Institute Vision

To emerge as an acclaimed centre of learning that provides value-based technical education for the holistic development of students

Institute Mission

- Undertake the activities that provide value-based knowledge in Science, Engineering, and Technology
- Provide opportunities for learning through industry-institute interaction on the state-of-the-art technologies
- Create a collaborative environment for research, innovation, and entrepreneurship
- Promote activities that bring in a sense of social responsibility

Principal

Principal
G V.P College of Engineering for Women
Madhurawada
Visakhapatnam-530048

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING FOR WOMEN
(Approved by AICTE New Delhi, Affiliated to JNTUK Kakinada)
(Accredited by National Board of Accreditation(NBA) for B.Tech CSE, ECE & IT - Valid from 2019-20 to 2021-22)
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Department of Computer Science and Engineering

Department Vision

To evolve into a Centre of learning that imparts quality education in Computer Science and Engineering to produce highly competent professionals.

Department Mission

- Impart computing and technical skills with an emphasis on professional competency and human values.
- Enrich the learning aptitude to face the dynamic environment of the Computer Industry.
- Enhance the analytical and problem-solving capability through contests and technical seminars.

Program Educational Objectives

After successful completion of the program, the graduates will be able to:

PEO-1: Apply both fundamental and advanced knowledge to analyse, design and develop innovative computing products.

PEO-2: Design and develop interdisciplinary and innovative software systems for real-world problems.

PEO-3: Inculcate soft skills, ethical conduct and an ability to engage in lifelong learning to serve the societal and environmental needs.

Program Specific Outcomes

Engineering Graduates will be able to:

PSO-1: Develop real-time applications by applying software engineering principles and implementing with emerging technologies in the field of Computer Science and Engineering.

PSO-2: Apply the knowledge of data analytics, soft computing, information security and other domains in Computer Science and Engineering for developing software systems.

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Department of Electrical and Electronics Engineering

Department Vision

To develop into a centre of learning that empowers students with contemporary knowledge in Electrical and Electronics Engineering for their overall growth.

Department Mission

- Impart skills both in traditional and modern areas of Electrical and Electronics Engineering.
- Provide exposure to latest developments in the field through Seminars, Industrial visits, Workshops and Paper presentations.
- Prepare the young minds to apply professional engineering practices by considering environmental and societal needs

Program Educational Objectives

PEO1: Applying fundamentals of Mathematics, Science, Electrical and Electronics Engineering and soft skills in their Professional Engineering Practice.

PEO2: Exhibit critical thinking, problem solving skills and design systems for real world problems.

PEO3: Establish leading positions in society by adopting professional ethics and life long learning.

Program Specific Objectives

PSO1: Design and analyze systems that efficiently generate, transmit, distribute and utilize electrical power.

PSO2: Demonstrate the proficiency in the use of hardware and software tools for solving the complex engineering problems in renewable energy and other emerging areas.

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Department of Electronics and Communication Engineering

Department Vision

Produce competitive engineers instilled with ethical and social responsibilities to deal with the technological challenges in the field of Electronics and Communication Engineering.

Department Mission

- Facilitate a value-based educational environment that provides updated technical knowledge.
- Provide opportunities for developing creative, innovative and leadership skills.
- Imbue technological and managerial capabilities for a successful career and lifelong learning.

Program Educational Objectives

After successful completion of the program, the graduates will be able to:

PEO-1: Analyze and apply the knowledge of Mathematics, Science, and Engineering concepts for solving Electronics and Communication Engineering problems.

PEO-2: Solve complex problems in Electronics and Communication Engineering and its allied areas to attain optimum solutions.

PEO-3: Excel in chosen career by exhibiting life skills and professional ethics in multidisciplinary fields through continuous learning and research.

Program Specific Objectives

Engineering Graduates will be able to:

PSO-1: Acquire knowledge required for designing Electronics and Communication systems.

PSO-2: Design, simulate and implement essential modules in the areas of Electronic circuits, VLSI, Embedded systems, Communication and Signal processing.

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Department of Information Technology

Department Vision

The Department of IT strives to produce competent professionals who are technically sound and ethically strong for the IT industry.

Department Mission

- Provide quality training that prepares Students to be technically competent for the Industrial and Societal needs.
- Facilitate an environment that promotes continuous learning to face the challenges in the IT sector.
- Provide opportunities for learning, leadership and communication skills.

Program Educational Objectives

After successful completion of the program, the graduates will be able to:

PEO-1: Apply, analyze and solve complex engineering problems using emerging IT technologies with the help of fundamental knowledge in mathematics, science, and engineering.

PEO-2: Comprehend, Analyse, Design and Create innovative computing products and solutions for real-life problems.

PEO-3: Inculcate the necessary skills to engage in lifelong learning.

Program Specific Objectives

Engineering Graduates will be able to:

PSO-1: Develop software applications by analyzing, designing and implementing with cutting edge technology to address the needs of IT industry.

PSO-2: Apply the knowledge of Data Science, machine learning, image processing and allied areas to obtain optimized solutions for real time problems.

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Program Outcomes(POs)

Engineering graduate will be able to

PO-1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-2: Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write

effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Department of Electronic & Communication Engineering
M. Tech VLSI Design & Embedded Systems

Department Vision

Produce competitive engineers instilled with ethical and social responsibilities to deal with the technological challenges in the field of Electronics and Communication Engineering.

Department Mission

- Facilitate a value-based educational environment that provides updated technical knowledge.
- Provide opportunities for developing creative, innovative and leadership skills.
- Imbue technological and managerial capabilities for a successful career and lifelong learning.

Programme Educational Objectives:

PEO1: Identify and apply modern hardware and software tools to solve VLSI & Embedded Systems design problems with collaborative and multidisciplinary approach.

PEO2: Pursue a career in research related to VLSI Design & Embedded Systems in cutting edge technologies through self and lifelong learning for societal development.

PEO3: Develop technical and managerial skills with ethical values to become successful professionals in the sectors related to VLSI & Embedded domain.

Program Specific Outcomes (PSOs)

M. Tech. in VLSI Design and Embedded Systems Program, Graduates will be able to:
PSO 1: Acquire competency in areas of IC Fabrication, Design, Testing, Verification and prototype development focusing on applications.

PSO2: Integrate multiple sub systems to develop System on Chip devices to optimize performance and to excel in industry sectors related to VLSI & Embedded domain.

Annexure-I
Program Outcomes

Graduate will be able to

PO1: Independently carry out research /investigation and development work to solve practical problems

PO2: Write and present a substantial technical report/document

PO3: Demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

PO4: Think laterally and originally to arrive at an optimal solution or valid conclusions by analysing and interpreting data through literature survey, applying research methodologies, techniques and modern IT tools to meet the industry standards.

PO5: Communicate confidently and effectively with the engineering community, and with society and will be able to write coherent reports and documentation ethically and make well-structured presentations.

PO6: Engage themselves in Life-long learning independently to improve the knowledge and competence with the technological changes in their area of expertise.

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Department Of Computer Science and Engineering

R16 Course Outcomes

1st Semester
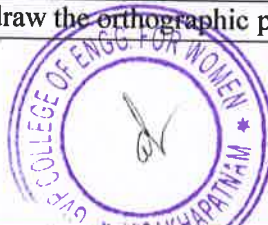
Theory Subjects

Course Code	Course Title		Course Outcomes
C111	English – I	CO1	Develop an understanding of the service that can be rendered through the human resources to the society and acquire knowledge of familial relationships portrayed in "An Ideal Family".
		CO2	Develop awareness and importance of road safety and relate the pain and hopelessness that war brings in the lives of ordinary people.
		CO3	Evaluate and to perceive the advantages and disadvantages of technology and show that courage and determination can triumph all obstacles.
		CO4	Plan alternatives to the depleting sources and to choose suitable sources of energy for rural India and distinguish between reality and illusion, to overcome the superstious beliefs.
		CO5	Build on the fact that the animal must be preserved because animal life is precious and analyse the tragedy that unplanned development can ensue.
		CO6	Apply safety measures at home, workplace, labs, industries by following safety measures and evaluate the complex issue prevails in racism and slavery.
C112	Mathematics - I	CO1	Solve the first order, first degree differential equations and apply the techniques to engineering applications.
		CO2	Solve the higher order differential equations with constant coefficients and apply it to solve physical situations whose behaviour can be described by Linear D.E.
		CO3	Determine Laplace Transforms of various functions and apply it to solve linear ODE with initial conditions.
		CO4	Utilize multivariate differential calculus concepts to determine the extrema of multivariable functions.
		CO5	Solve the linear and non linear partial differential equations of first order.
		CO6	Classify and solve the higher order linear/non-linear partial differential equations with constant coefficients.

C113	Mathematics – II (Mathematical Methods)	CO1	Solve algebraic, transcendental and simultaneous equations using numerical methods like Bisection, False-Position, Iterative and Newton Raphson method.
		CO2	Construct an interpolating polynomial for the given data and estimate the value of an unknown function at a given point using Newton forward, backward, Gauss forward, backward and Lagrange interpolation formulae.
		CO3	Evaluate definite integrals using Quadrature formula, and solve the ordinary differential equations numerically using Taylor, Picard, Euler's and RK methods.
		CO4	Find Fourier Series of an arbitrary function over a given range.
		CO5	Utilize the method of separation of variables to One dimensional wave, heat and two dimensional Laplace equations.
		CO6	Determine the Fourier Transform, sine, cosine transforms and their Inverse Fourier transforms of given function and evaluate integrals using Fourier integral theorem.
C114	Applied Physics	CO1	Utilize the concepts of interference of light in understanding the optical systems and apply the principle in observing the formation of interference pattern in thin films.
		CO2	Distinguish the different types and understand the resolving power of optical instruments through various slit pattern effects of diffraction.
		CO3	Understand the concepts of polarization types and conversion by studying wave plates and polarimeter and further understand working principle of lasers.
		CO4	Understand the basic principles of electromagnetic fields that predict the possibility of electromagnetic waves.
		CO5	Explain and apply the fundamentals of quantum mechanics to a particle in one dimensional potential box and to study the conductivity of free electrons in solids.
		CO6	Infer the mechanism of electrical conduction in solids, especially the semiconductors which are the basic materials for electronic devices.
C115	Computer Programming Using C	CO1	Understand the background of programming languages and computing environments.
		CO2	Make use of basic C- programming language constructs to build C-programs.
		CO3	Develop C-programs by utilizing various control structures.
		CO4	Classify modular programming techniques to implement C-programs.
		CO5	Build C-programs by using data structures like arrays, strings.
		CO6	Make use of pointers, structures and files to build c programs which are useful for real time development.
C116	Engineering Drawing	CO1	Make use of graphic representation as per standards and to construct polygons, ellipse and scales.
		CO2	Identify and draw the orthographic projection of points &

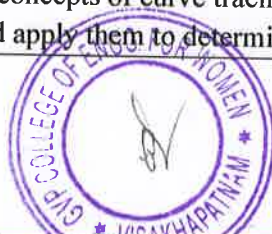|				straight lines placed in various quadrants
		CO3		Identify and draw the projection of straight lines inclined to both the planes
		CO4		Identify and draw the projection of planes inclined to both the planes.
		CO5		Plan and draw the projection of solids in different positions & inclined to one of the planes.
		CO6		Interpret orthographic and isometric views of objects.

Laboratory Courses

Course Code	Course Title	Experiment No	CO. No.	Course Outcomes
C117	English-Communication Skills Laboratory – I	1,2	CO1	Apply the skill of making inquiries over phone, thanking and responding to thanks.
		3,4	CO2	Develop responding to requests, requesting, asking permission, giving and refusing permission, asking direction and giving direction.
		5,6	CO3	Make use of language skills in inviting, accepting and declining invitations, congratulating, making and responding to complaints.
		7,8	CO4	Identify the relationship between letters and sounds.
		9,10	CO5	Develop pronunciation, stress and intonation while speaking.
C118	Applied / Engineering Physics Laboratory	4,5	CO1	Determine the elastic modulus of given material and Moments of inertia of various types of pendulums.
		1,2,3	CO2	Operate optical instruments (Spectrometer and travelling microscope) to understand principles of interference and diffraction of light.
		6	CO3	Understand the modes of mechanical vibrations and determine their frequency.
		13	CO4	Apply tangent law to study the variation of magnetic fields due to current carrying conductors.
		10,11, 12,14	CO5	Estimate the Energy band gap , thermal coeffiecients of resistance for semiconductors and understand the volt -ampere characteristics of diodes.
C119	Applied / Engineering Physics – Virtual Labs- Assignments		CO1	Inculcate basic scientific concepts through a virtual studying and learning environment within short duration of time
			CO2	Execute experiments through simulations which are difficult to do in the real laboratories either because of their risk and/or high cost of the equipment
			CO3	Develop skills for technical documentation as well as exploration for any project/research which they do at later stages

Course Code	Course Title			Course Outcomes
C1110	C Programming Laboratory	1,2	CO1	Make use of basic C-programming language constructs and practice logical ability to solve problems in Linux Environment.
		3,4,5, 6,7	CO2	Solve problems by using control structures and modularity.
		8,9,12	CO3	Build programs using basic data structures include arrays, strings and structures.
		10,11	CO4	Apply pointers and dynamic memory allocation for dealing real world problems.
		13,14, 15,16	CO5	Utilize files for developing C-programs and understand the basic concepts of Computer Hardware and software .

2ndSemester
Theory Subjects

Course Code	Course Title		Course Outcomes
C121	English – II	CO1	Make use of the greatest resource, education and follow Dr.A.P.J's simple life and service to the nation. Develop the skill of writing official letters.
		CO2	Develop peaceful co existence and universal harmony and have deep insight on the achievements of Sir C.V.Raman. Apply e-correspondence in professional field.
		CO3	Analyse the symptoms of cultural shock and aftermath consequences due to globalization and assimilate the contributions of H.J.Bhabha. Plan speech writing.
		CO4	Assess the theme which the society needs to re-examine its traditions when they are outdated and acquire the knowledge of discoveries and inventions made by J.CBose. Understand the structure of the text.
		CO5	Categorize several health disorders due to climatic change and recommend protective environment for the sustainability of the future generations and develop insight into the contributions of P.C.Ray. Make use of technical writing for the media.
		CO6	Relate eminent personalities, who toiled for the present day advancement in software field and perceive Ramanujan innate talent. Develop report writing skills.
C122	Mathematics – III	CO1	Determine the rank of a matrix and Solve linear system of equations using Rank and iterative methods
		CO2	Determine Eigen values and Eigen vectors of a matrix and apply the concept to examine the nature of quadratic forms
		CO3	Explain the concepts of curve tracing, double and triple integrals and apply them to determine areas and volumes.

		CO4	Examine the properties of Beta and Gamma functions and apply them to solve improper integrals.
		CO5	Apply vector differential operator on scalar and vector point functions and determine directional derivative, angle between two surfaces.
		CO6	Determine the work done using Line Integrals and evaluate line, surface and volume integrals using Green's Theorem, Stoke's Theorem and Gauss Divergence theorem.
C123	Applied Chemistry	CO1	Understand the preparation, properties, advantages and limitations of plastic materials and relate the ideas to engineering applications
		CO2	Compare and relate the advantages, limitations of different fuels with the computational air requirements for combustion
		CO3	Make use of electrochemical reactions in understanding the construction and working of batteries and further gain knowledge of corrosion control
		CO4	Utilize fundamentals of applied chemistry to acquire knowledge of advanced materials and their applications
		CO5	Apply the basics of solid state chemistry in understanding the structure and properties of crystalline solids
		CO6	Gain knowledge regarding non-conventional energy sources and compare their advantages and limitations
C124	Object Oriented Programming through C++	CO1	Compare the conventional programming language with Object Oriented Programming language and outline the key concepts of OOP
		CO2	Make use of C++ Programming constructs and classes, objects, function overloading and constructors
		CO3	Develop Object Oriented Programming using operator overloading, type conversion and Simplify the code using inheritance with code reusability
		CO4	Experiment with the pointer concepts, polymorphism and virtual functions
		CO5	Utilize templates for generic programming and Examine the raised exceptions using exception handling
		CO6	Outline the STL programming model, Make Use of the various containers and associated algorithms
C125	Environmental Studies	CO1	Outline global environmental challenges, initiatives towards sustainable development, understand the concept of the ecosystem and its importance
		CO2	Demonstrate an understanding about natural resources and recognize the need to conserve them
		CO3	Explain biodiversity, identify threats to biodiversity and the conservation methods
		CO4	Categorize and explain different types pollution, their causes, impacts, control measures and waste management practices
		CO5	Identify social issues pertaining to environment and gain knowledge about various environmental legislations

			CO6	Examine and understand the concept of environmental impact assessment, environmental audit and its importance
C126	Engineering Mechanics		CO1	Understand the concepts of moment, friction and its applications
			CO2	Analyze the given physical problem for finding the unknown reaction forces by using equilibrium equations & graphical method
			CO3	Determine the centroid and centre of gravity of the given plane area and solid body
			CO4	Estimate area and mass moment of inertia of a plane area and solid body
			CO5	Evaluate the displacement, velocity and acceleration of a particle subjected to rectilinear and curvilinear motion & methods of representing plane motion
			CO6	Apply work energy principle, impulse momentum principle for connected systems

Laboratory Courses

Course Code	Course Title	Experiment No	CO. No.	Course Outcomes
C127	Applied / Engineering Chemistry Laboratory	2&3	CO1	Make use of experimental skills for volumetric titrations and perform acid - base titrations using indicators
		4, & 16	CO2	Demonstrate an understanding of redox titrations like permanganometry and estimation of vitamin c in different samples
		7,8 &15	CO3	Apply the principles of complexometric titrations to determine hardness of water, amount of Zinc and Copper using EDTA in the given samples
		9,10,11,12,13, &14	CO4	Perform Experiments with instruments such as conductometer, pH meter to acquire skills of conductometric titrations and chemical analysis
		5 &6	CO5	Estimate the amount of Ferrous Iron in the sample using Potassium Dichromate using the principles of oxidation - reduction titration
C128	English-Communication Skills Laboratory - II	1,2	CO1	Build the basics of debating, presenting their views, arguing and counter arguing.
		3,4	CO2	Plan and prepare for a Group Discussion
		5,6	CO3	Organise and structure the content of a presentation.
		7,8	CO4	Make use of C.V for interviews, face interviews confidently and develop official emails.

		9,10	CO5	Apply idiomatic expressions in usage and avoid common errors in English.
C129	Object Oriented Programming Lab	1,2	CO1	Explain g++ compiler and translate basic c programs into c++ programs
		3,4,5 ,8	CO2	Develop programs using different operators like scope access, new, delete and utilize different function concepts like inline, friend, function overloading and operator overloading
		6,7	CO3	Construct programs on classes, objects, constructors and Make use of access specifies in classes
		9,10, 11	CO4	Utilize inheritance and polymorphism features to implement code reusability
		12,13 14,15	CO5	Apply exception handling concepts to handle runtime errors and Make use of templates ,STL concepts to implement generic programming

3rd Semester

Theory Subjects

Course Code	Course Title		Course Outcomes
C211	Statistics with R Programming(SR P)	CO1	**List** motivation for learning R programming language and make use of different types of data structures in R.
		CO2	**Identify and implement** appropriate control structures to **solve** a particular programming problem and also import new function packages into the R workspace.
		CO3	**Examine** numerical statistics used in introductory statistics, manipulate and summarize data-sets in R.
		CO4	**Build** simple plots by using introductory statistics for data visualization.
		CO5	**Make use of** data-sets to create testable hypotheses and identify appropriate statistical tests.
		CO6	**Outline** the usage of linear and non-linear models in R.
C212	Mathematical Foundations of Computer Science	CO1	Make use of propositional, predicate logic and truth tables to verify the validity of logical flow of arguments
		CO2	Analyze sets, relations and functions
		CO3	Demonstrate Number Theory and Mathematical Induction
		CO4	Apply knowledge of Binomial Theorem, Permutations, Combinations associated operations in problem solving

		CO5	Construct generating functions, recurrence relations; solve recurrence relations
		CO6	Construct graphs, trees and also determine spanning tree of a given graph using DFS / BFS, minimal spanning tree of a given graph.
C213	Digital Logic Design	CO1	Represent number systems and perform binary arithmetics
		CO2	Make use of Boolean Algebra to minimize logic functions
		CO3	Apply the concepts of K map to minmize logic functions.
		CO4	Model combinational logic circuits using basic gates and HDL.
		CO5	Develop minimised FSMs by using the concepts of sequential circuits.
		CO6	Construct registers and counters by using flip-flops.
C214	Python Programming	CO1	Outline the need for learning Python programming language and basic programming constructs.
		CO2	Identify and implement appropriate control structures to solve programming problem.
		CO3	Apply various data structures in developing solutions to real time scenarios.
		CO4	Build functions and make use of packages for solving real world problems
		CO5	Analyzeobject oriented concepts in python and Outline Exception handling concepts.
		CO6	Summarize the usage of pattern matching, GUI and other system packages in python.
C215	DS Through C++	CO1	Relate the concept of Abstract Data Type using classes and Build Polynomials, Sparse Matrix ADT.
		CO2	Apply data structures like stacks and queues to Solve various real time computing problems.
		CO3	Develop programs using linear data structures to Solve real world problems.
		CO4	Develop various non-linear data structures like trees to solve various computing problems.
		CO5	Apply various non-linear data structures like graphs to solve various computing problems.
		CO6	Make use of various sorting techniques on unsorted Data.
C216	Computer Graphics	CO1	Show the importance of various primitive algorithms, Clipping algorithms, and Geometric Transformations on various 2D objects.
		CO2	Classify different types of Projections, Extend the concepts of geometric transformations to 3D, 3D viewing, curves, surfaces and hidden surface removal algorithms
		CO3	Outline various Color models, General Computer Animation and Experiment with different openGL operations on 2D objects.

			CO4	Summarize the concepts of Shading models, textures, shadows on objects to get realistic appearance and build a camera using openGL .
			CO5	Show the generations of various self similarity curves and Explain Iterated function Systems, Mandelbrot sets and Julia sets.
			CO6	Explain Ray tracing, Surface textures, Reflections and transparency to the objects.

Laboratory Subjects

Course Code	Course Title	Experiment No		Course Outcomes
C217	DS Through C++ Lab	3,4	CO1	Develop programs on Stack ADT and Queue ADT.
		1,2	CO2	Construct C++ programs on Linear Data Structures like Single Linked List and Double Linked List Operations.
		5,6,7,15	CO3	Build C++ programs on nonlinear Data Structures like Heaps, Binary Search Trees.
		8,9,10,11,12	CO4	Make use of Graphs to DevelopC++ programs to like Graphs Traversal Algorithms, Minimum Spanning tree Algorithm.
		13,14	CO5	Develop C++ programs for several recursive non recursive Sorting Techniques.
C218	Python Programming Lab	1,2,3,4	CO1	Apply control structures and operators for writing basic python programs.
		5,6,11	CO2	List various python data structure concepts and apply them to solve real world problems.
		7,8,9,10	CO3	Develop functions and examine various file handling techniques and apply them to solve real world problems.
		12	CO4	Build simple Modules used for solving real world problems.
		13,14,15,16	CO5	Analyzeobject oriented concepts in python and develop, test various GUI applications.

4th Semester

Theory Subjects

Course Code	Course Title		Course Outcomes
C221	Software Engineering	CO1	Classify various Software Engineering Methods and Software Process Models.
		CO2	Summarize the requirements analysis to organize SRS documents and demonstrate the software design approaches.
		CO3	Apply various software design models on function, object oriented analysis, and interfaces.

		CO4	Illustrate coding and different software testing approaches.
		CO5	Classify capability maturity model and make use of CASE tools on software to ensure quality.
		CO6	Summarize maintenance process models and reuse approaches.
C222	Java Programming	CO1	Compare and contrast between Object Oriented Programming & Procedural Oriented Programming by building, compiling and testing with sample java programs.
		CO2	Develop java programs using control structures, arrays to solve real world problems.
		CO3	Solve real world problems using object oriented constructs such as inheritance, interfaces and exception handling concepts.
		CO4	Make use of multithreaded programming in java and file operations by using classes in java.io package.
		CO5	Build dynamic user interfaces using applets and event handling.
		CO6	Distinguish between AWT and Swing components by developing a GUI using those components.
C223	Advanced Data Structures	CO1	Outline K-way merging techniques in any parallel and distributed scenarios.
		CO2	Make use of hash tables in wide range of real time applications like paging , information retrieval systems and information security.
		CO3	Utilize non linear data structures such as heap tree and binomial queues
		CO4	to solve various real time computing problems.
		CO5	Construct B Tree and B+ Tree by using the concept of M way search tree.
		CO6	Outline the digital search trees, binary tries, Patricia, Multi way Tries and internet packet forwarding
C224	Computer Organization	CO1	Summarize the Functional Units of a Computer, Bus Structures, System Software and Analyze the Performance of a Computer using different parameters

		CO2	Summarize Register Transfer Notation , Assembly Language Notation and Apply the knowledge of Stacks to sub-routine nesting in Computer Program Execution.
		CO3	Outline Arithmetic ,Logic ,Branch Instructions and Apply the knowledge of Addressing Modes to identify Effective Address of an operand.
		CO4	Make Use Of Interrupt Handling and DMA in multiple devices.
		CO5	Classify various Memory Circuits and Apply the concept of Mapping Techniques to identify the Address in Cache Memory.
		CO6	Outline the process of storing positive/negative numbers and performing Arithmetic Operations ,Hardwired and Micro-Programmed Control.
C225	Formal Languages and Automata Theory	CO1	Construct different types of Finite Automata
		CO2	Develop Regular Expressions for Regular Languages, Finite Automata, Regular Sets
		CO3	Analyze Context Free Grammars.
		CO4	Illustrate Push Down Automata (PDA) for a given Language and discuss its properties
		CO5	Build the abstract model of computing machine through Turing Machine and its types.
		CO6	Identify whether a problem is decidable or un decidable to solve PCP, MPCP, P and NP class problems.
C226	Principles of Programming Languages	CO1	Summarize Syntax and Semantics of different programming languages
		CO2	Outlinethe concepts of Variables, Datatypes, Expressions and Control Statements of Programming languages
		CO3	Interpret pros and cons of Subprograms/subroutines and analyse subprograms associated with various programming languages
		CO4	Outline Object Oriented, Concurrency and Event Handling programming constructs
		CO5	RelateFunctional programming languages with Imperative languages and construct programs in SCHEME and ML

		CO6	Develop programs in PROLOG and inspect different multi-paradigm languages

Laboratory Subjects

Course Code	Course Title	Experiment No		Course Outcomes
C227	Advanced Data Structures Lab	1,2	CO1	Construct balanced trees such as AVL tree and binary heap to improve the efficiency of the basic operations
		3,4,5	CO2	Compare and implement shortest path algorithm and minimum cost spanning tree algorithms to real world problems.
		6	CO3	Apply collision resolution technique using hashing to improve searching of a given list.
		7	CO4	Determine the Huffman coding to the given information for error detection.
		8	CO5	Build B-Tree of order m for efficient mass storage of data in database.
C228	Java Programming Lab	1,2	CO1	Develop Java applications using command line arguments, arrays and control structures.
		2(d)	CO2	Explain the usage of strings in Java by developing suitable applications.
		3,4,5,6,8,12	CO3	Solve real world problems using OOPs concepts.
		7,9	CO4	Build Java applications by handling exceptions.
		10,11,13, 14,15,16	CO5	Construct concurrent applications by applying Multithreading,AWT concepts in java

5th Semester

Theory Subjects

Course Code	Course Title		Course Outcomes
C311	Compiler Design	CO1	Summarize the Basic Concepts related to Language Translation and phases of Compilation
		CO2	Make use of different parsing Techniques in constructing parse trees

		CO3	Identify the similarities and differences among various parsing techniques and relate Syntax Directed Definitions to Translations
		CO4	Compare various forms of Three address code
		CO5	Summarize the process of code generation and Symbol table management
		CO6	Outline different code optimization Techniques
C312	UNIX Programming	CO1	Summarize the history of UNIX operating system, UNIX components and Demonstrate basic UNIX commands.
		CO2	Make use of UNIX file system hierarchy and architecture to experiment with file utility commands like chmod, chgrp, chown.
		CO3	Develop new commands using command line arguments, shell variables and I/O redirection.
		CO4	Make use of grep, awk, SED stream editors for file processing.
		CO5	Develop shell script by analysing shell programming constructs.
		CO6	Illustrate about child and parent process, internal and external commands.
C313	OOAD using UML	CO1	Compare structure oriented with object –oriented approaches to solve complex problems and frame solutions
		CO2	Identify classes and objects through classification approaches
		CO3	Make use of basic UML constructs and develop class and object diagram.
		CO4	Identify interaction and use cases, model the use case diagram, interaction diagram, and activity diagram.
		CO5	Make use of behavioralmodeling concepts to build state chart diagram.
		CO6	Build component and deployment diagrams with Architectural modeling concepts.ms.
C314	Database Management Systems	CO1	Outline the architecture of DBMS and provide the knowledge on levels of abstraction
		CO2	Construct the E-R model to represent databases and write expressions in relational algebra, tuple and domain relational

				calculus to represent queries on real world problems
			CO3	Experiment with queries and nested queries on real world problems by using several operators like join, set, and aggregate.
			CO4	Relate and Plan the concept of data planning and database design using normalization
			CO5	Utilize the ACID properties in transaction management and interpret concurrency control mechanisms
			CO6	Categorize various file organizations and indexing for faster retrieval of data, persistent storage of data
C315		Operating Systems	CO1	Summarize structures, functions of operating systems and system calls.
			CO2	Outline various process management, multithreading concepts and make use of CPU scheduling algorithms in multiprogramming.
			CO3	Summarize Memory Management concepts and Apply various Page Replacement Algorithms to manage the memory efficiently
			CO4	Outline various Process synchronization concepts, Identify the causes and effects of deadlocks in Operating system.
			CO5	Make use of File System Interface, File System Implementation and Mass Storage Structure.
			CO6	Examine Linux, Android operating systems with general operating systems principles
C319		Professional Ethics & Human Values	CO1	Apply the moral template inculcating the core human values for transformation into an ethical human being
			CO2	Utilize the principles of harmony, value education and human virtues for professional competency
			CO3	Explain and understand the role of engineering ethics and code of conduct for development of professionalism
			CO4	Evaluate the responsibility and accountability of a professional engineer towards design, operation, safety, by adopting risk benefit analysis
			CO5	Judge issues pertaining to individual rights, collegiality, moral dilemmas and conflicts while discharging their professional duties .

		CO6	Analyse cross cultural issues in different ethical domains by acquiring knowledge on intellectual property rights in the context of globalization

Laboratory Subjects

Course Code	Course Title	Experiment No		Course Outcomes
C316	Unified Modelling Lab	WEEK-1,2,3,4	CO1	Construct UML diagrams for static view of the system and develop Event table and CRUD Matrix.
		WEEK-7,8,9,10	CO2	Make use of GRASP patterns to refine models for the given scenario.
		WEEK-7,8,9,10	CO3	Build three layer package diagrams for the given case studies.
		WEEK-11,12	CO4	Develop design solutions using various design patterns.
		WEEK-5,6,13	CO5	Construct UML diagrams for use-case view and dynamic view of the system.
C317	Operating System & Linux Programming Lab	OS1	CO1	Develop programs for various CPU Scheduling Algorithms
		OS2,OS3, OS6	CO2	Build programs for Memory Management Techniques and Page Replacement Algorithms.
		OS4,OS5, OS7	CO3	Construct programs for various File Allocation Strategies , Deadlock Prevention and Avoidance Techniques.
		LP1,LP3	CO4	Experiment with different Linux commands.
		LP2,LP4,LP5,LP6,LP7,LP8	CO5	Develop programs simulating various OS concepts and Linux commands using System Calls.
C318	Database Management System Lab	1,3,7	CO1	Populate the database using SQL DDL, DML commands and make use of built-in-functions to write queries
		2,4	CO2	Identify and implement different operators and clauses in nested queries to solve real time problems.
		5,6,8,9	CO3	Implement Queries on Joins, and correlated sub-queries with access control capabilities to build reports
		10,11,12,13	CO4	Construct simple PL/SQL programs using control statements and exception handling methods

		14,15,16	CO5	Develop applications using PL/SQL including procedures, functions, cursors, packages, forms and database connectivies

6th Semester

Theory Subjects

Course Code	Course Title		Course Outcomes	
C321	Computer Networks	CO1	Understand the concepts of Network Topologies and network reference models (OSI and TCP/IP reference models).	
		CO2	Illustrate Physical layer Guided Transmission media and Multiplexing concepts.	
		CO3	Interpret Datalink layer Framing Techniques, Error control Techniques using CRC error detection mechanism, flow control mechanisms using Elementary Data Link layer protocols, sliding window protocols Algorithms in a network.	
		CO4	understand the Media(channel) Access control problem in a network using multiple access protocols–ALOHA,CSMA protocols.	
		CO5	Make use of the Network Layer routing algorithms to determine the best route(path) in a network communication.	
		CO6	Apply the internet Transport layer protocols-TCP,UDP in client – server data communication	
C322	Datawarehousing & Mining	CO1	Classify the kinds of data, functionalities, issues in data mining and similarity and dis-similarity measures	
		CO2	Illustrate various preprocessing techniques.	
		CO3	Develop decision tree algorithms and evaluate the performance of a classifier.	
		CO4	Build Classification model using Naive Bayes Classification and Bayessian Networks.	
		CO5	Construct association rule generation and identify frequent item sets using apriori and FP growth algorithm.	
		CO6	Develop the various kinds of clustering methods and apply the clustering algorithm on a dataset.	
C323	Design and Analysis of Algorithms	CO1	Analyse time and space complexties of alogirthms using asymptotic notations	

		CO2	Apply divide and conquer paradigm to solve real time program
		CO3	Make use of greedy paradigm to solve real time problems.
		CO4	Compare dynamic programming paradigm with greedy paradigm to design efficient algorithms.
		CO5	Analyse engineering applications using backtracking method.
		CO6	Outline the various branch and Bound techniques and apply least cost branch and bound solution to the problems.
C324	Software Testing methodologies	CO1	Extend Software Testing to software engineering, distinguish between types of testing and examine the concepts of Flow graphs and Path Testing.
		CO2	Interpret the concepts of transaction flow testing and experiment with the concepts of data flow testing in real-time situations
		CO3	Identify the strategies in domain testing and extend them to path products and expressions.
		CO4	Utilize the concepts of syntax testing in the current programming trend and assess the logic based testing methodologies.
		CO5	Explain the designs of state graphs and graph matrices and apply them with an algorithmic view.
		CO6	Make use of the software testing tools and apply them to resolve the problems in real time environment.
C325	Artificial Intelligence	CO1	Summarize what constitutes "Artificial" Intelligence to implement and identify applications.
		CO2	Apply Problem-solving, Problem reduction and Game playing techniques for solving different types of artificial intelligence problems.
		CO3	Make use of propositional and predicate logic in AI for planning, problem-solving, intelligent control, and diagnosis
		CO4	Apply knowledge representation techniques on AI applications using semantic network and frames.
		CO5	Categorize shells and tools for building expert systems by using AI techniques.
		CO6	Make use of probability theory and fuzzy logic for uncertainty measure in Artificial Intelligence.

	Internet of Things	CO1		Outline the Internet of Things Technology, Sources of IoT and Design Principles.
		CO2		Summarize Business Models in the Internet of Things, IoT Layers and Design Standardizations, Communication Technologies and Ease of Designing & Affordability
		CO3		Infer the design principles for the web connectivity for connected-devices
		CO4		Outline internet connectivity principles and Application Layer Protocols
		CO5		Summarize data acquiring, organizing and analytics in IoT and explain business processes, integration.
		CO6		Make use of Data collection, Storage and Computing Using cloud platform and Identify Everything as a service and Cloud Service Models
C329	IPR& PATENTS	CO1		Outline concept of Intellectual property rights, IPR tool kitand its importance in the global scenario
		CO2		Demonstrate an understanding about copyright protection, the registration process and legal remedies available in case of infringement
		CO3		Explain and gain knowledge on patents, steps for registration and recent developments in patent system
		CO4		Utilize the concept of Trademark, their registration, infringement and related laws
		CO5		Make use of principles of trade secrets and laws of unfair competition
		CO6		Applythe information gained on cyber laws and cyber - crimes in the domain of e-commerce and data security

Laboratory Subjects

Course Code	Course Title	Experiment No		Course Outcomes
C326	Network Programming Lab	Exp 1,4,5,6	CO1	Understand the networking commands like ifconfig, netstat, ping, arp, telnet, ftp, finger,traceroute, whoisetc. And use of elementary socket system calls in Linux environment.
		Exp2,3	CO2	Experiment with Transport layer TCP ,UPD protocols , and system calls in Client –Server communication

Course Code	Course Title		Exp/CO	Course Outcomes
		CO3	Exp8	Apply Network layer routing algorithm Distance Vector Routing algorithm in finding the best route within a network
		CO4	Exp 9 ,10,11	Make use of Application layer protocols such as Telnet, HTTP ,FTP, SMTP for data communication in a network
		CO5	Exp12	Apply the RSA algorithm to provide security for the data in network
C327	Software Testing Lab	CO1	1,2	Build programs concerning loops and matrices in C and Develop appropriate test cases using Adhoc testing and black-box testing.
		CO2	3, 4, 5	Construct test cases for known applications like ATM/Banking/Library management to utilize BBT, BVA, equivalence class partitioning etc. and model a test plan.
		CO3	6a, b, c, d, e	Examine the deployment, usage and testing script language in the automated tool WinRunner.
		CO4	6d, e, f	Apply WinRunner on GUIs and summarize their behavior and performance.
		CO5	6g, h, i, j, and 7	Develop Data-Driven Tests and batch tests on GUIs and apply WinRunner on any real-time application.
C328	Data Warehousing and Mining Lab	CO1	Exp1,Exp2	Demonstration of preprocessing on dataset student.arff and Labor.arff
		CO2	Exp3,Exp4	Build Association rules on dataset contactlenses.arff and test.arff using apriori algorithm
		CO3	Exp5,Exp6	Make use of classification rule process on dataset student.arff and employee.arff using j48 algorithm
		CO4	Exp7,Exp8	Apply classification rule process on dataset employee.arff using ID3 and Naive Bayes algorithm
		CO5	Exp9,Exp10	Demonstration of clustering rule process on dataset iris.arff and student.arffusing simple k-means

7th Semester

Theory Subjects

Course Code	Course Title		Course Outcomes
C411	Cryptography & Network Security	CO1	Classify various Security attacks ,Services, Mechanisms and Mathematics of Cryptography
		CO2	Relate Mathematics of Symmetric Key Cryptography and

			Apply the Symmetric key Cryptography like DES, AES.
		CO3	Relate Mathematics of Asymmetric Key Cryptography and Apply the Asymmetric key cryptography
		CO4	Make use of Data Integrity, Digital Signature Schemes & Key Management for verifying the authenticity of digital messages
		CO5	Select protocols like PGP,S/MIME in Application layer and SSL,TLS in Transport layer to Secure the Network during data transmission
		CO6	Select Internet protocol security (IPsec) at the Network Layer to provide security for Internet Protocol
C412	Software Architecture & Design Patterns	CO1	Understand the structures, types of models, and views of software Architectures.
		CO2	Illustrate the documentation and reconstruction of software architecture.
		CO3	Analyze and evaluate given software architectures and patterns.
		CO4	Demonstrate system architectures for a given scenario.
		CO5	Describe creational, structural, and behavioral design patterns.
		CO6	Implement various case studies for utilization of design patterns.
C413	Web Technologies	CO1	Illustrate the HTML tags and cascading style sheet formats for developing static web content.
		CO2	Explain the development of dynamic web content using JavaScript
		CO3	Develop the web applications with help of XML and AJAX
		CO4	Build web content by integrating PHP and database
		CO5	Interpret the PERL basic functions and its usage in web applications.
		CO6	Apply ruby programming principles and ruby on rails for developing web applications and other solutions
C414	Managerial Economics &Financial Analysis	CO1	Learn the concepts of Managerial Economics and utilize the demand forecasting methods to predict demand of a product
		CO2	Make use of Production function & economies of scale and assess the BEP of their own business

			CO3	Understand the concepts of competitive market situations
			CO4	Classify the types of business organizations and identify the stages of business cycles to improve the organizations
			CO5	Analyze accounting concepts to prevent loss for the organization
			CO6	Identify the sources of raising capital for business undertaking
C415	Big Data Analytics		CO1	Summarize the Data Structures and Generics in JAVA
			CO2	Outline the building blocks of Hadoop and Summarize the different modes of Hadoop installation
			CO3	Experiment by writing basic MapReduce programs
			CO4	Make use of Hadoop I/O and writable interfaces for building MapReduce applications
			CO5	Demonstrate PIG Architecture and Develop PIG scripts.
			CO6	Apply HIVE to structured data and Develop HIVE Queries
C416	Cloud Computing		CO1	Make use of the system models for distributed and cloud computing through which HPC and HTC can be obtained.
			CO2	Extend the virtualization concept to chips, CPUs, networks and data centers
			CO3	Apply the offered services, servicing models, cloud platforms and bring-out an efficient SOA
			CO4	Identify the features of distributed and grid platforms and survey the services offered by Google App Engine, AWS and MS-Azure
			CO5	Analyze cloud resource management, queuing methodologies and scheduling of the MapReduce applications
			CO6	Illustrate different file systems like Google file system, Apache Hadoop and Amazon S3.

Laboratory Subjects

Course Code	Course Title	Experiment No		Course Outcomes
C417	Software Architec	SA1	CO1	Specify, configure, and analyze various industrial strength software development tools like Rational rose and CORBA-IDL.

		SA2,SA3	CO2	Design, Deploy, and communicate different software architectures
	ture & Design Patterns Lab	SA4,SA5	CO3	Implement an architecture pertaining to specific cases.
		DP1,DP2, DP3,DP4	CO4	Understand creational, behavioral, and structural design patterns.
		DP5,DP6, DP7,DP8, DP9,DP10	CO5	Design suitable requirement specific design patterns.
C418	Web Technologies Lab	1,2,3,4,5	CO1	Apply and make use of HTML, CSS to develop the web applications.
		6	CO2	Build the web application for data storage and transmission over net using XML
		7,8,9,10,11,12,13,14	CO3	Construct basic operations and GUI applications using Ruby language
		15,16,17,18	CO4	Develop operations on data and database using PERL
		19,20,21,22,23,24,25	CO5	Construct usage of cookies and database applications using PHP script

8th Semester

Course Code	Course Title		Course Outcomes
C421	Distributed Systems	CO1	Outline the important characteristics of Distributed Systems and salient features of Distributed Systems
		CO2	Make use of Interprocess communication mechanisms with TCP and UDP protocols in Distributed systems
		CO3	Apply RMI and RPC for Remote Invocation in Distributed systems for Distributed Objects.
		CO4	Illustrate the Operating systems facilities at the nodes of a Distributed Systems
		CO5	Examine the different file management systems of Distributed nature and to choose appropriate algorithm for process coordination and agreement.
		CO6	Distinguish various protocols for transaction and replication in distributed systems
C422	Management Science	CO1	Appraise the practices of management concepts in the business environment and evaluate various types of organization

			CO2	Identify the production management practices and distinguish the different stock levels of an organization.
				structures.
			CO3	Prepare an appropriate marketing mix and determine the recruitment process in global competitive environment.
			CO4	Evaluate the project process on the basis of costs and time.
			CO5	Recognize and analyze the strategies of the firm and can re discover the SWOT of themselves.
			CO6	Understand and develop the contemporary management practices such as MIS, MRP, TQM,ERP, BPO and assess the changing business environment.
C423	Machine Learning		CO1	Outline the characteristics of machine learning that make it useful to real-world Problems
			CO2	Make use of Regression, Unsupervised and descriptive learningto handle more than two classes and Concept learning in classification
			CO3	Understand various Tree models and Rule models techniques in machine learning
			CO4	Apply linear models and Distance based models to solve real-world problems
			CO5	Identify Probabilistic models for categorical data and Construct model using ensembles Techniques
			CO6	Understand the concept behind neural networks for learning non-linear functions and Build model using neural networks algorithms
C424	Artificial Neural Networks		CO1	What constitutes Artificial Neuron?and classify different Network Architectures and Active Functions in ANN
			CO2	Relate mathematical basis of learning mechanisms through ANN
			CO3	Construct different classifiers using structure and learning of perceptrons
			CO4	Apply backpropagation Algorithm with multilayer feed forward ANN on real world problems
			CO5	Apply regularization using Radial Basis Function Networks and Summarize approximation properties of RBF
			CO6	Explain a Support Vector Machine and Apply to solve linear separable real world problem.
C425	Seminar		CO1	Outline the important concepts to gain factual knowledge.
			CO2	Organise the presentation and disseminate ideas effectively with good communication skills.
			CO3	Develop self learning& time management skills to engage in

			continuous learning.
		CO4	Synthesize and reflect on to show the depth of knowledge in a compelling, well structured and professional behaviour.
		CO5	Develop writing skills with clarity of thought and expression.
C426	Project	CO1	Demonstrate the technical knowledge to identify problems in the field of Computer Science and Engineering and its allied areas.
		CO2	Analyze and formulate technical projects with a comprehensive and systematic approach.
		CO3	Identify the modern tools to implement technical projects.
		CO4	Design engineering solutions for solving complex engineering problems.
		CO5	Develop effective communication skills, professional behaviour and team work.

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Department of Electronics and Communication Engineering

R16 Course Outcomes

1st Semester

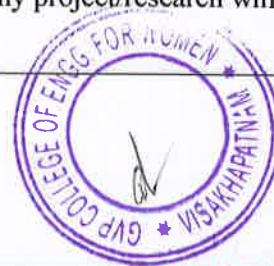| Course Code	Course Title		Course Outcomes
C111	English – I	CO1	Develop an understanding of the service that can be rendered through the human resources to the society and acquire knowledge of familial relationships portrayed in "An Ideal Family".
		CO2	Develop awareness and importance of road safety and relate the pain and hopelessness that war brings in the lives of ordinary people.
		CO3	Evaluate and to perceive the advantages and disadvantages of technology and show that courage and determination can triumph all obstacles.
		CO4	Plan alternatives to the depleting sources and to choose suitable sources of energy for rural India and distinguish between reality and illusion, to overcome the superstious beliefs.
		CO5	Build on the fact that the animal must be preserved because animal life is precious and analyse the tragedy that unplanned development can ensue.
		CO6	Apply safety measures at home, workplace, labs, industries by following safety measures and evaluate the complex issue prevails in racism and slavery.
C112	Mathematics - I	CO1	Solve the first order, first degree differential equations and apply the techniques to engineering applications.
		CO2	Solve the higher order differential equations with constant coefficients and apply it to solve physical situations whose behaviour can be described by Linear D.E.
		CO3	Determine Laplace Transforms of various functions and apply it to solve linear ODE with initial conditions.
		CO4	Utilize multivariate differential calculus concepts to determine the extrema of multivariable functions.
		CO5	Solve the linear and non linear partial differential equations of first order.
		CO6	Classify and solve the higher order linear/non-linear partial differential equations with constant coefficients.
C113	Mathematics-II	CO1	Solve algebraic and transcendental equations using Numerical

	(Numerical Methods and Complex Variables)		Methods.
		CO2	Construct interpolation polynomials for a given set of data and estimate the value of the function at a given point using Newton ,Gauss and Lagrange interpolation polynomials.
		CO3	Evaluate a definite integral from a given set of tabulated values of the integrand f(x) using Simpson's and Trapezoidal rules and solve Ordinary differential Equations using Taylor's, Picard's and R-K methods .
		CO4	Explain the fundamental concepts of complex variable theory, can inspect analyticity of a complex function using C-R equations and determine harmonic conjugate of a function.
		CO5	Evaluate a contour integral using Cauchy's theorem and Cauchy's integral formula. Also determine the Taylor and Laurent expansions of simple functions.
		CO6	Determine the residue of a function , utilize the residue theory to evaluate real definite integrals: around a unit circle, around a semi circle and Indenting the contours having poles on the real axis.
C114	Applied Physics	CO1	Utilize the concepts of interference of light in understanding the optical systems and apply the principle in observing the formation of interference pattern in thin films.
		CO2	Distinguish the different types and understand the resolving power of optical instruments through various slit pattern effects of diffraction.
		CO3	Understand the concepts of polarization types and conversion by studying wave plates and polarimeter and further understand working principle of lasers.
		CO4	Understand the basic principles of electromagnetic fields that predict the possibility of electromagnetic waves.
		CO5	Explain and apply the fundamentals of quantum mechanics to a particle in one dimensional potential box and to study the conductivity of free electrons in solids.
		CO6	Infer the mechanism of electrical conduction in solids, especially the semiconductors which are the basic materials for electronic devices.
C115	Computer Programming	CO1	Outline the basic terminology of computer programming and illustrate to write, compile & debug a C-program.
		CO2	Make use of basic C- programming language constructs to build C-programs.
		CO3	Develop C-programs by utilizing various control structures.
		CO4	Classify modular programming techniques to implement C-programs.
		CO5	Build C-programs by using data structures like arrays, strings.
		CO6	Make use of pointers and different derived data structures to solve problems in C.
C116	Engineering Drawing	CO1	Make use of graphic representation as per standards and to construct polygons, curves

		CO2	Construct scales and prepare the orthographic projections of points and straight lines placed in various quadrants
		CO3	Identify and draw the projection of straight lines inclined to both the planes
		CO4	Identify and draw the projection of planes inclined to both the planes
		CO5	Plan and draw the projection of solids in different positions & inclined to one of the planes
		CO6	Interpret orthographic and isometric views of objects

Laboratory Courses

Course Code	Course Title	Experiment No	CO. No.	Course Outcomes
C117	English-Communication Skills Laboratory - I	1,2	CO1	Apply the skill of making inquiries over phone, thanking and responding to thanks.
		3,4	CO2	Develop responding to requests, requesting, asking permission, giving and refusing permission, asking direction and giving direction.
		5,6	CO3	Make use of language skills in inviting, accepting and declining invitations, congratulating, making and responding to complaints.
		7,8	CO4	Identify the relationship between letters and sounds.
		9,10	CO5	Develop pronunciation, stress and intonation while speaking.
C118	Applied / Engineering Physics Laboratory	4,5	CO1	Determine the elastic modulus of given material and Moments of inertia of various types of pendulums.
		1,2,3	CO2	Operate optical instruments (Spectrometer and travelling microscope) to understand principles of interference and diffraction of light.
		6	CO3	Understand the modes of mechanical vibrations and determine their frequency.
		13	CO4	Apply tangent law to study the variation of magnetic fields due to current carrying conductors.
		10,11,12,14	CO5	Estimate the Energy band gap , thermal coeffiecients of resistance for semiconductors and understand the volt -ampere characteristics of diodes.
	Applied / Engineering Physics – Virtual Labs		CO1	Inculcate basic scientific concepts through a virtual studying and learning environment within short duration of time
			CO2	Execute experiments through simulations which are difficult to do in the real laboratories either because of their risk and/or high cost of the equipment
			CO3	Develop skills for technical documentation as well as exploration for any project/research which they do at later stages

Course Code	Course Title				Course Outcomes
C119	Engg.Workshop & IT Workshop	5,6,7,8		CO1	Select tools required for getting required shape and size of the object for black smithy operations and Compare process of least wastage of material and economy in process.
		1,2,3,4		CO2	Prepare various joints with the available work materials i.e with wood, M.S flats.
		9,10,11		CO3	Understand and connects different circuits in house wiring. Further, Identify parts/peripherals of CPU, experiment with system assembling and disassembling, OS installation and Make use of MS office tools to prepare different types of documents.
		1,2,3,4,5,6		CO4	Experiment with Network configuration, Soft ware installation, Internet, Trouble shooting
		7,8		CO5	Model various graph plots using MATLAB and understand basic commands, subroutines of MATLAB and Utilize LATEX to do basic formatting, handling equations and images.

2ndSemester

Course Code	Course Title		Course Outcomes
C121	English – II	CO1	Make use of the greatest resource, education and follow Dr.A.P.J's simple life and service to the nation. Develop the skill of writing official letters.
		CO2	Develop peaceful co existence and universal harmony and have deep insight on the achievements of Sir C.V.Raman. apply e-correspondence in professional field.
		CO3	Analyse the symptoms of cultural shock and aftermath consequences due to globalization and assimilate the contributions of H.J.Bhabha. Plan speech writing.
		CO4	Assess the theme which the society needs to re-examine its traditions when they are outdated and acquire the knowledge of discoveries and inventions made by J.CBose. Understand the structure of the text.
		CO5	Categorize several health disorders due to climatic change and recommend protective environment for the sustainability of the future generations and develop insight into the contributions of P.C.Ray. Make use of technical writing for the media.
		CO6	Relate eminent personalities, who toiled for the present day advancement in software field and perceive Ramanujan innate talent. Develop report writing skills.
C122	Mathematics – III	CO1	Determine the rank of a matrix and Solve linear system of equations using Rank and iterative methods
		CO2	Determine Eigen values and Eigen vectors of a matrix and apply the concept to examine the nature of quadratic forms
		CO3	Explain the concepts of curve tracing, double and triple integrals and apply them to determine areas and volumes.

		CO4	Examine the properties of Beta and Gamma functions and apply them to solve improper integrals.
		CO5	Apply vector differential operator on scalar and vector point functions and determine directional derivative, angle between two surfaces.
		CO6	Determine the work done using Line Integrals and evaluate line, surface and volume integrals using Green's Theorem, Stoke's Theorem and Gauss Divergence theorem.
C123	Applied Chemistry	CO1	Understand the preparation, properties, advantages and limitations of plastic materials and relate the ideas to engineering applications
		CO2	Compare and relate the advantages, limitations of different fuels with the computational air requirements for combustion
		CO3	Make use of electrochemical reactions in understanding the construction and working of batteries and further gain knowledge of corrosion control
		CO4	Utilize fundamentals of applied chemistry to acquire knowledge of advanced materials and their applications
		CO5	Apply the basics of solid state chemistry in understanding the structure and properties of crystalline solids
		CO6	Gain knowledge regarding non-conventional energy sources and compare their advantages and limitations
C124	Electrical and Mechanical Technology	CO1	Outline the working principles of DC Machines and Transformers
		CO2	Make use of the principles of electromechanical conversion to summarize the operation of AC Machines
		CO3	Classify and Illustrate the construction and working of various measuring instruments.
		CO4	Classify Internal combustion engines by their operational principals and evaluate the performance of IC engines
		CO5	Understand the fundamentals of heat transfer mechanisms in fluids and solids and their applications
		CO6	Analyze the different power transmission systems and Select the suitable manufacturing processes for a typical component
C125	Environmental Studies	CO1	Outline global environmental challenges, initiatives towards sustainable development, understand the concept of the ecosystem and its importance
		CO2	Demonstrate an understanding about natural resources and recognize the need to conserve them
		CO3	Explain biodiversity, identify threats to biodiversity and the conservation methods
		CO4	Categorize and explain different types pollution, their causes, impacts, control measures and waste management practices
		CO5	Identify social issues pertaining to environment and gain knowledge about various environmental legislations
		CO6	Examine and understand the concept of environmental impact assessment, environmental audit and its importance
C126	Data Structures	CO1	Relate the concept of Abstract Data Type and Build Polynomials, Sparse Matrix ADT.

		CO2	Apply data structures like stacks and queues to Solve various real time computing problems.
		CO3	Develop algorithms using linear data structures to Solve real world problems
		CO4	Utilize various non-linear data structures such as trees to Solve various computing problems..
		CO5	Apply various non-linear data structures such as graphs on various computing problems..
		CO6	Make use of various sorting techniques on unsorted Data.

Laboratory Courses

Course Code	Course Title	Experiment No	CO. No.	Course Outcomes
C127	Applied / Engineering Chemistry Laboratory	2&3	CO1	Make use of experimental skills for volumetric titrations and perform acid - base titrations using indicators
		4, & 16	CO2	Demonstrate an understanding of redox titrations like permanganometry and estimation of vitamin c in different samples
		7,8 &15	CO3	Apply the principles of complexometric titrations to determine hardness of water, amount of Zinc and Copper using EDTA in the given samples
		9,10, 11,12,13, &14	CO4	Perform Experiments with instruments such as conductometer, pH meter to acquire skills of conductometric titrations and chemical analysis
		5 &6	CO5	Estimate the amount of Ferrous Iron in the sample using Potassium Dichromate using the principles of oxidation - reduction titration
C128	English- Communication Skills Laboratory - II	1,2	CO1	Build the basics of debating, presenting their views, arguing and counter arguing.
		3,4	CO2	Plan and prepare for a Group Discussion
		5,6	CO3	Organise and structure the content of a presentation.
		7,8	CO4	Make use of C.V for interviews, face interviews confidently and develop official emails.
		9,10	CO5	Apply idiomatic expressions in usage and avoid common errors in English.
C129	C Programming Laboratory	1,2	CO1	Make use of basic C-programming language constructs and practice logical ability to solve problems in Linux Environment.
		3,4,5,6,7	CO2	Solve problems by using control structures and modularity.
		8,9	CO3	Build programs using basic data structures include arrays, structures.
		10,1	CO4	Apply pointers and dynamic memory allocation for dealing

		1		real world problems.
		12,1 3,14	CO5	Utilize files and Strings for developing C-programs.

3rd Semester

Course Code	Course Title		Course Outcomes	
C211	Electronic Devices and Circuits	CO1	Outline the basic concepts of semiconductor physics.	
		CO2	Understand the concept of formation of a p-n junction and the construction of different diodes.	
		CO3	Analyze the working of rectifiers and filters with relevant expressions.	
		CO4	Understand the operation and analyze the characteristics of BJT and FET in different configurations.	
		CO5	Apply proper biasing and stabilization methods to BJT and FET circuits.	
		CO6	Analyze BJT and FET amplifier circuits using small signal low frequency model.	
C212	Switching Theory and Logic Design	CO1	Represent signed binary numbers using different number systems and binary codes.	
		CO2	Apply Boolean algebra, K-maps and Tabular method to minimize logic functions.	
		CO3	Make use of combinational circuits to implement combinational logic functions.	
		CO4	Develop combinational circuits using PLD's.	
		CO5	Construct sequential circuits like counters and registers using flip-flops.	
		CO6	Model the minimized Finite State Machines by using state diagrams.	
C213	Signals and Systems	CO1	Characterize the signals and systems and build the analogy between vectors & signals to develop the Fourier series concepts.	
		CO2	Make use of the Fourier concept to analyze the spectral characteristics for different classes of signals.	
		CO3	Explain the process of sampling and reconstruction of signal.	
		CO4	Outline the concepts of convolution & Correlation to examine the response of LTI systems.	
		CO5	Apply the Laplace transform to analyze continuous LTI	

			systems.
		CO6	Apply the Z- transform to analyze DT LTI systems.
C214	Network Analysis	CO1	Understand the basic concepts, laws and network topologies of electric circuits.
		CO2	Analyze R, L, and C network with sinusoidal excitation to evaluate its response.
		CO3	Understand the concepts of magnetic circuits with various dot conventions and examine the concept of resonance by varying the parameters of electrical circuits.
		CO4	Simplify electrical networks by using principles of network theorems.
		CO5	Determine the parameters of two port networks.
		CO6	Evaluate the transient response of electrical networks for different types of excitations.
C215	Random Variables and Stochastic Process	CO1	Mathematically model the random phenomena and solve simple probabilistic problems.
		CO2	Identify different types of random variables and compute statistical averages of these random variables.
		CO3	Make use of the concepts of single random variable to study the behaviour of random phenomenon for a multi random variable case.
		CO4	Outline the Temporal characteristics of the Random processes.
		CO5	Explain the characteristics of the Random processes in spectral domain.
		CO6	Apply the concepts of random variables and processes to analyze the behaviour of LTI systems in the presence of different types of noise.
C216	Managerial Economics & Financial Analysis	CO1	Utilize the demand forecasting methods to predict demand of a product.
		CO2	Analyse Production function & economies of scale and assess the BEP of their own business.
		CO3	Identify the concepts of competitive market situations.
		CO4	Classify the types of business organizations and identify the stages of business cycles to improve the organizations.
		CO5	Simplify accounting concepts to prevent loss for the organization.
		CO6	Discover the sources of raising capital for business undertaking

Laboratory Courses

Course Code	Course Title	Experiment No	CO. No.	Course Outcomes
C217	Electronic Devices and Circuits Lab	1,2,3	CO1	Analyze the characteristics of P-N junction diode and Zener diode. Build the rectifier circuits and regulator circuits using diode.
		4,5	CO2	Analyze the operation and characteristics of BJT and FET in different configurations, which can be used in the design of amplifiers.
		7	CO3	Understand the operation of unipolar junction transistor by examining UJT for its characteristics.
		8	CO4	Design the biasing circuits for transistor.
		9,10,11	CO5	Design amplifier circuits using BJT and find the frequency response of amplifier to determine its bandwidth.
C218	Networks & Electrical Technology Lab	4,5,6 (Part A)	CO1	Apply Network theorems to analyze Electric Circuits
		1,2 (Part A)	CO2	Determine the time and frequency responses of R,L and C networks
		3 (Part A)	CO3	Evaluate the two port network parameters for a given circuit
		4 (Part B)	CO4	Analyze the performance of a single phase transformer
		1,2,3,5 (Part B)	CO5	Analyze the performance characteristics of DC machines and Induction motors

4th Semester

Course Code	Course Title		Course Outcomes
C221	Electronic Circuit Analysis	CO1	Compare small signal low & high frequency amplifiers using BJT and FET.
		CO2	Compare multistage amplifiers based on the combination of different amplifier configurations.
		CO3	Compare different types of feedback amplifiers
		CO4	Make use of baurkhasan criteion to design different types of

			oscillators.
		CO5	Apply load line concept to examine different types of power amplifiers.
		CO6	Analyze different Tuned amplifiers.
C222	Control Systems	CO1	Develop the transfer function using block diagram algebra and signal flow graph methods
		CO2	Analyze the Transient & Steady State Performance of control systems
		CO3	Analyze the stability of LTI systems using Routh's stability criterion and the Root locus method.
		CO4	Analyze the stability of LTI systems using frequency response methods.
		CO5	Design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.
		CO6	Develop the state models to solve time invariant state equations and outline the concepts of controllability and observability of control systems.
C223	Electromagnetic Waves and Transmission Lines	CO1	Explain and illustrate the steady Electric fields in different media.
		CO2	Summarize magnetostatic fields for static case, and apply the Maxwell equations to study the time varying behaviour of EM waves.
		CO3	Interpret the characteristics of uniform plane waves in different media.
		CO4	Illustrate the wave characteristics for normal and oblique incidence and derive the relation for the power flow mechanism.
		CO5	Classify different types of transmission lines based on primary and secondary constants.
		CO6	Derive the expressions to determine different transmission line parameters and verify the same with the smith chart.
C224	Analog Communications	CO1	Explain the basic concepts of analog communication system and compare various generation, detection techniques of amplitude modulation
		CO2	Compare various types of amplitude modulation techniques with spectral characteristics

Course Code	Course Title	CO No.	Course Outcomes
		CO3	Explain different methods of generation and detection of FM
		CO4	Classify radio transmitters and receivers based on their operation
		CO5	Outline the effect of noise on analog modulation systems
		CO6	Illustrate various analog pulse modulation systems
C225	Pulse and Digital Circuits	CO1	Explain the response of linear waveshaping circuits to various non sinusoidal inputs.
		CO2	Extend the applications of diodes and transistors to non-linear waveshaping case.
		CO3	Build the Collector and Emitter Coupled Bistable Multivibrators for the given specifications.
		CO4	Make use of basic electronic components to design monostable and astable multivibrators.
		CO5	Explain the operation of different time base generators.
		CO6	Compare the working mechanism of logic gates in different logic families.
C226	Management Science	CO1	Appraise the practices of management concepts in the business environment and evaluate various types of organization structures.
		CO2	Identify the production management practices and distinguish the different stock levels of an organization.
		CO3	Prepare an appropriate marketing mix and determine the recruitment process in global competitive environment.
		CO4	Evaluate the project process on the basis of costs and time.
		CO5	Recognize and analyze the strategies of the firm and can re discover the SWOT of themselves.
		CO6	Understand and develop the contemporary management practices such as MIS, MRP, TQM,ERP, BPO and assess the changing business environment.

Laboratory Courses

Course Code	Course Title	Experiment No	CO. No.	Course Outcomes
C227	Electronic Circuit	1,4,5,6	CO1	Design and analyze various amplifiers (Multi stage amplifiers and Single tuned amplifier).

		2,3	CO2	Design and analyze various oscillators (RC phase shift oscillator and Colpitt's oscillator).
	Analysis Lab	7,8	CO3	Design and analyze feedback amplifiers (voltage series and current shunt feedback amplifiers).
		9,10	CO4	Design and analyze power amplifiers (Class A and Class B complimentary symmetry).
		All experiments	CO5	Become expert with computer skills (Multisim, OrCAD Pspice) for the analysis and design of circuits.
C228	Analog Communications Lab	1,2,3,5	CO1	Generate, detect and analyze different analog modulation techniques.
		4,6,11	CO2	Analyze AM radio receiver characteristics.
		7	CO3	Demonstrate analog to discrete signal conversion and reconstruction process.
		8,9,10	CO4	Demonstrate various pulse modulation techniques.
		1,2,3,5,8,9	CO5	Make use of MATLAB Communication toolbox for analyzing analog modulation techniques.

5th Semester

Course Code	Course Title		Course Outcomes
C311	Computer Architecture and Organization	CO1	Outline the architecture, the performance measurement of a modern computer
		CO2	Extend the knowledge of registers, instructions and addressing modes in understanding the architecture of a digital computer.
		CO3	Extend the knowledge of instructions ,addressing modes and I/O operations in understanding the architecture of a digital computer.
		CO4	Compare and Contrast different methods for computer I/O.
		CO5	Classify read only memories, cache memories, Secondary storages in hierarchical memory system.
		CO6	Summarize processing unit and Micro programmed control unit
C312	Linear I C Applications	CO1	Outline the basic operation and performance parameters of differential amplifiers.
		CO2	Demonstrate the measuring techniques for performance parameters of OP-AMP.
		CO3	Construct different linear and non-linear circuits using OP-

			AMPs
		CO4	Analyze and design amplifiers and active filters using OP-AMPs
		CO5	Develop applications by making use of different analog ICs.
		CO6	Construct different types of DAC's and ADC's using OP-AMP
C313	Digital I C Applications	CO1	Illustrate the electrical behavior of CMOS and Bipolar logic families.
		CO2	Apply Data flow and Structural VHDL modeling styles to realize digital circuits.
		CO3	Model different digital circuits using behavioral modeling in VHDL and Study the logic synthesis process steps.
		CO4	Develop different combinational based digital system design modules with relevant digital ICs.
		CO5	Build different Sequential based digital system design modules with relevant digital ICs.
		CO6	Analyze different Synchronous and Asynchronous Sequential circuits with examples.
C314	Digital Communications	CO1	Illustrate the various types of baseband digital modulation techniques
		CO2	Explain band pass digital modulation and demodulation techniques
		CO3	Identify the error probability of various receivers using digital modulation techniques
		CO4	Apply the information theory in determine the channel capacity
		CO5	Compare different source coding schemes for efficient data representation
		CO6	Compare different error control coding schemes for the reliable transmission of digital information over the channel
C315	Antenna and Wave Propagation	CO1	Explain the radiation mechanism of an antenna and basic antenna parameters.
		CO2	Apply Maxwell's equations to quantify the fields radiated by thin linear wire antennas.
		CO3	Classify and Examine various types of antenna Arrays.
		CO4	Construct and analyze non resonant antennas and Broad band

				antennas.
		CO5		Analyze UHF, Microwave antennas and summarize the antenna measurement techniques.
		CO6		Outline the characteristics of radio wave propagation.
		CO1		Apply the moral template inculcating the core human values for transformation into an ethical human being.
C319	Professional Ethics & Human Values	CO2		Utilize the principles of engineering ethics for development of professionalism and professional competencies and also to solve moral dilemmas.
		CO3		Explain and understand accountability, engineering codes and experimental nature of engineering.
		CO4		Evaluate the responsibility and accountability of a professional engineer towards design, operation, safety, by adopting risk benefit analysis.
		CO5		Judge issues pertaining to individual rights, collegiality, moral dilemmas and conflicts while discharging their professional duties.
		CO6		Analyse cross cultural issues in different ethical domains by acquiring knowledge on intellectual property rights in the context of globalization.

Laboratory Courses

Course Code	Course Title	Experiment No	CO. No.	Course Outcomes
C316	Pulse and Digital Circuits Lab	1,2,3	CO1	Design the various linear and nonlinear wave shaping circuits.
		4	CO2	Justify that the transistor acts as a switch.
		8,9,10,11	CO3	Design and test bistable, monostable and astable multivibrators.
		12,13	CO4	Explain how a sweep signal can be generated using different time base generators.
		5,6,7	CO5	understand sampling gates and to design NAND and NOR gates using various logic families.
C317	Linear I C Applications Lab	1	CO1	Understand the basic architecture of an IC 741 operational amplifier.
		2,3	CO2	Basic characterics of opamp parameters and its measurements design compensating circuits
		4,5,6,7,10	CO3	Analyze the stability of the system and application opamp.

Course Code	Course Title			Course Outcomes
		8,9,10	CO4	Develop applications using linear and nonlinear characterization of OPAMP.
		11,12	CO5	Understand the basic architecture of IC 555 timer and IC 565,IC 566 to design PLL's and Oscillators.
C318	Digital I C Applications Lab	1-10	CO1	Develop data flow, behavioral and structural models for digital circuits.
		1-10	CO2	Simulate VHDL models of digital circuits using CAD tool.
		1-10	CO3	Synthesize different digital circuit design modules using CAD tool.
		1-5	CO4	Determine the necessary requirements for emulating the outputs and implement digital modules on FPGA
		1-5	CO5	Configure target device and test digital circuits on FPGA.

6th Semester

Course Code	Course Title		Course Outcomes
C321	Micro Processors & Micro Controllers	CO1	Comprehend the architecture and working of 16 bit microprocessor 8086.
		CO2	Apply assembly language programming skills to perform arithmetic, logical and string operations with 8086.
		CO3	Develop applications involving interfacing of various peripherals with 8086 microprocessor.
		CO4	Outline the architectural features of 80386 and 80486 microprocessors.
		CO5	Develop microcontroller based standalone applications for societal needs.
		CO6	Comprehend the architecture and instruction set of PIC 16F877 microcontroller.
C322	Micro Wave Engineering	CO1	Make use of maxwells equations to derive the field components in rectangular wave guides.
		CO2	Analyze the field components in circular wave guides & Cavity resonators.
		CO3	Compare and analyze various klystron oscillators and amplifiers.
		CO4	Classify the slow wave structures and cross field devices.
		CO5	Examine different types waveguide junctions and components.
		CO6	Explain the procedure to measure the wave guide parameters

				using microwave bench setup.
C323	VLSI Design	CO1		Illustrate the various fabrications steps of IC and come across basic electrical properties of MOSFET.
		CO2		Apply design rules to construct the layout of different digital circuits.
		CO3		Build MOS circuits with the help of Basic circuit concepts and analyze its characteristics based on the Scaling factors.
		CO4		Describe Chip input & output circuits and Design For Testability using different testing techniques.
		CO5		Make use of FPGA architectures to realize digital circuits.
		CO6		Analyze low power circuits through low Power Design Approaches.
C324	Digital Signal Processing	CO1		Apply the concepts of difference equations to analyze the discrete time systems.
		CO2		Make use of the FFT algorithm for solving the DFT of a given signal.
		CO3		Analyze the Digital IIR filter design for different specifications and Realize its structures.
		CO4		Analyze the Digital FIR filter design for different specifications and Realize its structures.
		CO5		Understand the Multirate Processing concepts in various applications.
		CO6		Outline the architecture of programmable Digital Signal processors and apply the signal processing concepts on DSP Processor.
C325	Artificial Neural Networks OPEN ELECTIVE	CO1		Understand the fundamental concept of Artificial Neural Networks , Characteristics, Models of Neuron, Learning Rules, Learning Methods, Stability and Convergence.
		CO2		Explain the basics of Pattern Recognition and Feed forward Neural Networks.
		CO3		Understand the basics of Feedback neural networks and Boltzmann machine.
		CO4		Analyze Feedback layer for different output functions, Pattern Clustering and Mapping networks.
		CO5		Analyze the Stability, Plasticity, Neocognitron and architectures of complex pattern recognition tasks.

Course Code	Course Title		CO No.	Course Outcomes
		CO6		Illustrate the Different applications of Neural Networks in fields like image processing, decision making, etc.
C329	IPR & Patents	CO1		Recall and relate the real property law with Intellectual property law.
		CO2		Outline the subject matters of copyright and could able to demonstrate the registration procedure and infringement consequences.
		CO3		Make use of Rights and Limitations under Patent Law and could make new inventions and developments in Patent Law.
		CO4		Understand the Trade Mark Registration Process, maintenance, Inter parties Proceedings, Infringement, Ownership of Trade Mark and Litigations.
		CO5		Utilize maintaining Trade Secret, Physical Security, Employee Access Limitation, Employee Confidentiality Agreement of Trade Secret Law.
		CO6		Understand the concepts of the Cyber Law, Cyber Crime, E-commerce, Data Security, Confidentiality, Privacy and International aspects of Computer and Online Crime.

Laboratory Courses

Course Code	Course Title	Experiment No	CO. No.	Course Outcomes
C326	Micro Processors & Micro Controllers Lab	1,2,3,4,5	CO1	Develop basic assembly language programs based on arithmetic, logical, and shift operations using 8086 microprocessor.
		6,7,8	CO2	Develop standalone applications by Interfacing I/O peripheral devices with 8086 microprocessor.
		9,10,11	CO3	Develop basic assembly language programs based on arithmetic, logical, and shift operations using 8051 microcontroller.
		12,13,14	CO4	Develop standalone applications for societal needs by Interfacing I/O peripheral devices with 8051 microcontroller.
C327	VLSI Lab	1-10	CO1	Demonstrate the work flow of Mentor Pyxis Schematic tools for digital and analog design through experimentation.
		1-10	CO2	Develop transistor level digital and analog design applications in Mentor Pyxis Schematic editor.
		1-10	CO3	Figure out AC, DC and Transient analysis for different digital and analog applications with given specifications.
		1-3	CO4	Demonstrate the workflow to draw the layout using Mentor Graphics CAD tool through experimentation.
		1-3	CO5	Verify the design by drawing Layout and check for DRC, LVS and Extract Parasitics for different applications.

Course Code	Course Title			Course Outcomes
C328	Digital Communications Lab	2,3,4,8	CO1	Demonstrate various baseband digital modulation techniques.
		1	CO2	Explain the process of multiplexing and demultiplexing of analog signals.
		5,6,7	CO3	Demonstrate various passband digital modulation techniques.
		9	CO4	Apply Source coding techniques for efficient data representation
		10,11,12	CO5	Apply various error control coding techniques for efficient data transmission

7th Semester

Course Code	Course Title		Course Outcomes
C411	Radar Systems	CO1	Illustrate the basic principle of radar and to derive the radar range equation.
		CO2	Classify the different types of Radars and its applications.
		CO3	Analyze the principle of each and every block of MTI and Pulse Doppler Radar.
		CO4	Compare the various techniques involved in tracking the targets.
		CO5	Demonstrate the basic principle of Receiver and also extraction of signal in Noise.
		CO6	Understand the various components used in radar receivers and can describe antennas used for radar.
C412	Digital Image Processing	CO1	Illustrate the fundamental concepts of Digital Image Processing and apply different transforms for image processing applications.
		CO2	Analyze the effect of spatial and frequency domain filtering of images.
		CO3	Outline various image restoration and reconstruction methods.
		CO4	Apply different image compression techniques and outline the concepts of wavelet transforms for image processing.
		CO5	Illustrate different image segmentation techniques and morphological image operations.
		CO6	Compare full color and pseudo color image processing techniques.

C413	Computer Networks	CO1	Understand the concepts of Network Topologies and network (communication) reference models (OSI and TCP/IP reference models).
		CO2	Illustrate Physical layer Guided Transmission media and Multiplexing concepts.
		CO3	InterpretDatalink layer Framing Techniques, Error control Techniques using CRC, flow control techniques using Elementary Data Link layer protocols, sliding window protocols in a network..
		CO4	Illustrate how the MediaAccess control problem solved in a network using multiple access protocols– ALOHA,CSMA,collision free protocols
		CO5	Make use of the Network Layer routing algorithms , congestion control algorithms to perform better network communication.
		CO6	Analyze the internet Transport layer protocols-TCP,UDP protocol working mechanismin Client – Server Data communication.
C414	Optical Communications	CO1	Explain the working principle of the optical fiber and classify the structures of Optical fiber and types
		CO2	Explain the various loss and dispersion mechanisms in optical fiber. Choose the appropriate materials required to construct the optical fibers.
		CO3	Choose appropriate connectors and/or splices to join the optical fibers.
		CO4	Classify the Optical sources and detectors and to discuss their principle.
		CO5	Analyze the power launching and coupling techinques of optical fiber. Compare the performance of optical analog and digital recievers.
		CO6	Design the optical system for given specifications and also high speed links using WDM. Measure the optical fiber parameters.
C415	System Design through Verilog ELECTIVE I	CO1	Illustrate basic Verilog language Constructs and Conventions.
		CO2	Apply Gate Level modeling to realize digital circuits using Veriog.
		CO3	Make use of Behavioral modeling to realize digital circuits.
		CO4	Build digital circuits using Data flow and Switch level

				modeling.
		CO5		Develop Combinational and Sequential logic circuits using Verilog Synthesis.
		CO6		Analyze Verilog Models like SRAM,UART.
C416	Embedded Systems ELECTIVE II	CO1		Classify the elements, characteristics, quality attributes and applications of typical embedded systems.
		CO2		Identify hardware components required for an embedded system and the design approach of an embedded hardware.
		CO3		Compare embedded firmware design approaches on embedded environment.
		CO4		Explain Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design and identify the need for hardware software Co-design.
		CO5		Make use of different IDEs for firmware development of different family of processors/controllers and embedded operating systems.
		CO6		Outline the concepts of embedded system implementation and testing.

Laboratory Courses

Course Code	Course Title	Experiment No	CO. No.	Course Outcomes
C417	Micro Wave Engineering & Optical Lab	1,8,9	CO1	Measure and Analyze the Characteristics and Parameters of Microwave signals using Klystron power supply.
		2,3,4,5	CO2	Analyze Scattering Parameters of various Microwave Waveguide Junctions.
		6	CO3	Plot and Analyze the Radiation Patterns of Horn and Parabolic Reflecter Antennas.
		7	CO4	Design and Analyze Rectangular Microstrip Patch Antenna using HFSS Software.
		10,11,12	CO5	Measure and Analyze the Characteristics , Parameters and Losses of Optical link using LED and LASER as sources.
C418	Digital Signal Processing Lab	1-12	CO1	Design different Digital Signal & image Processing algorithms using MATLAB/CCSTUDIO software.
		1-12	CO2	Understand the basic operations of Signal & image processing and their significance.
		3, 4	CO3	Understand the application of mathematical tools like Fourier Series and DFT to analyze a DT signal.
		5,6,7	CO4	Design and simulate FIR and IIR filters using different

		,8		techniques.
		1-12	CO5	Apply digital signal processing techniques to design discrete time systems and digital filters.

8th Semester

Course Code	Course Title		Course Outcomes
C421	Cellular Mobile Communications	CO1	Outline the concepts of cellular systems and the effect of co-channel Interference reduction.
		CO2	Analyze the effects of interferences, develop antenna system.
		CO3	Outline various frequency management, channel assignment algorithms in cellular systems and illustrate various propagation effects in cellular environment.
		CO4	Illustrate different types of antennas used at cell site and mobile stations.
		CO5	Compare various types of handoff techniques and summarise the concepts of dropped calls.
		CO6	Illustrate the architecture of GSM and multiple access techniques.
C422	Electronic Measurements and Instrumentation	CO1	Understand the different characteristics of electronic measuring instruments.
		CO2	Make use of Signal generators to analyze a signal.
		CO3	Understand the design and functioning of Oscilloscopes.
		CO4	Utilize AC bridges for measurement of inductance.
		CO5	Distinguish active transducers from passive transducers.
		CO6	Develop the ability to use instruments for measurement of physical parameters.
C423	Satellite Communications	CO1	Understand the basics of satellite communication and Ability to calculate the orbital determination and launching methods.
		CO2	Demonstrate the Different Sub systems required in a satellite communication system.
		CO3	Design satellite link system for specified C/N .
		CO4	Compare various types of multiple access techniques like TDMA, FDMA , CDMA and DAMA.
		CO5	Illustrate the architecture of Earth station Technology and

			Ability to demonstrate the LEO and GEO satellite systems.
		CO6	Outline the concepts of satellite navigation and the global positioning system.
C424	Digital IC Design ELECTIVE III	CO1	Illustrate the concepts of MOS Design.
		CO2	Design and analysis of Combinational MOS Circuits.
		CO3	Build different Sequential MOS Circuits.
		CO4	Extend the Digital IC Design to Different Applications.
		CO5	Analyze Advanced interconnect techniques.
		CO6	Compare the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.
C425	SEMINAR	CO1	Outline the important concepts to gain factual knowledge.
		CO2	Organise the presentation and disseminate ideas effectively with good communication skills.
		CO3	Develop self learning & time management skills to engage in continuous learning.
		CO4	Synthesize and reflect on to show the depth of knowledge in a compelling, well structured and professional behaviour.
		CO5	Develop writing skills with clarity of thought and expression.
C426	PROJECT	CO1	Demonstrate the technical knowledge to identify problems in the field of Electronics & Communication Engineering and its allied areas.
		CO2	Analyze and formulate technical projects with a comprehensive and systematic approach.
		CO3	Identify the modern tools to implement technical projects.
		CO4	Design engineering solutions for solving complex engineering problems.
		CO5	Develop effective communication skills, professional behaviour and team work.

Department Of Electrical and Electronics Engineering

Course Outcomes (R16)

1st Semester

Theory Courses

Course Code	Course Title		Course Outcomes
C111	English – I	CO1	Develop an understanding of the service that can be rendered through the human resources to the society and acquire knowledge of familial relationships portrayed in "An Ideal Family".
		CO2	Develop awareness and importance of road safety and relate the pain and hopelessness that war brings in the lives of ordinary people.
		CO3	Evaluate and to perceive the advantages and disadvantages of technology and show that courage and determination can triumph all obstacles.
		CO4	Plan alternatives to the depleting sources and to choose suitable sources of energy for rural India and distinguish between reality and illusion, to overcome the superstious beliefs.
		CO5	Build on the fact that the animal must be preserved because animal life is precious and analyse the tragedy that unplanned development can ensue.
		CO6	Apply safety measures at home, workplace, labs, industries by following safety measures and evaluate the complex issue prevails in racism and slavery.
C112	Mathematics - I	CO1	Solve the first order, first degree differential equations and apply the techniques to engineering applications.
		CO2	Solve the higher order differential equations with constant coefficients and apply it to solve physical situations whose behaviour can be described by Linear D.E.
		CO3	Determine Laplace Transforms of various functions and

				apply it to solve linear ODE with initial conditions.
			CO4	Utilize multivariate differential calculus concepts to determine the extrema of multivariable functions.
			CO5	Solve the linear and non linear partial differential equations of first order.
			CO6	Classify and solve the higher order linear/non-linear partial differential equations with constant coefficients.
C113	Applied Chemistry		CO1	Understand the preparation, properties, advantages and limitations of plastic materials and relate the ideas to engineering applications
			CO2	Compare and relate the advantages, limitations of different fuels with the computational air requirements for combustion.
			CO3	Make use of electrochemical reactions in understanding the construction and working of batteries and further gain knowledge of corrosion control
			CO4	Utilize fundamentals of applied chemistry to acquire knowledge of advanced materials and their applications
			CO5	Apply the basics of solid state chemistry in understanding the structure and properties of crystalline solids
			CO6	Gain knowledge regarding non-conventional energy sources and compare their advantages and limitations
C114	Engineering Mechanics		CO1	Understand the concepts of moment, friction and its applications
			CO2	Analyze the given physical problem for finding the unknown reaction forces by using equilibrium equations & graphical method
			CO3	Determine the centroid and centre of gravity of the given plane area and solid body
			CO4	Estimate area and mass moment of inertia of a plane area and solid body
			CO5	Evaluate the displacement, velocity and acceleration of a particle subjected to rectilinear and curvilinear motion & methods of representing plane motion
			CO6	Apply work energy principle, impulse momentum principle for connected systems
C115	Computer Programming		CO1	Outline the basic terminology of computer programming and illustrate to write, compile & debug a C-program.
			CO2	Make use of basic C- programming language constructs to build C-programs.

		CO3	Develop C-programs by utilizing various control structures.	
		CO4	Classify modular programming techniques to implement C-programs.	
		CO5	Build C-programs by using data structures like arrays, strings.	
		CO6	Make use of pointers and different derived data structures to solve problems in C.	
C116	Environmental Studies	CO1	Outline global environmental challenges, initiatives towards sustainable development, understand the concept of the ecosystem and its importance	
		CO2	Demonstrate an understanding about natural resources and recognize the need to conserve them	
		CO3	Explain biodiversity, identify threats to biodiversity and the conservation methods	
		CO4	Categorize and explain different types pollution, their causes, impacts, control measures and waste management practices	
		CO5	Identify social issues pertaining to environment and gain knowledge about various environmental legislations	
		CO6	Examine and understand the concept of environmental impact assessment, environmental audit and its importance	

Laboratory Courses

Course Code	Course Title	Experiment No	CO. No.	Course Outcomes
C117	Applied / Engineering Chemistry Laboratory	2&3	CO1	Make use of experimental skills for volumetric titrations and perform acid - base titrations using indicators
		4, & 16	CO2	Demonstrate an understanding of redox titrations like permanganometry and estimation of vitamin c in different samples
		7,8 &15	CO3	Apply the principles of complexometric titrations to determine hardness of water, amount of Zinc and Copper using EDTA in the given samples
		9,10,11, 12,13,&	CO4	Perform Experiments with instruments such as conductometer, pH meter to acquire skills of conductometric titrations and chemical analysis

| Course Code	Course Title		CO	Course Outcomes
		14		
		5 &6	CO5	Estimate the amount of Ferrous Iron in the sample using Potassium Dichromate using the principles of oxidation - reduction titration
C118	English-Communication Skills Laboratory - I	1,2	CO1	Apply the skill of making inquiries on the phone, thanking and responding to thanks.
		3,4	CO2	Develop responding to requests, requesting, asking for permission, giving and refusing permission, asking for and giving directions.
		5,6	CO3	Make use of language skills for inviting, accepting, declining invitations, congratulating, making and responding to complaints.
		7,8	CO4	Identify the relationship between letters and sounds.
		9,10	CO5	Develop pronunciation, stress and intonation.
C119	C Programming Laboratory	1,2	CO1	Make use of basic C-programming language constructs and practice logical ability to solve problems in Linux Environment.
		3,4,5,6,7	CO2	Solve problems by using control structures and modularity.
		8,9,12	CO3	Build programs using basic data structures include arrays, structures.
		10,11	CO4	Apply pointers and dynamic memory allocation for dealing real world problems.
		13,14,15,16	CO5	Utilize files and Strings for developing C-programs.

2nd Semester
Theory Courses

Course Code	Course Title		Course Outcomes
C121	English – II	CO1	Make use of the greatest resource, education and follow Dr.A.P.J's simple life and service to the nation. Develop the skill of writing official letters.
		CO2	Develop peaceful co existence and universal harmony and have deep insight on the achievements of Sir C.V.Raman.

				apply e-correspondence in professional field.
			CO3	Analyse the symptoms of cultural shock and aftermath consequences due to globalization and assimilate the contributions of H.J.Bhabha. Plan speech writing.
			CO4	Assess the theme which the society needs to re-examine its traditions when they are outdated and acquire the knowledge of discoveries and inventions made by J.CBose. Understand the structure of the text.
			CO5	Categorize several health disorders due to climatic change and recommend protective environment for the sustainability of the future generations and develop insight into the contributions of P.C.Ray. Make use of technical writing for the media.
			CO6	Relate eminent personalities, who toiled for the present day advancement in software field and perceive Ramanujan innate talent. Develop report writing skills.
C122	Mathematics – II (Mathematical Methods)		CO1	Solve algebraic, transcendental and simultaneous equations using numerical methods like Bisection, False-Position, Iterative and Newton Raphson method.
			CO2	Construct an interpolating polynomial for the given data and estimate the value of an unkown function at a given point using Newton forward, backward, Gauss forward, backward and Lagrange interpolation formulae.
			CO3	Evaluate definite integrals using Quadrature formula, and solve the ordinary differential equations numerically using Taylor, Picard, Euler's and RK methods.
			CO4	Find Fourier Series of an arbitrary function over a given range.
			CO5	Utilize the method of separation of variables to One dimensional wave, heat and two dimensional Laplace equations.
			CO6	Determine the Fourier Transform, sine, cosine transforms and their Inverse transforms of given function and evaluate integrals using Fourier integral theorem.
C123	Mathematics – III		CO1	Determine the rank of a matrix and Solve linear system of equations using Rank and iterative methods
			CO2	Determine Eigen values and Eigen vectors of a matrix and apply the concept to examine the nature of quadratic forms
			CO3	Explain the concepts of curve tracing, double and triple

				integrals and apply them to determine areas and volumes.
			CO4	Examine the properties of Beta and Gamma functions and apply them to solve improper integrals.
			CO5	Apply vector differential operator on scalar and vector point functions and determine directional derivative, angle between two surfaces.
			CO6	Determine the work done using Line Integrals and evaluate line, surface and volume integrals using Green's Theorem, Stoke's Theorem and Gauss Divergence theorem.
C124	Applied Physics		CO1	Utilize the concepts of interference of light in understanding the optical systems and apply the principle in observing the formation of interference pattern in thin films.
			CO2	Distinguish the different types and understand the resolving power of optical instruments through various slit pattern effects of diffraction.
			CO3	Understand the concepts of polarization types and conversion by studying wave plates and polarimeter and further understand working principle of lasers.
			CO4	Understand the basic principles of electromagnetic fields that predict the possibility of electromagnetic waves.
			CO5	Explain and apply the fundamentals of quantum mechanics to a particle in one dimensional potential box and to study the conductivity of free electrons in solids.
			CO6	Infer the mechanism of electrical conduction in solids, especially the semiconductors which are the basic materials for electronic devices.
C125	Electrical Circuit Analysis - I		CO1	Outline and apply the basic concepts, laws for analyzing DC electric circuits
			CO2	Explain the Concept of duality and graph theory approach to solve the electrical networks.
			CO3	Develop electrical equivalent for magnetic circuits and solve the magnetic circuit using Dot convention.
			CO4	Summarize the basic concepts of AC electric circuits
			CO5	Outline the performance of AC circuits under resonance conditions
			CO6	Make use of network theorems for analyzing the
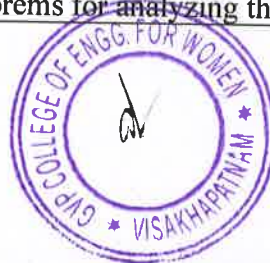
				electrical circuits
C126	Engineering Drawing	CO1		Make use of graphic representation as per standards and to construct polygons, ellipse and scales.
		CO2		Identify and draw the orthographic projection of points & straight lines placed in various quadrants
		CO3		Identify and draw the projection of straight lines inclined to both the planes
		CO4		Identify and draw the projection of planes inclined to both the planes.
		CO5		Plan and draw the projection of solids in different positions & inclined to one of the planes.
		CO6		Interpret orthographic and isometric views of objects.

Laboratory Courses

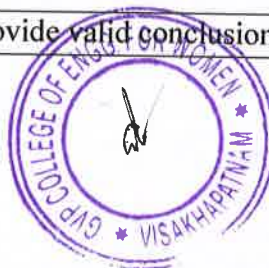| Course Code	Course Title	Experiment No	CO. No.	Course Outcomes
C127	English-Communication Skills Laboratory - II	1,2	CO1	Build the basics of debating, presenting their views, arguing and counter arguing.
		3,4	CO2	Plan and prepare for a Group Discussion
		5,6	CO3	Organise and structure the content of a presentation.
		7,8	CO4	Make use of C.V for interviews, face interviews confidently and develop official emails.
		9,10	CO5	Apply idiomatic expressions in usage and avoid common errors in English.
C128	Applied / Engineering Physics Laboratory	4,5	CO1	Determine the elastic modulus of given material and Moments of inertia of various types of pendulums
		1,2,3	CO2	Operate optical instruments (Spectrometer and travelling microscope) to understand principles of interference and diffraction of light
		6	CO3	understand the modes of mechanical vibrations and determine their frequency.
		13	CO4	Apply tangent law to study the variation of magnetic fields due to current carrying conductors
		10,11,12,	CO5	Estimate the Energy band gap , thermal coefficients of resistance for semiconductors and understand the volt - ampere characteristics of diodes

		14		
C129	Engg.Workshop & IT Workshop	5,6,7,8	CO1	Select tools required for getting required shape and size of the object for black smithy operations and Compare process of least wastage of material and economy in process.
		1,2,3,4	CO2	Prepare various joints with the available work materials i.e with wood, M.S flats.
		9,10,11	CO3	Understand and connects different circuits in house wiring. Further, Identify parts/peripherals of CPU and experiment with system assembling and disassembling, OS installation and Make use of MS office tools to prepare different types of documents.
		1,2,3,4,5,6	CO4	Experiment with Network configuration, Soft ware installation, Internet, Trouble shooting
		7,8	CO5	Model various graph plots using MATLAB and understand basic commands, subroutines of MATLAB and Utilize LATEX to do basic formatting, handling equations and images.

3rd Semester
Theory Courses

Course Code	Course Title		Course Outcomes
C211	Electrical Circuit Analysis-II	CO1	Analyze three phase circuits under balanced condition.
		CO2	Analyze three phase circuits under unbalanced condition.
		CO3	Evaluate the transient response of electrical networks for different types of excitations.
		CO4	Determine the parameters of two port networks.
		CO5	Assess electrical equivalent network for a given network transfer function.
		CO6	Estimate different harmonic components from the response of an electrical networks.
C212	Electrical	CO1	Understand the fundamental principles and control practices associated with DC Machines.
		CO2	Analyze performance and operational problems of the D.C.Machines and suggest the remedial measures to solve them.
		CO3	Test, Measure and provide valid conclusions on the

	Machines-I		performance of DC Machines using the tools or equipment.
		CO4	Analyze the performance of single phase transformers.
		CO5	Solve regulation, losses and efficiency of single phase transformers.
		CO6	Understand the concepts of voltage control with tap changing methods and achieve three-phase to two-phase transformation.
C213	Basic Electronics And Devices	CO1	Understand the basic concepts of semiconductor physics, which are useful to understand the operation of diodes and transistors.
		CO2	Explain the operation and characteristics of PN junction diode and special diodes.
		CO3	Understand operation and design aspects of rectifiers and regulators.
		CO4	Understand the characteristics of various transistor configurations. Familiarize with different biasing, stabilization and compensation techniques used in transistor circuits.
		CO5	Understand the basic operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.
		CO6	Understand the merits and demerits of positive and negative feedback and the role of feedback in oscillators and amplifiers.
C214	Electro Magnetic Fields	CO1	Summarize the laws of Electrostatics and apply them in electrostatic field.
		CO2	Model the capacitance for different configurations and understand the properties of dielectrics.
		CO3	Summarize the laws of Magnetostatics and apply them in static magnetic field.
		CO4	Analyze the force experienced by charged bodies in magnetic field.
		CO5	Determine the self and mutual inductances and energy stored in magnetic fields.
		CO6	Analyze the time varying field and understand Faradays Laws of Electromagnetic Induction.
C215	Thermal and Hydro Prime	CO1	Classify internal combustion engine and Evaluate the performance of IC engines.
		CO2	Identify the basic components of steam turbines and determine the performance of steam turbine using velocity diagrams.

			CO3	Analyze the different methods for improving the efficiency of gas turbines.
	movers		CO4	Apply the concepts of momentum equation for finding the forces acting on the vanes of the turbines, centrifugal pump.
			CO5	Understand working of various types of hydraulic turbines and determine the performance of hydraulic turbines.
			CO6	Understand the working of hydro electric power plant and estimate the different loads in hydro electric power plant.
C216	Managerial Economics And Financial Analysis		CO1	Learn the concepts of Managerial Economics and utilize the demand forecasting methods to predict demand of a product.
			CO2	Make use of Production function & economies of scale and assess the BEP of their own business.
			CO3	Understand the concepts of competitive market situations.
			CO4	Classify the types of business organizations and identify the stages of business cycles to improve the organizations.
			CO5	Analyze accounting concepts to prevent loss for the organization.
			CO6	Identify the sources of raising capital for business undertaking.

Laboratory Courses

Course Code	Course Title	Experiment No		Course Outcomes
C217	Thermal and Hydro Lab	1,5	CO1	Understand the working of two stroke engine, four stroke engine and boiler
		2,3,4	CO2	Evaluate the performance parameter of two stroke petrol engine, four stroke diesel engines
		6	CO3	Apply the concepts of Impulse momentum equation for finding the forces acting on the vanes and compare theoretical and actual force values
		10,11	CO4	Determine the coefficient of discharge for Venturimeter, Orifice meter
		7,8,9	CO5	Analyze the performance characteristic curves of different turbines and centrifugal pump
C218		1,2,3,4	CO1	Analyze the different Network Theorems
		5	CO2	Test for Series and Parallel Resonance

	Electrical Circuits Lab	6	CO3	Determine the self inductance, mutual inductance and coefficient of coupling of a given transformer.
		7,8	CO4	Determine the different two port network parameters
		9,10	CO5	Measure the powers in three phase circuits and parameters of choke coil.

4th Semester
Theory Courses

Course Code	Course Title		Course Outcomes
C221	Electrical Measurements	CO1	Select suitable instrument for measurement of voltage and current for AC and DC applications.
		CO2	Summarize the instruments for measurement of power and energy.
		CO3	Outline the working principle and calibration of DC and AC potentiometers.
		CO4	Analyze the various types of bridges for measurement of resistance,inductance,capacitance and frequency.
		CO5	Demonstrate the operation of ballistic galvanometer and flux meter for magnetic measurements.
		CO6	Summarize the operation of CRO and digital instruments.
C222	Electrical Machines-II	CO1	Outline the principle of operation and performance of three phase induction motor.
		CO2	Interpret the torque-speed relation and explain speed control, starting and testing methods of induction motor.
		CO3	Summarize the torque producing mechanism of a single phase induction motor.
		CO4	Summarize the performance characteristics of synchronous generators.
		CO5	Outline the parallel operation of synchronous generators when connected to an infinite bus.
		CO6	Summarize the operation, performance and starting methods of synchronous motors.
C223	Switching Theory and Logic Design	CO1	Represent signed binary numbers using different number systems and binary codes.
		CO2	Apply Boolean algebra, K-maps and Tabular method to minimize logic functions
		CO3	Make use of combinational circuits to implement combinational logic functions

		CO4	Develop combinational circuits using PLD's.
		CO5	Develop different types of counters and registers using flip-flops.
		CO6	Model minimized Finite State Machines.
C224	Control Systems	CO1	Develope the transfer function using block diagram algebra and signal flow graph methods.
		CO2	Evaluate the time response specifications of second order systems and its error constants.
		CO3	Analyze the stability of LTI systems using Routh's stability criterion and the Root locus method.
		CO4	Analyze the stability of LTI systems using frequency response methods.
		CO5	Design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.
		CO6	Develop the state models to solve timeinvariant state equations and outline the concepts of controllability and observability of control systems.
C225	Power Systems-I	CO1	Summarize the operation of thermal power plant.
		CO2	Outline the operation and safety measures of nuclear power plant.
		CO3	Compare DC & AC distribution systems and determine voltage drops in distribution systems.
		CO4	Classify and summarize the construction details of a substation.
		CO5	List the types and outline the construction details of cables.
		CO6	Outline various economic aspects and tariff methods of power generation.
C226	Management Science	CO1	Appraise the practices of management concepts in the business environment and evaluate various types of organization structures.
		CO2	Identify the production management practices and distinguish the different stock levels of an organization.
		CO3	Prepare an appropriate marketing mix and determine the recruitment process in global competitive environment.
		CO4	Evaluate the project process on the basis of costs and time.
		CO5	Recognize and analyze the strategies of the firm and can re discover the SWOT of themselves.
		CO6	Understand and develop the contemporary management practices such as MIS, MRP, TQM,ERP, BPO and assess the changing business environment.

Laboratory Courses

Course Code	Course Title	Experiment No		Course Outcomes
C227	Electrical Machines - I Lab	2,3,4	CO1	Determine the performance of DC machines and transformer by Direct and Indirect test methods.
		1	CO2	Identify different conditions required to be satisfied for self – excited DC Generators.
		5	CO3	Examine the different methods of speed control of a DC machine.
		9	CO4	Examine the load sharing between two parallel connected transformers.
		6,7,8, 10	CO5	Determine the losses in a DC machine and Transformer by different test methods.
C228	Electronic Devices & Circuits Lab	1,2,3	CO1	Analyze the characteristicsof P-N junction diode and Zenerdiode. Build the rectifier circuits and regulator circuits using diode.
		4,5	CO2	Analyze the operation and characteristics of BJT and FET in different configurations, which can be used in the design of amplifiers.
		7	CO3	Understand the operation of unipolar junction transistor by examining UJT for its characteristics.
		8	CO4	Design the biasing circuits for transistor.
		9,10,11	CO5	Design amplifier circuits using BJT and FET. Find the frequency response of amplifier to determine its bandwidth.

5th Semester

Theory Courses

Course Code	Course Title		Course Outcomes
C311	Power Systems-	CO1	Evaluate the transmission line parameters for various types of transmission line configuration.
		CO2	Classify transmission lines and determine the performance of short and medium transmission lines.

		II	CO3	Summarize the performance of long transmission lines.
			CO4	Infer about surge behavior of transmission lines for different types of line termination.
			CO5	Outline the various factors governing the performance of transmission lines.
			CO6	Summarize the concepts of mechanical design and selection of suitable insulators for transmission lines.
C312	Renewable Energy Sources		CO1	Analyze solar radiation data for extraterrestrial radiation and radiation on earth surface.
			CO2	Classify and compare Solar thermal collectors.
			CO3	Make use of MPPT methods to model solar photo voltaic systems.
			CO4	Determine Betz coefficient, tip speed ratio and MPPT methods for Wind Energy Systems.
			CO5	Understand the basic principle and working of various types of hydro, tidal , wave and OTEC systems.
			CO6	Understand the basic principle and working of types of Biomass, Geothermal systems and fuel cells.
C313	Signals & Systems		CO1	Characterize the signals and systems and build the analogy between vectors & signals to develop the Fourier series concept.
			CO2	Make use of the Fourier concept to analyze the spectral characteristics for different classes of signals.
			CO3	Explain the process of sampling and reconstruction of signal.
			CO4	Outline the concepts of convolution & Correlation to examine the response of LTI systems.
			CO5	Apply the Laplace transform to analyze continuous LTI systems.
			CO6	Apply the Z- transform to analyze DT LTI systems .
C314	Pulse & Digital Circuits		CO1	Explain the response of linear waveshaping circuits to various non sinusoidal inputs.
			CO2	Extend the applications of diodes and transistors to non-linear waveshaping case.
			CO3	Construct the Collector and Emitter Coupled Bistable Multivibrators for the given specifications.
			CO4	Make use of basic electronic components to design monostable and astable multivibrators.
			CO5	Explain the operation of different time base generators.

		CO6	Compare the working mechanism of logic gates in different logic families.
C315	Power Electronics	CO1	Summarize the characteristics of power semiconductor devices and designof firing circuits for SCR.
		CO2	Analyze the performance of single phase controlled converters for R , RL and RLE loads.
		CO3	Analyze the performance of three phase controlled converters.
		CO4	Summarize the operation DC-DC converters.
		CO5	List the advantages of the inverters and summarize its operation.
		CO6	Summarize the operation AC-AC converters.
C319	IPR & Patents	CO1	Outline concept of Intellectual property rights, IPR tool kit and its importance in the global scenario.
		CO2	Demonstrate an understanding about copyright protection, the registration process and legal remedies available in case of infringement.
		CO3	Explain and gain knowledge on patents, steps for registration and recent developments in patent system.
		CO4	Utilize the concept of Trademark, their registration, infringement and related laws.
		CO5	Make use of principles of trade secrets and laws of unfair competition.
		CO6	Apply the information gained on cyber laws and cyber - crimes in the domain of e-commerce and data security.

Laboratory Courses

| Course Code	Course Title	Experiment No		Course Outcomes
C316	Electrical Machines- II Lab	1,2	CO1	Determine and predetermine the performance of three phase Induction motor.
		3,4	CO2	Predetermine the regulation of three–phase alternator by various methods.
		8	CO3	Start and speed control of the three phase Induction motor.
		5,6,9	CO4	Analyze the performance of three phase synchronous machine.

		7,10	CO5	Assess and improve the performance of single phase induction motor.
C317	Control Systems Lab	2,8,9,10	CO1	Analyze the performance and working of Magnetic amplifier, Synchro, D.C. servo motor and A.C. Servo motor.
		1	CO2	Determine the transient response of Second order system.
		4,5,7	CO3	Examine the Effect of P, PD, PI, PID Controllers and compensators on second order systems.
		3	CO4	Analyze the performance of D.C servo motor with the effect of feedback.
		6	CO5	Determine the transfer function of D.C. Motor.
C318	Electrical Measurements Lab	1,8	CO1	Test for calibration of energy meter and wattmeter using Direct loading.
		4,5,6	CO2	Measure Resistance, inductance and Capacitance using different bridges.
		3	CO3	Test for calibration of voltmeter and ammeter using DC Potentiometer.
		7,9,10	CO4	Measure the Active Power & reactive power using Direct loading.
		2	CO5	Calibration of dynamometer wattmeter using indirect loading.

6th Semester

Theory Courses

Course Code	Course Title		Course Outcomes
C321	Power Electronic Controllers & Drives	CO1	Summarize the concept of load torque, dynamics of electric drive, four quadrant operation and braking methods.
		CO2	Analyze speed control and their characteristics of converter fed drives.
		CO3	Analyze speed torque characteristics of chopper fed dc drives under motoring & braking conditions.
		CO4	Summarize the performance of power converter fed induction motor from stator side.
		CO5	Assess the performance of induction motor using slip power recovery schemes.
		CO6	Summarize the operation of power converter fed synchronous motor drives.
C322		CO1	Develop the Impedance Diagram in (p.u) and Construct the Ybus matrix for a Power System by singular transformation
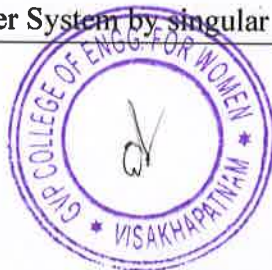
	Power System Analysis		and direct inspection method.
		CO2	Summarize the load flow solutions for Power System using various types of Power Flow Methods.
		CO3	Develop the Zbus matrix for a Power System by element by element method.
		CO4	Determine the fault current for 3 phase short circuit conditions of a power system and to provide data for the design of protective devices.
		CO5	Analyze the sequence components of currents for unbalanced power system network.
		CO6	Analyze the steady state, transient and dynamic stability concepts of a Power System.
C323	Microprocessors & Microcontrollers	CO1	Comprehend the architecture of 8086 microprocessor and explore the evaluation of Intel family microprocessors.
		CO2	Understand the operating modes, instruction set and process time details of 8086 microprocessor.
		CO3	Summarize the interfacing methodologies of various peripherals with 8086 microprocessor.
		CO4	Identify the features of microcontroller; understand the instruction set and onboard peripherals of 8051 microcontroller.
		CO5	Outline the features of PIC18 microcontroller architecture.
		CO6	Apply C language programming skills to perform logical and Input/Output operations with PIC18.
C324	Data Structures	CO1	Relate the concept of Abstract Data typewith Arrays and Strings
		CO2	Apply data structures like stacks and queues to Solve various real time computing problems
		CO3	Develop algorithms using linear data structures to Solve real world problems.
		CO4	Utilizenon-linear data structuresuch as treesto Solve various computing problems.
		CO5	Apply various non-linear data structures such as graphs onvarious computing problems.
		CO6	Make use of searching and sorting techniques to Solve computing Problems.
C325	Energy Audit and Conservation&	CO1	Summarize the schemes of energy conservation ,concept of energy audit and management.
		CO2	Outline the types of energy efficient lighting systems.
		CO3	Determine the factors to increase the efficiency of electrical

				equipment.
	Management(open elective)		CO4	Summarize the energy conservation methods of HVAC systems.
			CO5	Apply suitable methods to estimate the economic benefits of conservation, management and auditing of energy.
			CO6	Summarize the concepts of simple payback period and life cycle cost analysis.
C329	Professional Ethics & Human Values		CO1	Apply the moral template inculcatingthe core human values for transformation into an ethical human being.
			CO2	Utilize the principles of harmony, value education and human virtues for professional competency.
			CO3	Explain and understand the role of engineering ethics and code of conduct for development of professionalism.
			CO4	Evaluate the responsibility and accountability of a professional engineer towardsdesign, operation, safety, by adopting risk benefit analysis.
			CO5	Judge issues pertaining to individual rights, collegiality, moral dilemmas and conflicts while discharging their professional duties.
			CO6	Analyse cross cultural issues in different ethical domains by acquiring knowledge on intellectual property rights in the context of globalization.

Laboratory Courses

Course Code	Course Title	Experiment No		Course Outcomes
C326	Power Electronics Lab	1,2,3	CO1	Summarize the characteristics of power semiconductor devices and design of firing circuits for SCR.
		4,5	CO2	Analyze the performance of single phase controlled converters for R and RL loads.
		6	CO3	Summarize the operation of AC-AC converters.
		8	CO4	Analyze the performance of three phase controlled converters.
		7,9,10	CO5	Summarize the operation of AC-DC Converters and DC-DC converters.
C327	Microprocessors & Microcontrollers	1,2	CO1	Develop basic assembly language programs based on arithmetic, logical, and shift operations using 8086 microprocessor.
		3	CO2	Develop assembly language programs based on string operations using 8086 microprocessor.

Course Code	Course Title			Course Outcomes
	Lab	4,5,6,7	CO3	Develop standalone applications by Interfacing I/O peripheral devices with 8086 microprocessor.
		8,9,10	CO4	Develop parallel and serial communication using 8051 and PIC microcontrollers.
C328	Data Structures Lab	3,4	CO1	Develop programs on Stack ADT and Queue ADT.
		1,2	CO2	Construct C programs on Linear Data Structures like Single Linked List and Double Linked List Operations.
		5,6,7	CO3	Build Cprograms on nonlinear Data Structures like Heaps, Hash, Binary Search Trees.
		8,9,10,11,12	CO4	Make use of Graphs to DevelopCprograms to like Graphs Traversal Algorithms, Minimum Spanning tree Algorithm.
		13,14,15	CO5	Develop C programs for several recursive non recursive Sorting and searching Techniques.

7th Semester

Theory Courses

Course Code	Course Title		Course Outcomes
C411	Utilization of Electrical Energy	CO1	Select a suitable motor for electric drives and industrial applications.
		CO2	Identify the most appropriate heating or welding technique for suitable applications.
		CO3	Interpret various levels of illumination produced by different illuminating sources.
		CO4	Estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources.
		CO5	Determine the speed-time characteristics of different types of Electric traction services.
		CO6	Evaluate energy consumption levels at various modes of operation.
C412	Linear IC Applications	CO1	Outline the basic operation and performance parameters of differential amplifiers.
		CO2	Demonstrate the measuring techniques for performance parameters of OP-AMP.

		CO3	Construct different linear and non-linear circuits using OP-AMPs.
		CO4	Analyze and design amplifiers and active filters using OP-AMPs.
		CO5	Develop applications by making use of different analog ICs.
		CO6	Construct different types of DAC's and ADC's using OP-AMP.
C413	Power System Operation & Control	CO1	Determine the optimal scheduling of Generators.
		CO2	Outline the Hydrothermal scheduling.
		CO3	Solve the Unit commitment problems subjected to constraints.
		CO4	Model the Isolated power system for single area and two area system and obtain it's load frequency control.
		CO5	Make use of PID controllers in single area and two area system to find the steady state response.
		CO6	Understand the Importance of Reactive power control and line power compensation.
C414	Switch Gear and Protection	CO1	Make use of the principles of arc interruption to perceive the operation of circuit breakers.
		CO2	Classify and compare different types of electromagnetic protective relays.
		CO3	Illustrate various protection schemes used for transformers and alternator.
		CO4	Examine various types of protection schemes for transmission line and busbar.
		CO5	Distinguish different types of static relays and use the concept for an application to the system.
		CO6	Outline various methods of over voltage protection in power systems.
C415	Instrumentation (Elective I)	CO1	Understand different characteristics and errors of measuring systems , classify the types of signals and modulation schemes.
		CO2	Distinguish active transducers from passive transducers.
		CO3	Develop the ability to use instruments for measurement of physical parameters.
		CO4	Understand the working principle of various types of digital voltmeter.
		CO5	Utilize the design and functioning of Oscilloscopes to measure the phase and frequency.
		CO6	Make use of Signal generators to analyze a signal.

Course Code	Course Title		CO	Course Outcomes
C416	Special Electrical Machines(Elective II)		CO1	Outline the operation and analyze performance of switched reluctance motor
			CO2	Explain the performance and control of stepper motors, and their applications
			CO3	Outline the operation and characteristics of permanent magnet dc motor
			CO4	Distinguish between brush dc motor and brush less dc motor
			CO5	Summarize the concepts of travelling magnetic field and their applications
			CO6	Outline the significance of electrical motors for traction drives

Laboratory Courses

Course Code	Course Title	Experiment No		Course Outcomes
C417	Electrical Simulation Lab	1,4	CO1	Analyze the response of series RLC circuit for different inputs & the stability of systems using Bode plot,Root locus and Nyquist plot.
		2,6	CO2	Simulate transmission line,D.C separately excited motor.
		7	CO3	Determine the equivalent circuit parameters of single phase Transformer and simulate.
		5,9	CO4	Simulate Integrator & differentiator circuit, Buck-Boost converters.
		3,8,10	CO5	Simulate the AC Voltage Controller, full converter and PWM inverter.
C418	Power systems & Simulation lab	1,2,3	CO1	Analyze the performance of Alternator and Transformer under different fault conditions.
		4	CO2	Determine equivalent circuit parameters of the transmission line.
		7,12	CO3	Analyze the steady state and Transient behaviour of the powersystem.
		10,11	CO4	Determine the economic scheduling of generators with and without transmission losses.
		8,9	CO5	Design the controller to improve frequency stability of powersystem.

Course Code	Course Title		Course Outcomes
C421	Digital Control Systems	CO1	Summarize the concepts of digital control systems and assemble various components associated with it.
		CO2	Apply Z- transforms in the analysis of Digital Control Systems.
		CO3	Evaluate the response for the given discrete time systems. Understanding the concepts of controllability and observability.
		CO4	Outline the stability of the system using various methods.
		CO5	Design discrete- time control systems using conventional methods
		CO6	Estimate the design of state feedback control by "the pole placement method.
C422	HVDC Transmission	CO1	List the types of HVDC levels and basic concepts.
		CO2	Analyze the performance of HVDC Converters.
		CO3	Analyze the power control of HVDC transmission.
		CO4	Develop the control concepts for reactive power control and AC/DC power flow.
		CO5	Summarize the converter faults, protection and harmonic effects.
		CO6	Outline the low pass and high pass filter requirements in HVDC systems.
C423	Electrical Distribution Systems	CO1	Understand the various factors of distribution system.
		CO2	Understand the design considerations of substations and distribution feeders.
		CO3	Determine the voltage drop and power loss in a distribution system.
		CO4	Apply various protective devices and its coordination techniques to distribution system.
		CO5	Understand the effect of compensation on power factor improvement.
		CO6	Make use of the concepts of voltage drop compensation to Identify methods for voltage control.
C424	FACTS: Flexible	CO1	Summarize the concept of power flow control in transmission lines using FACTS controllers.

	Alternating Current Transmission Systems (Elective-III)	CO2	Outline the differences between VSC and CSC.
		CO3	Apply the shunt compensation methods to improve the stability in the transmission lines.
		CO4	Summarize the Shunt compensation methods.
		CO5	Outline the importance of series capacitive compensation.
		CO6	Explain the operating principle and list applications of UPFC and IPfC.
C425	Seminar	CO1	Outline the important concepts to gain factual knowledge.
		CO2	Organise the presentation and disseminate ideas effectively with good communication skills.
		CO3	Develop self learning& time management skills to engage in continuous learning.
		CO4	Synthesize and reflect on to show the depth of knowledge in a compelling, well structured and professional behaviour.
		CO5	Develop writing skills with clarity of thought and expression.
C426	Project	CO1	Demonstrate the technical knowledge to identify problems in the field of Electrical &Electronics Engineering and its allied areas.
		CO2	Analyze and formulate technical projects with a comprehensive and systematic approach.
		CO3	Identify the modern tools to implement technical projects.
		CO4	Design engineering solutions for solving complex engineering problems.
		CO5	Develop effective communication skills, professional behaviour and team work.

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING FOR WOMEN
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Department of Information Technology

R16-Course Outcomes

1ˢᵗ Semester

Course Code	Course Title	Course Outcomes	
C111	English – I	CO1	Develop an understanding of the service that can be rendered through the human resources to the society and acquire knowledge of familial relationships portrayed in "An Ideal Family".
		CO2	Develop awareness and importance of road safety and relate the pain and hopelessness that war brings in the lives of ordinary people.
		CO3	Evaluate and to perceive the advantages and disadvantages of technology and show that courage and determination can triumph all obstacles.
		CO4	Plan alternatives to the depleting sources and to choose suitable sources of energy for rural India and distinguish between reality and illusion, to overcome the superstious beliefs.
		CO5	Build on the fact that the animal must be preserved because animal life is precious and analyze the tragedy that unplanned development can ensue.
		CO6	Apply safety measures at home, workplace, labs, industries by following safety measures and evaluate the complex issue prevails in racism and slavery.
C112	Mathematics - I	CO1	Solve the first order, first degree differential equations and apply the techniques to engineering applications.
		CO2	Solve the higher order differential equations with constant coefficients and apply it to solve physical situations whose behavior can be described by Linear D.E.
		CO3	Determine Laplace Transforms of various functions and apply it to solve linear ODE with initial conditions.
		CO4	Utilize multivariate differential calculus concepts to determine the extrema of multivariable functions.
		CO5	Solve the linear and nonlinear partial differential equations of first order.
		CO6	Classify and solve the higher order linear/non-linear partial

			differential equations with constant coefficients.
C113	Mathematics – II (Mathematical Methods)	CO1	Solve algebraic, transcendental and simultaneous equations using numerical methods like Bisection, False-Position, Iterative and Newton Raphson method.
		CO2	Construct an interpolating polynomial for the given data and estimate the value of an unknown function at a given point using Newton forward, backward, Gauss forward, backward and Lagrange interpolation formulae.
		CO3	Evaluate definite integrals using Quadrature formula, and solve the ordinary differential equations numerically using Taylor, Picard, Euler's and RK methods.
		CO4	Find Fourier Series of an arbitrary function over a given range.
		CO5	Utilize the method of separation of variables to One dimensional wave, heat and two dimensional Laplace equations.
		CO6	Determine the Fourier Transform, sine, cosine transforms and their Inverse Fourier transforms of given function and evaluates integrals using Fourier integral theorem.
C114	Applied Physics	CO1	Utilize the concepts of interference of light in understanding the optical systems and apply the principle in observing the formation of interference pattern in thin films.
		CO2	Distinguish the different types and understand the resolving power of optical instruments through various slit pattern effects of diffraction.
		CO3	Understand the concepts of polarization types and conversion by studying wave plates and polarimeter and further understand working principle of lasers.
		CO4	Understand the basic principles of electromagnetic fields that predict the possibility of electromagnetic waves.
		CO5	Explain and apply the fundamentals of quantum mechanics to a particle in one dimensional potential box and to study the conductivity of free electrons in solids.
		CO6	Infer the mechanism of electrical conduction in solids, especially the semiconductors which are the basic materials for electronic devices.
C115	Computer Programming Using C	CO1	Understand the background of programming languages and computing environments.
		CO2	Make use of basic C- programming language constructs to build C-programs.
		CO3	Develop C-programs by utilizing various control structures.
		CO4	Classify modular programming techniques to implement C-

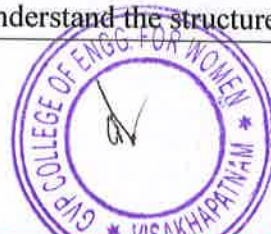|			CO5	Build C-programs by using data structures like arrays, strings.
			CO6	Make use of pointers, structures and files to build c programs which are useful for real time development.
C116	Engineering Drawing		CO1	Make use of graphic representation as per standards and to construct polygons, ellipse and scales.
			CO2	Identify and draw the orthographic projection of points & straight lines placed in various quadrants
			CO3	Identify and draw the projection of straight lines inclined to both the planes
			CO4	Identify and draw the projection of planes inclined to both the planes.
			CO5	Plan and draw the projection of solids in different positions & inclined to one of the planes.
			CO6	Interpret orthographic and isometric views of objects.

Laboratory Courses

Course Code	Course Title	Experiment No	CO.No.	Course Outcomes
C117	English-Communication Skills Laboratory – I	1,2	CO1	Apply the skill of making inquiries over phone, thanking and responding to thanks.
		3,4	CO2	Develop responding to requests, requesting, asking permission, giving and refusing permission, asking direction and giving direction.
		5,6	CO3	Make use of language skills in inviting, accepting and declining invitations, congratulating, making and responding to complaints.
		7,8	CO4	Identify the relationship between letters and sounds.
		9,10	CO5	Develop pronunciation, stress and intonation while speaking.
C118	Applied /Engineering Physics Laboratory	4,5	CO1	Determine the elastic modulus of given material and Moments of inertia of various types of pendulums.
		1,2,3	CO2	Operate optical instruments (Spectrometer and travelling microscope) to understand principles of interference and diffraction of light.
		6	CO3	Understand the modes of mechanical vibrations and determine their frequency.
		13	CO4	Apply tangent law to study the variation of magnetic fields due to current carrying conductors.
		10,11, 12,14	CO5	Estimate the Energy band gap, thermal coefficients of resistance for semiconductors and understand the volt -ampere characteristics of diodes.

C119	Applied/ Engineering Physics – Virtual Labs- Assignments	-	CO1	Inculcate basic scientific concepts through a virtual studying and learning environment within short duration of time
		-	CO2	Execute experiments through simulations which are difficult to do in the real laboratories either because of their risk and/or high cost of the equipment
		-	CO3	Develop skills for technical documentation as well as exploration for any project/research which they do at later stages
C1110	C Programming Laboratory	1,2	CO1	Make use of basic C-programming language constructs and practice logical ability to solve problems in Linux Environment.
		3,4,5, 6,7	CO2	Solve problems by using control structures and modularity.
		8,9,12	CO3	Build programs using basic data structures include arrays, strings and structures.
		10,11	CO4	Apply pointers and dynamic memory allocation for dealing real world problems.
		13,14, 15,16	CO5	Utilize files for developing C-programs and understand the basic concepts of Computer Hardware and software.

2ⁿᵈSemester

Course Code	Course Title	Course Outcomes	
C121	English – II	CO1	Make use of the greatest resource, education and follow Dr.A.P.J's simple life and service to the nation. Develop the skill of writing official letters.
		CO2	Develop peaceful co-existence and universal harmony and have deep insight on the achievements of Sir C.V.Raman. Apply e-correspondence in professional field.
		CO3	Analyze the symptoms of cultural shock and aftermath consequences due to globalization and assimilate the contributions of H.J.Bhabha. Plan speech writing.
		CO4	Assess the theme which the society needs to re-examine its traditions when they are outdated and acquire the knowledge of discoveries and inventions made by J.C.Bose. Understand the structure of the

			text.
		CO5	Categorize several health disorders due to climatic change and recommend protective environment for the sustainability of the future generations and develop insight into the contributions of P.C.Ray. Make use of technical writing for the media.
		CO6	Relate eminent personalities, who toiled for the present day advancement in software field and perceive Ramanujan innate talent. Develop report writing skills.
C122	Mathematics – III	CO1	Determine the rank of a matrix and Solve linear system of equations using Rank and iterative methods
		CO2	Determine Eigen values and Eigen vectors of a matrix and apply the concept to examine the nature of quadratic forms
		CO3	Explain the concepts of curve tracing, double and triple integrals and apply them to determine areas and volumes.
		CO4	Examine the properties of Beta and Gamma functions and apply them to solve improper integrals.
		CO5	Apply vector differential operator on scalar and vector point functions and determine directional derivative, angle between two surfaces.
		CO6	Determine the work done using Line Integrals and evaluate line, surface and volume integrals using Green's Theorem, Stoke's Theorem and Gauss Divergence theorem.
C123	Applied Chemistry	CO1	Understand the preparation, properties, advantages and limitations of plastic materials and relate the ideas to engineering applications
		CO2	Compare and relate the advantages, limitations of different fuels with the computational air requirements for combustion
		CO3	Make use of electrochemical reactions in understanding the construction and working of batteries and further gain knowledge of corrosion control
		CO4	Utilize fundamentals of applied chemistry to acquire knowledge of advanced materials and their applications

		CO5	Apply the basics of solid state chemistry in understanding the structure and properties of crystalline solids
		CO6	Gain knowledge regarding non-conventional energy sources and compare their advantages and limitations
C124	Object Oriented Programming through C++	CO1	Compare the conventional programming language with Object Oriented Programming language and outline the key concepts of OOP
		CO2	Make use of C++ Programming constructs and classes, objects, function overloading and constructors
		CO3	Develop Object Oriented Programming using operator overloading, type conversion and Simplify the code using inheritance with code reusability
		CO4	Experiment with the pointer concepts, polymorphism and virtual functions
		CO5	Utilize templates for generic programming and Examine the raised exceptions using exception handling
		CO6	Outline the STL programming model, Make Use of the various containers and associated algorithms
C125	Environmental Studies	CO1	Outline global environmental challenges, initiatives towards sustainable development, understand the concept of the ecosystem and its importance
		CO2	Demonstrate an understanding about natural resources and recognize the need to conserve them
		CO3	Explain biodiversity, identify threats to biodiversity and the conservation methods
		CO4	Categorize and explain different types pollution, their causes, impacts, control measures and waste management practices
		CO5	Identify social issues pertaining to environment and gain knowledge about various environmental legislations
		CO6	Examine and understand the concept of environmental impact assessment, environmental audit and its importance
C126	Engineering Mechanics	CO1	Understand the concepts of moment, friction and its applications
		CO2	Analyze the given physical problem for finding the unknown reaction forces by using equilibrium equations & graphical method

			CO3	Determine the centroid and center of gravity of the given plane area and solid body
			CO4	Estimate area and mass moment of inertia of a plane area and solid body
			CO5	Evaluate the displacement, velocity and acceleration of a particle subjected to rectilinear and curvilinear motion & methods of representing plane motion
			CO6	Apply work energy principle, impulse momentum principle for connected systems

Laboratory Courses

Course Code	Course Title	Experiment No	CO.No.	Course Outcomes
C127	Applied/ Engineering Chemistry Laboratory	2&3	CO1	Make use of experimental skills for volumetric titrations and perform acid - base titrations using indicators
		4, & 16	CO2	Demonstrate an understanding of redox titrations like permanganometry and estimation of vitamin c in different samples
		7,8 &15	CO3	Apply the principles of complexometric titrations to determine hardness of water, amount of Zinc and Copper using EDTA in the given samples
		9,10,11,12,13,&14	CO4	Perform Experiments with instruments such as conductometer, pH meter to acquire skills of conductometric titrations and chemical analysis
		5 &6	CO5	Estimate the amount of Ferrous Iron in the sample using Potassium Dichromate using the principles of oxidation - reduction titration
C128	English- Communication Skills Laboratory - II	1,2	CO1	Build the basics of debating, presenting their views, arguing and counter arguing.
		3,4	CO2	Plan and prepare for a Group Discussion
		5,6	CO3	Organize and structure the content of a presentation.
		7,8	CO4	Make use of C.V for interviews, face interviews confidently and develop official emails.
		9,10	CO5	Apply idiomatic expressions in usage and avoid common errors in English.
C129	Object Oriented Programming Lab	1,2	CO1	Explain g++ compiler and translate basic c programs into c++ programs
		3,4,5,8	CO2	Develop programs using different operators like scope access, new, delete and utilize different function concepts like inline, friend, function overloading and

			operator overloading
		6,7	CO3	Construct programs on classes, objects, constructors and Make use of access specifies in classes
		9,10,11	CO4	Utilize inheritance and polymorphism features to implement code reusability
		12,13 14,15	CO5	Apply exception handling concepts to handle runtime errors and Make use of templates ,STL concepts to implement generic programming

3rd Semester

Course Code	Course Title	Course Outcomes	
C211	Statistics with R Programming	CO1	List motivation for learning R programming language and make use of different types of data structures in R.
		CO2	Identify and implement appropriate control structures to solve a particular programming problem and also import new function packages into the R workspace.
		CO3	Examine numerical statistics used in introductory statistics, manipulate and summarize data-sets in R.
		CO4	Build simple plots by using introductory statistics for data visualization.
		CO5	Make use of data-sets to create testable hypotheses and identify appropriate statistical tests.
		CO6	Outline the usage of linear and non-linear models in R.
C212	Mathematical Foundations of Computer Science	CO1	Make use of propositional, predicate logic and truth tables to verify the validity of logical flow of arguments
		CO2	Analyze sets, relations and functions
		CO3	Demonstrate Number Theory and Mathematical Induction
		CO4	Apply knowledge of Binomial Theorem, Permutations, Combinations associated operations in problem solving
		CO5	Construct generating functions, recurrence relations; solve recurrence relations
		CO6	Construct graphs, trees and also determine spanning tree of a given graph using DFS / BFS, minimal spanning tree of a given graph.
C213	Digital Logic Design	CO1	Represent number systems and perform binary arithmetic's
		CO2	Make use of Boolean Algebra to minimize logic functions
		CO3	Apply the concepts of K map to minimize logic functions.
		CO4	Model combinational logic circuits using basic gates and HDL.

		CO5	Develop minimized FSMs by using the concepts of sequential circuits.
		CO6	Construct registers and counters by using flip-flops.
C214	Python Programming	CO1	Outline the need for learning Python programming language and basic programming constructs.
		CO2	Identify and implement appropriate control structures to solve programming problem.
		CO3	Apply various data structures in developing solutions to real time scenarios.
		CO4	Build functions and make use of packages for solving real world problems
		CO5	Analyze object oriented concepts in python and Outline Exception handling concepts.
		CO6	Summarize the usage of pattern matching, GUI and other system packages in python.
C215	DS Through C++	CO1	Relate the concept of Abstract Data Type using classes and Build Polynomials, Sparse Matrix ADT.
		CO2	Apply data structures like stacks and queues to Solve various real time computing problems.
		CO3	Develop programs using linear data structures to Solve real world problems.
		CO4	Develop various non-linear data structures like trees to solve various computing problems.
		CO5	Apply various non-linear data structures like graphs to solve various computing problems.
		CO6	Make use of various sorting techniques on unsorted Data.
C216	Software Engineering	CO1	Classify various Software Engineering Methods and Software Process Models.
		CO2	Summarize the requirements analysis to organize SRS documents and demonstrate the software design approaches.
		CO3	Apply various software design models on function, object oriented analysis, and interfaces.
		CO4	Illustrate coding and different software testing approaches.
		CO5	Classify capability maturity model and make use of CASE tools on software to ensure quality.
		CO6	Summarize maintenance process models and reuse approaches.

Laboratory Subjects

Course Code	Course Title	Experiment No	Course Outcomes	
C217	DS Through C++ Lab	3,4	CO1	Develop programs on Stack ADT and Queue ADT.
		1,2	CO2	Construct C++ programs on Linear Data Structures like Single Linked List and Double Linked List Operations.
		5,6,7,15	CO3	Build C++ programs on nonlinear Data Structures like Heaps, Binary Search Trees.
		8,9,10,11,12	CO4	Make use of Graphs to Develop C++ programs to like Graphs Traversal Algorithms, Minimum Spanning tree Algorithm.
		13,14	CO5	Develop C++ programs for several recursive non recursive Sorting Techniques.
C218	Python Programming Lab	1,2,3,4	CO1	Apply control structures and operators for writing basic python programs.
		5,6,11	CO2	List various python data structure concepts and apply them to solve real world problems.
		7,8,9,10	CO3	Develop functions and examine various file handling techniques and apply them to solve real world problems.
		12	CO4	Build simple Modules used for solving real world problems.
		13,14,15,16	CO5	Analyze object oriented concepts in python and develop, test various GUI applications.

4th Semester

Course Code	Course Title	Course Outcomes	
C221	Computer Graphics	CO1	Show the importance of various primitive algorithms, Clipping algorithms, and Geometric Transformations on various 2D objects.
		CO2	Classify different types of Projections, Extend the concepts of geometric transformations to 3D, 3D viewing, curves, surfaces and hidden surface removal algorithms
		CO3	Outline various Color models, General Computer Animation and Experiment with different openGL operations on 2D objects.
		CO4	Summarize the concepts of Shading models, textures, shadows on objects to get realistic appearance and build a camera using openGL .
		CO5	Show the generations of various self-similarity curves and Explain Iterated function Systems, Mandelbrot sets and Julia sets.
		CO6	Explain Ray tracing, Surface textures, Reflections and transparency to the objects.

C222	Java Programming	CO1	Compare and contrast between Object Oriented Programming & Procedural Oriented Programming by building, compiling and testing with sample java programs.
		CO2	Develop java programs using control structures, arrays to solve real world problems.
		CO3	Solve real world problems using object oriented constructs such as inheritance, interfaces and exception handling concepts.
		CO4	Make use of multithreaded programming in java and file operations by using classes in java.io package.
		CO5	Build dynamic user interfaces using applets and event handling.
		CO6	Distinguish between AWT and Swing components by developing a GUI using those components.
C223	E-Commerce	CO1	Outline the anatomy and category of e-commerce applications and mercantile process models.
		CO2	Classify various electronic payment systems and illustrate electronic data interchange in inter organizational e-Commerce.
		CO3	Organize the workflow automation, coordination and utilize macro forces in Intra Organizational E-Commerce.
		CO4	Build a business case for document library, creation of data warehouses and apply information based marketing in businesses for case studies.
		CO5	Summarize search and discovery paradigms, e-commerce catalogs and directories and information filtering.
		CO6	Outline key multimedia concepts, digital video and electronic commerce and desktop video conferencing.
C224	Computer Organization	CO1	Summarize the Functional Units of a Computer, Bus Structures, System Software and Analyze the Performance of a Computer using different parameters
		CO2	Summarize Register Transfer Notation, Assembly Language Notation and Apply the knowledge of Stacks to

			sub-routine nesting in Computer Program Execution.
		CO3	Outline Arithmetic, Logic, and Branch Instructions and Apply the knowledge of Addressing Modes to identify Effective Address of an operand.
		CO4	Make Use Of Interrupt Handling and DMA in multiple devices.
		CO5	Classify various Memory Circuits and Apply the concept of Mapping Techniques to identify the Address in Cache Memory.
		CO6	Outline the process of storing positive/negative numbers and performing Arithmetic Operations, Hardwired and Micro-Programmed Control.
C225	OOAD using UML	CO1	Compare structure oriented with object –oriented approaches to solve complex problems and frame solutions
		CO2	Identify classes and objects through classification approaches
		CO3	Make use of basic UML constructs and develop class and object diagram.
		CO4	Identify interaction and use cases, model the use case diagram, interaction diagram, and activity diagram.
		CO5	Make use of behavioral modeling concepts to build state chart diagram.
		CO6	Build component and deployment diagrams with Architectural modeling concepts.ms.
C226	Principles of Programming Languages	CO1	Summarize Syntax and Semantics of different programming languages
		CO2	Outline the concepts of Variables, Data types, Expressions and Control Statements of Programming languages
		CO3	Interpret pros and cons of Subprograms/subroutines and analyze subprograms associated with various programming languages
		CO4	Outline Object Oriented, Concurrency and Event Handling

				programming constructs
		CO5		Relate Functional programming languages with Imperative languages and construct programs in SCHEME and ML
		CO6		Develop programs in PROLOG and inspect different multi-paradigm languages

Laboratory Subjects

Course Code	Course Title	Experiment No	Course Outcomes	
C227	Unified Modeling Languages Lab	WEEK-1,2,3,4	CO1	Construct UML diagrams for static view of the system and develop Event table and CRUD Matrix.
		WEEK-7,8,9,10	CO2	Make use of GRASP patterns to refine models for the given scenario.
		WEEK-7,8,9,10	CO3	Build three layer package diagrams for the given case studies.
		WEEK-11,12	CO4	Develop design solutions using various design patterns.
		WEEK-5,6,13	CO5	Construct UML diagrams for use-case view and dynamic view of the system.
C228	Java Programming Lab	1,2	CO1	Develop Java applications using command line arguments, arrays and control structures.
		2(d)	CO2	Explain the usage of strings in Java by developing suitable applications.
		3,4,5,6,8,12	CO3	Solve real world problems using OOPs concepts.
		7,9	CO4	Build Java applications by handling exceptions.
		10,11,13,14,15,16	CO5	Construct concurrent applications by applying Multithreading,AWT concepts in java

5th Semester

Course Code	Course Title		Course Outcomes
C311	Human Computer Interaction	CO1	Interpret the various concepts of human interaction with computers using various devices and processes.
		CO2	Outline typical Human-Computer Interaction (HCI) Models, styles and various historic HCI paradigms with real time examples.
		CO3	Extend the knowledge of HCI design principles, standards and guidelines to achieve good quality of service for interfaces.
		CO4	Examine principles of screen design and windows interface
		CO5	Categorize tasks of relevant HCI systems based on task analysis and specify various interaction devices.
		CO6	Identify documentation design issues for user assistance in HCI systems.
C312	UNIX &Shell Programming	CO1	Summarize the history of UNIX operating system, UNIX components and Demonstrate basic UNIX commands.
		CO2	Make use of UNIX file system hierarchy and architecture to experiment with file utility commands like chmod, chgrp, chown.
		CO3	Develop new commands using command line arguments, shell variables and I/O redirection.
		CO4	Make use of grep, awk, SED stream editors for file processing.
		CO5	Develop shell script by analyzing shell programming constructs.
		CO6	Illustrate about child and parent process, internal and external commands.
C313	Advanced Java Programming	CO1	Summarize HTML and outline the java Swing package, collections framework
		CO2	Illustrate Java Beans with bean introspection, bound and

			constrained properties, persistence and customizers.
		CO3	Make use of the javax.servlet package, servlet life cycle and build web application using servlets to implement http request responses, cookies and session tracking.
		CO4	Outline the anatomy of JSP Page and MVC Architecture and demonstrate installing of tomcat server and setting up JSP Environment.
		CO5	Build web application using JSP to implement dynamic content generation, implicit objects, directives, error handling, sharing of data between pages and sharing session and application data
		CO6	Apply java.sql package and build jsp code to demonstrate access to MySql or MSAccess Databases and perform database specific actions
C314	DataBase Management Systems	CO1	Outline the architecture of DBMS and provide the knowledge on levels of abstraction
		CO2	Construct the E-R model to represent databases and write expressions in relational algebra, tuple and domain relational calculus to represent queries on real world problems
		CO3	Experiment with queries and nested queries on real world problems by using several operators like join, set, and aggregate.
		CO4	Relate and Plan the concept of data planning and database design using normalization
		CO5	Utilize the ACID properties in transaction management and interpret concurrency control mechanisms
		CO6	Categorize various file organizations and indexing for faster retrieval of data, persistent storage of data
C315	Operating Systems	CO1	Summarize structures, functions of operating systems and system calls.
		CO2	Outline various process management, multithreading concepts and make use of CPU scheduling algorithms in multiprogramming.
		CO3	Summarize Memory Management concepts and Apply various

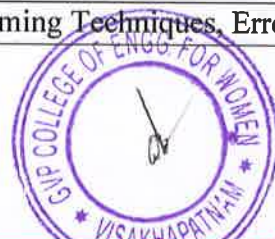|				
				Page Replacement Algorithms to manage the memory efficiently
			CO4	Outline various Process synchronization concepts, Identify the causes and effects of deadlocks in Operating system.
			CO5	Make use of File System Interface, File System Implementation and Mass Storage Structure.
			CO6	Examine Linux, Android operating systems with general operating systems principles
C319	Professional Ethics & Human Values		CO1	Apply the moral template inculcating the core human values for transformation into an ethical human being
			CO2	Utilize the principles of harmony, value education and human virtues for professional competency
			CO3	Explain and understand the role of engineering ethics and code of conduct for development of professionalism
			CO4	Evaluate the responsibility and accountability of a professional engineer towards design, operation, safety, by adopting risk benefit analysis
			CO5	Judge issues pertaining to individual rights, collegiality, moral dilemmas and conflicts while discharging their professional duties.
			CO6	Analyze cross cultural issues in different ethical domains by acquiring knowledge on intellectual property rights in the context of globalization

Laboratory Subjects

Course Code	Course Title	Experiment No		Course Outcomes
C316	Advanced Java Programming Lab	1,2,3	CO1	Explain the basic understanding of java.net package
		4,5,6	CO2	Build client server communication using TCP IP and UDP
		7,8,9,10	CO3	Construct applications to implement database interaction using JDBC
		11,12,13	CO4	Demonstrate client server interaction using Servlets

		14,15,16	CO5	Develop Java Beans applications
C317	UNIX & System Lab	OS1	CO1	Develop programs for various CPU Scheduling Algorithms
		OS2,OS3,OS6	CO2	Build programs for Memory Management Techniques and Page Replacement Algorithms.
		OS4,OS5,OS7	CO3	Construct programs for various File Allocation Strategies, Deadlock Prevention and Avoidance Techniques.
		LP1,LP3	CO4	Experiment with different Linux commands.
		LP2,LP4,LP5,LP6,LP7,LP8	CO5	Develop programs simulating various OS concepts and Linux commands using System Calls.
C318	Database Management System Lab	1,3,7	CO1	Populate the database using SQL DDL, DML commands and make use of built-in-functions to write queries
		2,4	CO2	Identify and implement different operators and clauses in nested queries to solve real time problems.
		5,6,8,9	CO3	Implement Queries on Joins, and correlated sub-queries with access control capabilities to build reports
		10,11,12,13	CO4	Construct simple PL/SQL programs using control statements and exception handling methods
		14,15,16	CO5	Develop applications using PL/SQL including procedures, functions, cursors, packages, forms and database connectives

6th Semester

Course Code	Course Title	Course Outcomes	
C321	Computer Networks	CO1	Understand the concepts of Network Topologies and network reference models (OSI and TCP/IP reference models).
		CO2	Illustrate Physical layer Guided Transmission media and Multiplexing concepts.
		CO3	Interpret Datalink layer Framing Techniques, Error control

|				
				Techniques using CRC error detection mechanism, flow control mechanisms using Elementary Data Link layer protocols, sliding window protocols Algorithms in a network.
			CO4	Understand the Media (channel) Access control problem in a network using multiple access protocols–ALOHA, CSMA protocols.
			CO5	Make use of the Network Layer routing algorithms to determine the best route (path) in a network communication.
			CO6	Apply the internet Transport layer protocols-TCP,UDP in client – server data communication
C322	Data Mining		CO1	Classify the kinds of data, functionalities, issues in data mining and similarity and dis-similarity measures
			CO2	Illustrate various preprocessing techniques.
			CO3	Develop decision tree algorithms and evaluate the performance of a classifier.
			CO4	Build Classification model using Naive Bayes Classification and Bayessian Networks.
			CO5	Construct association rule generation and identify frequent item sets using apriori and FP growth algorithm.
			CO6	Develop the various kinds of clustering methods and apply the clustering algorithm on a dataset.
C323	Web Technologies		CO1	Illustrate the HTML tags and cascading style sheet formats for developing static web content.
			CO2	Explain the development of dynamic web content using JavaScript
			CO3	Develop the web applications with help of XML and AJAX
			CO4	Build web content by integrating PHP and database
			CO5	Interpret the PERL basic functions and its usage in web applications.
			CO6	Apply ruby programming principles and ruby on rails for developing web applications and other solutions
C324	Software		CO1	Extend Software Testing to software engineering, distinguish

	Testing methodologies		between types of testing and examine the concepts of Flow graphs and Path Testing.
		CO2	Interpret the concepts of transaction flow testing and experiment with the concepts of data flow testing in real-time situations
		CO3	Identify the strategies in domain testing and extend them to path products and expressions.
		CO4	Utilize the concepts of syntax testing in the current programming trend and assess the logic based testing methodologies.
		CO5	Explain the designs of state graphs and graph matrices and apply them with an algorithmic view.
		CO6	Make use of the software testing tools and apply them to resolve the problems in real time environment.
C325	Artificial Intelligence	CO1	Summarize what constitutes "Artificial" Intelligence to implement and identify applications.
		CO2	Apply Problem-solving, Problem reduction and Game playing techniques for solving different types of artificial intelligence problems.
		CO3	Make use of propositional and predicate logic in AI for planning, problem-solving, intelligent control, and diagnosis
		CO4	Apply knowledge representation techniques on AI applications using semantic network and frames.
		CO5	Categorize shells and tools for building expert systems by using AI techniques.
		CO6	Make use of probability theory and fuzzy logic for uncertainty measure in Artificial Intelligence.
C329	IPR& Patents	CO1	Outline concept of Intellectual property rights, IPR tool kitand its importance in the global scenario
		CO2	Demonstrate an understanding about copyright protection, the registration process and legal remedies available in case of infringement
		CO3	Explain and gain knowledge on patents, steps for registration

Course Code	Course Title	Experiment No	Course Outcomes	
			CO4	Utilize the concept of Trademark, their registration, infringement and related laws
			CO5	Make use of principles of trade secrets and laws of unfair competition
			CO6	Apply the information gained on cyber laws and cyber - crimes in the domain of e-commerce and data security

Laboratory Subjects

Course Code	Course Title	Experiment No	Course Outcomes	
C326	Web Technologies Lab	1,2,3,4,5	CO1	Apply and make use of HTML, CSS to develop the web applications.
		6	CO2	Build the web application for data storage and transmission over net using XML
		7,8,9,10,11,12,13,14	CO3	Construct basic operations and GUI applications using Ruby language
		15,16,17,18	CO4	Develop operations on data and database using PERL
		19,20,21,22,23,24,25	CO5	Construct usage of cookies and database applications using PHP script
C327	Software Testing Lab	1,2	CO1	Build programs concerning loops and matrices in C and Develop appropriate test cases using Adhoc testing and black-box testing.
		3, 4, 5	CO2	Construct test cases for known applications like ATM/Banking/Library management to utilize BBT, BVA, equivalence class partitioning etc. and model a test plan.
		6a, b, c, d, e	CO3	Examine the deployment, usage and testing script language in the automated tool WinRunner.
		6d, e, f	CO4	Apply WinRunner on GUIs and summarize their behavior and performance.
		6g, h, i, j,	CO	Develop Data-Driven Tests and batch tests on GUIs and
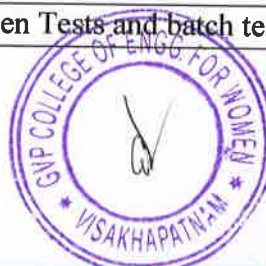
		and 7	5	apply Win Runner on any real-time application.
C328	Data Mining Lab	Exp1,Exp 2	CO 1	Demonstration of preprocessing on dataset student.arff and Labor.arff
		Exp3,Exp 4	CO 2	Build Association rules on dataset contactlenses.arff and test.arff using apriori algorithm
		Exp5,Exp 6	CO 3	Make use of classification rule process on dataset student.arff and employee.arff using j48 algorithm
		Exp7,Exp 8	CO 4	Apply classification rule process on dataset employee.arff using ID3 and Naive Bayes algorithm
		Exp9,Exp 10	CO 5	Demonstration of clustering rule process on dataset iris.arff and student.arffusing simple k-means

7th Semester

Course Code	Course Title	Course Outcomes	
C411	Cryptography & Network Security	CO1	Classify various Security attacks ,Services, Mechanisms and Mathematics of Cryptography
		CO2	Relate Mathematics of Symmetric Key Cryptography and Apply the Symmetric key Cryptography like DES, AES.
		CO3	Relate Mathematics of Asymmetric Key Cryptography and Apply the Asymmetric key cryptography
		CO4	Make use of Data Integrity, Digital Signature Schemes & Key Management for verifying the authenticity of digital messages
		CO5	Select protocols like PGP,S/MIME in Application layer and SSL,TLS in Transport layer to Secure the Network during data transmission
		CO6	Select Internet protocol security (IPsec) at the Network Layer to provide security for Internet Protocol
C412	Mobile Computing	CO1	Interpret the basic concepts, principles in mobile computing, Sensor Networks and develop new protocols related to mobile environment.
		CO2	Apply various access control techniques for Efficient and scalable Mobile Communication.

			CO3	Illustrate Mobile IP, packet delivery and Dynamic Host Configuration Protocols.
			CO4	Solve any new technical issue related to this new paradigm.
			CO5	Summarize data delivery mechanisms, data dissemination and data Synchronization and develop new mobile applications.
			CO6	Develop new mobile and ad hoc network applications and/or algorithms/protocols.
C413	Data Ware Housing and Business Intelligence		CO1	Summarize the data mining task primitives, functionalities, classification along withData Warehousing concepts
			CO2	Illustrate various pre-processing techniques
			CO3	Construct Association rules and identify frequent itemsets using FP growth algorithm along with mining multi-dimensional association rules
			CO4	Illustrate various classification and cluster analysis techniques.
			CO5	Identify the appropriate data mining technique for mining stream, spatial, sequence and text data
			CO6	Explain the concepts of web mining, web structure mining and demonstrate the need of datamining in business intelligence applications.
C414	Managerial Economics & Financial Analysis		CO1	Learn the concepts of Managerial Economics and utilize the demand forecasting methods to predict demand of a product
			CO2	Make use of Production function & economies of scale and assess the BEP of their own business
			CO3	Understand the concepts of competitive market situations
			CO4	Classify the types of business organizations and identify the stages of business cycles to improve the organizations
			CO5	Analyze accounting concepts to prevent loss for the organization
			CO6	Identify the sources of raising capital for business undertaking
C415	Big Data Analytics		CO1	Summarize the Data Structures and Generics in JAVA
			CO2	Outline the building blocks of Hadoop and Summarize the different modes of Hadoop installation
			CO3	Experiment by writing basic MapReduce programs
			CO4	Make use of Hadoop I/O and writable interfaces for building MapReduce applications
			CO5	Demonstrate PIG Architecture and Develop PIG scripts.
			CO6	Apply HIVE to structured data and Develop HIVE

Course Code	Course Title		CO	
				Queries
C416	Cloud Computing		CO1	Make use of the system models for distributed and cloud computing through which HPC and HTC can be obtained.
			CO2	Extend the virtualization concept to chips, CPUs, networks and data centers
			CO3	Apply the offered services, servicing models, cloud platforms and bring-out an efficient SOA
			CO4	Identify the features of distributed and grid platforms and survey the services offered by Google App Engine, AWS and MS-Azure
			CO5	Analyze cloud resource management, queuing methodologies and scheduling of the MapReduce applications
			CO6	Illustrate different file systems like Google file system, Apache Hadoop and Amazon S3.

Laboratory Subjects

Course Code	Course Title	Experiment No		Course Outcomes
C417	Mobile Computing Lab	1,2,3,4	CO1	Demonstrate the installation of various mobile development frameworks (Sun Java Wireless Tool Kit, Eclipse with J2ME plugin for Java supported mobile devices and learn how to work with components and structure of frameworks to create user interfaces
		5,6	CO2	Illustrate user interfaces for interacting with apps and triggering actions and handling multiple activities and develop MIDP Applications.
		7,8,9	CO3	Develop a working application with an authenticated Mobile Client Server Connectivity and thereby perform message exchange.
		10,11,12	CO4	Develop a working application in Android mobile platforms. Illustrate Graphical Layouts for better user interfaces and interaction with Android applications.
		13,14	CO5	Create useful Android applications for the current scenario

Course Code	Course Title				Course Outcomes
					in mobile computing
C418	Cryptography and Network Security Lab	1,2,3		CO1	Build programs on classical cipher techniques by replacing letters with other letters
		4,5		CO2	Construct programs using message authentication code and cryptographic hash function methods for verification of message integrity
		6,7		CO3	Implement programs on modern symmetric-key cipher techniques such as DES, and AES
		8,9		CO4	Implement programs using asymmetric-key cipher techniques
		10		CO5	Develop programs on digital signature that provides message authentication, integrity, and non-repudiation

8th Semester

Course Code	Course Title		Course Outcomes
C421	Distributed Systems	CO1	Outline the important characteristics of Distributed Systems and salient features of Distributed Systems
		CO2	Make use of Interprocess communication mechanisms with TCP and UDP protocols in Distributed systems
		CO3	Apply RMI and RPC for Remote Invocation in Distributed systems for Distributed Objects.
		CO4	Illustrate the Operating systems facilities at the nodes of a Distributed Systems
		CO5	Examine the different file management systems of Distributed nature and to choose appropriate algorithm for process coordination and agreement.
		CO6	Distinguish various protocols for transaction and replication in distributed systems
C422	Management Science	CO1	Appraise the practices of management concepts in the business environment and evaluate various types of organization structures.
		CO2	Identify the production management practices and distinguish the different stock levels of an organization.
		CO3	Prepare an appropriate marketing mix and determine the

				recruitment process in global competitive environment.
			CO4	Evaluate the project process on the basis of costs and time.
			CO5	Recognize and analyze the strategies of the firm and can re discover the SWOT of themselves.
			CO6	Understand and develop the contemporary management practices such as MIS, MRP, TQM,ERP, BPO and assess the changing business environment.
C423	Management Information System		CO1	Understand the concepts and technologies of Organization and developing strategic plan for an information system.
			CO2	Develop models for representing Systems and application of systems to case studies.
			CO3	Understand the characteristics of Information systems ,for appropriate decision making and approaches/tools to be used.
			CO4	Analyze the issues involved in the management and development of decision support systems.
			CO5	Show a practical level of competence in building applications for budgeting and planning that automate business applications.
			CO6	Examine the significance of development and maintenance of information systems appropriate to industry and organizational environments.
C424	Artificial Neural Networks		CO1	What constitutes Artificial Neuron?and classify different Network Architectures and Active Functions in ANN
			CO2	Relate mathematical basis of learning mechanisms through ANN
			CO3	Construct different classifiers using structure and learning of perceptrons
			CO4	Apply backpropagation Algorithm with multilayer feed forward ANN on real world problems
			CO5	Apply regularization using Radial Basis Function Networks and Summarize approximation properties of RBF
			CO6	Explain a Support Vector Machine and Apply to solve linear separable real world problem.
C425	Seminar		CO1	Outline the important concepts to gain factual knowledge.
			CO2	Organize the presentation and disseminate ideas effectively with good communication skills.
			CO3	Develop self-learning& time management skills to engage in continuous learning.

		CO4	Synthesize and reflect on to show the depth of knowledge in a compelling, well-structured and professional behavior.
		CO5	Develop writing skills with clarity of thought and expression.
C426	Project	CO1	Demonstrate the technical knowledge to identify problems in the field of Computer Science and Engineering and its allied areas.
		CO2	Analyze and formulate technical projects with a comprehensive and systematic approach.
		CO3	Identify the modern tools to implement technical projects.
		CO4	Design engineering solutions for solving complex engineering problems.
		CO5	Develop effective communication skills, professional behavior and team work.

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Department of Electronics & Communication Engineering

M. Tech VLSID & Embedded Systems

R16 Course Outcomes

1 Year 1st Semester

Course Title		Course Outcomes
Digital System Design	CO1	Apply CAMP algorithm for minimization of switching functions
	CO2	Make use of IISc and Compact algorithms in the development of minimized PLAs
	CO3	Develop Programmable Logic Devices using ASM charts
	CO4	Analyze various techniques for fault diagnosis in combinational circuits
	CO5	Analyze various techniques for fault diagnosis in sequential circuits
VLSI Technology and Design	CO1	Comprehending IC production processes and design technologies.
	CO2	Explain cmos vlsi architectures and design issues.
	CO3	Identify properties of mos and bicmos.
	CO4	Analyze subsystem design processes.
	CO5	Design architectures for low power.
CMOS Analog IC Design	CO1	Understand the concepts of MOS Devices and Modeling
	CO2	Analyze the CMOS sub circuits
	CO3	Design and analysis of CMOS amplifiers
	CO4	Design and analysis of CMOS Operational amplifiers
	CO5	Classify open loop and Discrete-Time Comparators
Hardware Software Co-Design	CO1	Analyze specific requirements and tradeoffs in Hardware and soft ware co design for embedded system.
	CO2	Understand the design specifications and tools in the Hardware – Software Co design
	CO3	Acquire the knowledge of firmware development process and tools during Co-design.
	CO4	Apply the concepts of modeling, verification and system-level synthesis in embedded system design.
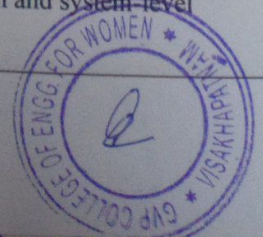
Elective I-CMOS Digital IC Design	CO1	Illustrate the concepts of MOS Design and compare the characteristics of a Psuedo-nmos and CMOS Inverter.
	CO2	Design and analysis of Combinational Circuits using NMOS logic, CMOS logic and Transmission gate logic.
	CO3	Design and analysis of Sequential Circuits using NMOS logic, CMOS logic and Transmission gate logic.
	CO4	Extend the Digital IC Design to Different Dynamic Applications.
	CO5	Compare the concepts of various Semiconductor Memories.
Elective II-System on Chip Design	CO1	Illustrate System on Chip design architecture,Memory and Addressing
	CO2	Compare different processor architectures like VLIW and Superscalar
	CO3	Build SOC Memory system design,Types of cache and Memory interaction
	CO4	Analyze interconnect architectures and Reconfiguration technologies
	CO5	Examine different SOC design application case studies
VLSI Laboratory	CO1	Develop a model,simulate & Synthesize different digital circuits using CAD tool.
	CO2	Determine the necessary requirements for emulating the outputs ,implement ,configure target device and test digital circuits on FPGA.
	CO3	Develop transistor level digital and analog design applications in Mentor Pyxis Schematic editor.
	CO4	Figure out AC, DC and Transient analysis for different digital and analog applications with given specifications.
	CO5	Verify the design by drawing Layout and check for DRC, LVS and Extract Parasitics for different applications.

1 Year 2nd Semester

Course Title		Course Outcomes
Embedded System Design	CO1	Identify the design requirements and classify the basic building blocks to design any Embedded Systems module.
	CO2	Summarize the firmware design principles.
	CO3	Outline the concepts of the development, implementation and testing of embedded system module.
	CO4	Examine the specifications of real time embedded programming with case studies.

CMOS Mixed Signal Circuit Design	CO1	Apply concepts of Switched Capacitor circuits to design filters.
	CO2	Analyze and design PLLs and know their applications.
	CO3	Compare various Nyquist Rate D/A Converters.
	CO4	Distinguish and Design Nyquist Rate A/D Converters.
	CO5	Analyze Oversampling Converters.
Embedded Real Time Operating Systems	CO1	Summarize the acquired knowledge about concepts related to OS Services, Scheduling techniques and issues in real time computing.
	CO2	Understand the need to create the special purpose operating system by learning some examples of real time operating systems.
	CO3	Make use of the concepts of programming models in the real time systems- Case studies.
	CO4	Develop target image creation and small applications by using Linux and shell programming.
	CO5	Understand the programming of RT Linux by analyzing a case study.
Design For Testability	CO1	Outline the testing process and fault modelling
	CO2	Analyze different algorithms for true value and fault simulation
	CO3	Test circuits for SCOAP measures and list various scan design methods
	CO4	Analyze BIST process and types of BISTs
	CO5	Outline the configuration of a system with boundary scan
Elective III-Low Power VLSI Design	CO1	Illustrate the necessity of low power VLSI, Sources of power dissipation techniques and importance of Short-Channel effects
	CO2	Explain the concepts of Low-Power Design Approaches
	CO3	Analyze Low-Voltage Low-Power Adder Circuits
	CO4	Apply Low Power Design concept to Different Multiplier circuits
	CO5	Classify and Compare Low-Voltage Low-Power Memories
Elective IV-CPLD and FPGA Architectures and Applications	CO1	Illustrate simple and Complex programmable logic device architecture
	CO2	Build FPGA architecture and its applications
	CO3	Analyze different SRAM programmable FPGAs
	CO4	Compare Anti-Fuse programmed FPGAs
	CO5	Design and Analyze Adders,Accumulators with ACT architecutre

Embedded System Design Laboratory	CO1	Understand the datasheet and working of any embedded board or firmware.	
	CO2	Learn a set of tools for embedded systems programming and debugging.	
	CO3	Program, simulate and test ARM Cortex board and their interfaces using Coo Cox platform.	
	CO4	Test different Inter process Communication mechanisms using Perfect RTOS on ARM processor board.	