wave WirelessCommunication, Pearson Education, 2015.

REFERENCE BOOKS:

1. M. Manish, G. Devendra, P. Pattanayak, and N. Ha, 5G and Beyond Wireless Systems PHYLayer Perspective, Springer Series in Wireless Technology
2. M. Vaezi, Z. Ding, and H. V. Poor, Multiple Access techniques for 5G Wireless Networks andBeyond, Springer Nature, Switzerland, 2019.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC56: MACHINE LEARNING (PE – V)

B.Tech. IV Year II Semester

L	T	P	C
3	0	0	3

Course Objectives:

1. To introduce the foundations of Artificial Neural Networks
2. To acquire the knowledge on Deep Learning Concepts
3. To learn various types of Artificial Neural Networks
4. To gain knowledge to apply optimization strategies

UNIT - I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT - II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT - III

Linear Models: Linear Basis Function Models -Maximum likelihood and least squares, Geometry of least squares , Sequential learning, Regularized least squares, Multiple outputs , The Bias-Variance Decomposition, Bayesian Linear Regression -Parameter distribution, Predictive, Equivalent, Bayesian Model Comparison, Probabilistic Generative Models-Continuous inputs, Maximum likelihood solution, Discrete features, Exponential family, Probabilistic Discriminative Models -Fixed basis functions, Logistic regression, Iterative reweighted least squares, Multiclass logistic regression, Probit regression, Canonical link functions

UNIT - IV

Kernel Methods: Constructing Kernels, Radial Basis Function Networks - Nadaraya-Watson model, Gaussian Processes -Linear regression revisited, Gaussian processes for regression, Learning the hyper parameters, Automatic relevance determination, Gaussian processes for classification, Laplace approximation, Connection to neural networks, Sparse Kernel Machines- Maximum Margin Classifiers, Overlapping class distributions, Relation to logistic regression, Multiclass SVMs, SVMs for regression, Computational learning theory, Relevance Vector Machines- RVM for regression, Analysis of sparsity, RVM for classification

UNIT-V

Graphical Models: Bayesian Networks, Example: Polynomial regression, Generative models, Discrete variables, Linear-Gaussian models, Conditional Independence- Three example graphs, D-separation, Markov Random Fields -Conditional independence properties, Factorization properties, Illustration: Image de-noising, Relation to directed graphs, Inference in Graphical Models- Inference on a chain, Trees, Factor graphs, The sum-product algorithm, The max-sum algorithm, Exact inference in eneral graphs, Loopy belief propagation, Learning the graph structure.

Course Outcomes: Upon completing this course, the students will be able to

1. Ability to understand the concepts of Neural Networks
2. Ability to select the Learning Networks in modeling real world systems
3. Ability to use an efficient algorithm for Deep Models
4. Ability to apply optimization strategies for large scale applications
5. Ability to apply graphical models & strategies in machine learning

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	1	-	-	-	-	1	-	2	2
CO2	3	3	2	2	1	1	1	-	-	-	-	1	-	2	2
CO3	3	3	2	2	3	1	1	-	-	-	-	1	-	2	2
CO4	3	3	2	2	3	1	1	-	-	-	-	1	-	2	2
CO5	3	3	2	2	2	1	1	-	-	-	-	1	-	2	2

TEXT BOOKS:

1. C. Bishop -Pattern Recognition and Machine Learning- -Springer, 2006.
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.

REFERENCE BOOKS:

1. Nils J. Nilsson -Introduction to machine learning, Stanford University Stanford.
2. William J. Deuschle – Undergraduate Fundamentals of Machine Learning, thesis Harvard College, Cambridge.
3. Shai Shalev-Shwartz, Shai Ben-David- Understanding Machine Learning, From theory to Algorithms, Cambridge University press, 2014

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC57: MULTIMEDIA DATABASE MANAGEMENT SYSTEMS (PE – VI)

B.Tech. IV Year II Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Prerequisite: Data Structures

Course Objectives:

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

UNIT - I

Database System Applications: A Historical Perspective, File Systems versus a DBMS**,** the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT - II

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra**,** Tuple relational Calculus, Domain relational calculus.

UNIT - III

SQL: Queries, Constraints, Triggers: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normalform.

UNIT - IV

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT - V

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Course Outcomes: Upon completing this course, the students will be able to

1. Gain knowledge of fundamentals of DBMS, database design and normal forms.
2. Apply relational model techniques for relational data.
3. Master the basics of SQL for retrieval and management of data.
4. Be acquainted with the basics of transaction processing and concurrency control.
5. Familiarity with database storage structures and access techniques

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	1	-	-	-	-	1	-	2	1
CO2	3	3	2	2	1	1	1	-	-	-	-	1	-	2	1
CO3	3	3	2	2	3	1	1	-	-	-	-	1	-	2	1
CO4	3	3	2	2	3	1	1	-	-	-	-	1	-	2	1
CO5	3	3	2	2	3	1	1	-	-	-	-	1	-	1	1

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata Mc Graw Hill* 3rd Edition
2. Database System Concepts, Silberschatz, Korth, *Mc Graw hill*, V edition.

REFERENCE BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, *Pearson Education*
3. Introduction to Database Systems, C. J. Date, *Pearson Education*
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, *SPD.*
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, *PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student* Edition.

VAAGDEVI COLLEGE OF ENGINEERING
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B22EC58: SYSTEM ON CHIP ARCHITECTURE (PE – VI)

B.Tech. IV Year II Semester

L	T	P	C
3	0	0	3

Prerequisite: Embedded System Design

Course Objectives:

- To introduce the architectural features of system on chip.
- To imbibe the knowledge of customization using case studies.

UNIT - I:

Introduction to the System Approach: System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, An approach for SOC Design, System Architecture and Complexity.

UNIT - II:

Processors: Introduction, Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT - III:

Memory Design for SOC: Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation, SOC Memory System, Models of Simple Processor – memory interaction.

UNIT - IV:

Interconnect Customization: Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization:

UNIT - V:

Configuration: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

Course Outcomes: Upon completing this course, the students will be able to

1. Expected to understand SOC Architectural features.
2. To acquire the knowledge on processor selection criteria and limitations
3. To acquires the knowledge of memory architectures on SOC.
4. To understands the interconnection strategies and their customization on SOC.
5. To learn the different configurations of SOC.

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	1	-	-	-	-	1	-	2	2
CO2	3	3	2	2	1	1	1	-	-	-	-	1	-	2	1
CO3	3	3	2	2	3	1	1	-	-	-	-	1	-	2	2
CO4	3	3	2	2	3	1	1	-	-	-	-	1	-	2	1
CO5	3	3	2	2	3	1	1	-	-	-	-	1	-	2	1

TEXT BOOKS:

1. Computer System Design System-on-Chip by Michael J. Flynn and Wayne Luk, Wiely India Pvt.Ltd.
2. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.

REFERENCE BOOKS:

1. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer
2. Co-Verification of Hardware and Software for ARM System on Chip Design (EmbeddedTechnology) – Jason Andrews – Newnes, BK and CDROM
3. System on Chip Verification — Methodologies and Techniques –Prakash Rashinkar, PeterPaterson and Leena Singh L, 2001, Kluwer Academic Publishers.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

B22EC59: WIRELESS SENSOR NETWORKS (PE – V)

B.Tech. IV Year II Semester **L T P C**
Prerequisite: Analogue and Digital Communications 3 0 0 3

Course Objectives:

- To acquire the knowledge about various architectures and applications of Sensor Networks
- To understand issues, challenges and emerging technologies for wireless sensor networks
- To learn about various routing protocols and MAC Protocols
- To understand various data gathering and data dissemination methods
- To Study about design principals, node architectures, hardware and software required for implementation of wireless sensor networks.

UNIT - I:

Introduction to Sensor Networks, unique constraints and challenges, Advantage of Sensor Networks, Applications of Sensor Networks, Types of wireless sensor networks

UNIT - II:

Mobile Ad-hoc Networks (MANETs) and Wireless Sensor Networks, Enabling technologies for WirelessSensor Networks. Issues and challenges in wireless sensor networks

UNIT - III:

Routing protocols, MAC protocols: Classification of MAC Protocols, S-MAC Protocol, B-MAC protocol,IEEE 802.15.4 standard and ZigBee

UNIT - IV:

Dissemination protocol for large sensor network. Data dissemination, data gathering, and data fusion;Quality of a sensor network; Real-time traffic support and security protocols.

UNIT - V:

Design Principles for WSNs, Gateway Concepts Need for gateway, WSN to Internet ommunication,and Internet to WSN Communication. Single-node architecture, Hardware components & design constraints, Operating systems and execution environments, introduction to TinyOS and nesC.

Course Outcomes: Upon completion of the course, the student will be able to:

1. Analyze and compare various architectures of Wireless Sensor Networks.
2. Understand Design issues and challenges in wireless sensor networks.
3. Understand various routing protocols and MAC protocols.
4. Analyze and compare various data gathering and data dissemination methods.
5. Design, Simulate and Compare the performance of various routing and MAC protocol

CO-PO/PSO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	1	1	-	-	-	-	1	-	2	2
CO2	3	3	2	2	1	1	1	-	-	-	-	1	-	2	2
CO3	3	3	3	2	2	1	1	-	-	-	-	1	-	2	2
CO4	3	3	2	2	3	1	1	-	-	-	-	1	-	2	2
CO5	3	3	2	2	3	1	1	-	-	-	-	1	-	2	2

TEXT BOOKS:

1. Ad-Hoc Wireless Sensor Networks- C. Siva Ram Murthy, B. S. Manoj, Pearson
2. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy, 2002, PE

REFERENCE BOOKS:

1. Wireless Digital Communications – Kamilo Feher, 1999, PHI.
2. Wireless Communications-Andrea Goldsmith, 2005 Cambridge University Press.
3. Mobile Cellular Communication – Gottapu Sasibhushana Rao, Pearson Education, 2012.
4. Wireless Communication and Networking – William Stallings, 2003, PHI.