R16 CO-PO-PSO GRAND MATRIX

By the end of each course student will be able to

B,Tech Ist Year –Ist Semester

R161101 — English-1

CO1	Read and comprehend English stories and texts
CO2	Write effectively using appropriate format
CO3	Listen and speak in English without inhibition
CO4	Expand vocabulary range to improve essential grammar necessary for effective communication
CO5	Transfer verbal information into nonverbal information and vice versa
CO6	critically respond in English to a real life situations and improve life skills and core skills necessary for effective communication

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO6	-	-	-	-	-	-	-	-	2	3	-	1	-	-

R161102 — Mathematics-I

CO1	Able to solve first order ordinary Differential equations and their applications.
CO2	Able to solve higher order ordinary differential equations
CO3	Able to learn Laplace transforms and solve initial value problems in ordinary differential equations using Laplace transforms.
CO4	Able to learn Partial differentiation
CO5	Able to Solve first order partial differential equations
CO6	Able to Solve higher order partial differential equations.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO6	3	2	-	-	-	-	-	-	-	-	-	1	-	-

R161110 — Mathematics-II

CO1	Able to solve trancdential equations using numerical methods
CO2	Able to learn errors in polynomial interpolation using finite differences
CO3	Able to solve intimal value problems in ordinary differential equations using numerical methods
CO4	Able to learn expansion of a periodic function as fourier series and it's applications
CO5	Able to learn Fourier integration and Fourier transformations
CO6	Able to learn Z transformations and inverse Z transformations and it's properties they able to

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO6	3	2	-	-	-	-	-	-	-	-	-	1	-	-

R161104 — Applied Physics

CO1	Students acquire the ability to apply knowledge of Interference concepts of light.
CO2	Students acquire the ability to apply knowledge of Diffraction concepts of light.
CO3	Students will be able to understand the applications of Lasers.
CO4	Knowledge of EM Wave propagation and its applications will be gained
CO5	Students will be able to develop scientific point of view in solving problems in Quantum mechanic
CO6	Students will be able to design and analyse Laws and principles of Semiconductor Physics and con

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO6	3	2	-	-	-	-	-	-	-	-	-	1	-	-

R161107 — Computer Programming

CO1	Able to Design algorithmic solutions to problems and implementing algorithms inC.
CO2	Able to Design algorithmic solutions to problems and implementing algorithms inC.
CO3	Able to Illustrate branching, iteration and data representation using arrays.
CO4	Able to Implement modular programming and recursive solution formulation.
CO5	Able to Illustrate branching, iteration and data representation using arrays.
CO6	Able to Comprehend pointers and dynamic memory allocation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	3	1	1	-	-	-	-	-	-	-	3	3
CO2	1	1	3	1	1	-	-	-	-	-	-	-	3	3
CO3	2	2	2	2	-	-	-	-	-	-	-	-	3	2
CO4	2	2	3	2	2	-	-	-	-	-	-	-	3	2
CO5	2	2	2	2	-	-	-	-	-	-	-	-	3	2
CO6	2	2	2	3	2	-	-	-	-	-	-	-	3	3

R161113 — Engineering Drawing

CO1	Able to understand different scales used in industry and draw various curves.
CO2	Able to recognize principles of projections to draw orthographic projections.
CO3	Able to interpret the projection principles to draw projections of straight lines.
CO4	Able to understand the various ways to draw projection of planes.
CO5	Able to draw projections of solids by applying principles of orthographic projections and isometric projections
CO6	Able to convert isometric views into orthographic views and orthographic views to isometric

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	1	-	-	1	1	
CO2	3	2	2	-	-	-	-	-	1	-	-	1	1	2
CO3	3	2	2	-	-	-	-	-	1	-	-	1	1	2
CO4	2	2	2	-	-	-	-	-	1	-	-	1	2	2
CO5	2	2	3	-	-	-	-	-	1	-	-	1	3	1
CO6	2	2	3	-	-	-	-	-	1	-	-	1	1	1

R161114 — English Lab

CO1	Elicit information in English and respond appropriately
CO2	Learn telephone etiquette and converse effectively
CO3	Use functional English as demanded by situations through role plays
CO4	Understand native and non-native accents of English
CO5	Learn Phonetics of English and transcribe given texts

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

	CO1	-	-	-	-	-	-	-	-	1	3	-	1	-	-
	CO2	-	-	-	-	-	-	-	-	1	3	-	1	-	-
	CO3	-	-	-	-	-	-	-	-	1	3	-	1	-	-
	CO4	-	-	-	-	-	-	-	-	1	3	-	1	-	-
	CO5	-	-	-	-	-	-	-	-	1	3	-	1	-	-

Applied Physics Lab

CO1	Elicit information in English and respond appropriately
CO2	Learn telephone etiquette and converse effectively
CO3	Use functional English as demanded by situations through role plays
CO4	Understand native and non-native accents of English
CO5	Learn Phonetics of English and transcribe given texts
CO6	Able to understand electromagnetism and experimental experience.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	3	2	-	-	-	-	-	-	1	-	-
CO2	3	-	-	3	2	-	-	-	-	-	-	1	-	-
CO3	3	-	-	3	2	-	-	-	-	-	-	1	-	-
CO4	3	-	-	3	2	-	-	-	-	-	-	1	-	-
CO5	3	-	-	3	2	-	-	-	-	-	-	1	-	-
CO6	3	-	-	3	2	-	-	-	-	-	-	1	-	-

ENGINEERING WORKSHOP &IT WORKSHOP

CO1	To select suitable carpentry tools to prepare different types of joints.
CO2	To identify tools required in the fitting operation to perform joint preparations.
CO3	To understand the process of making different objects with thin sheets using proper tinsmithy tools.
CO4	To differentiate single phase, 3 phase wiring connections.
CO5	Identify the basic computer peripheral and gain sufficient knowledge on assembling and disassembling a PC.
CO6	Learn the installation procedure of Windows and Linux OS, Acquire knowledge on basic

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	2	-	2	-	-	-	3	2	-
CO2	3	3	-	-	-	2	-	2	-	-	-	3	3	2
CO3	3	3	-	-	-	2	-	2	-	-	-	3	-	-
CO4	3	3	-	-	-	2	-	2	-	-	-	3	-	2
CO5	3	3	-	-	-	2	-	2	-	-	-	3	3	-
CO6	3	3	-	-	-	2	-	2	-	-	-	3	2	1

B.Tech., I-Year II Semester

R161201 — English II

CO1	Read and comprehend biographies and technical texts in English
CO2	Write letters, emails effectively using appropriate format for technical communication
CO3	Improve listening skills particularly related to Technical English and speak in English without inhibition
CO4	Improve word power and identify grammatical errors in sentences
CO5	Draft technical reports, summarize stories and articles
CO6	critically respond in English to a real life situations and improve life skills and core skills necessaryfor effective communication

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO6	-	-	-	-	-	-	-	-	2	3	-	1	-	-

R161203 — Mathematics III

CO1	Solve the system of linear equations and Analyse their applications.
CO2	Compute an Eigen values and eigen vectors
CO3	Evaluate double and Triple integrals and Apply to find surface area and volumes of solids.
CO4	Compare definite integral with special functions
CO5	Differentiate the scalar and vector functions.
CO6	Understand line, surface and volume integrals and Establish vector integral theorems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO6	3	2	-	-	-	-	-	-	-	-	-	1	-	-

R161211 — Applied Chemistry

CO1	Able to explain about synthesis, physical and mechanical properties, compounding and reframing & fabrication of polymers, plastics and elastomers and Applications of fibre reinforced polymers along with conducting polymers.
CO2	Recognize specific characteristic properties of fuels including calorific value determination ,Ranking and Analysis of coal by proximate and ultimate methods.
CO3	Understanding the principles, Construction and working of galvanic cells, electrode potentials, concentration cells , rechargeable batteries.
CO4	Illustrate the applications of cleaner and greener synthetic methods adapt in industries forhealthy living.
CO5	Understanding the structures of solid crystalline structures, synthesis of ultra pure semiconductors
CO6	Recognize non conventional energy sources, construction & working of photovoltaic cell.

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

		CO5	2	1	-	-	-	-	-	-	-	-	1	2	-	-
		CO6	2	2	-	-	-	-	-	-	-	-	1	1	-	-

R161212	Environmental Studies	CO1	Understand The concepts of the ecosystem													
		CO2	Understand The natural resources and their importance													
		CO3	Learn The biodiversity of India and the threats to biodiversity ,and Apply conservationpractices													
		CO4	Learn Various attributes of the pollution and their impacts													
		CO5	Understand Social issues both rural and urban environment													
		CO6	Understand About environmental Impact assessment and Evaluate the stages involved in													
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	3	-	-	3	2	--	3	3	--	--	3	2	2	-
		CO2	2	-	-	2	2	--	2	2	--	--	3	2	3	2
		CO3	3	-	-	3	2	--	2	2	--	--	3	3	-	-
		CO4	2	-	-	3	2	--	2	2	--	--	3	3	-	2
		CO5	3	-	-	1	3	--	3	3	--	--	3	2	3	-
		CO6	3	-	-	3	3	--	3	3	--	--	2	2	2	1

R1612135	Data Structures	CO1	Define basic static and dynamic data structures and infer searching and sorting Algorithms.													
		CO2	Infer appropriate data structures like stacks or queues in simple programs or programparts.													
		CO3	Demonstrate usage of linked list in real world applications.													
		CO4	Illustrate binary trees with examples.													
		CO5	Apply algorithms for finding shortest path in graphs.													
		CO6	Understand sorting techniques													
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	2	3	2	2	-	-	-	-	-	-	-	-	2	-
		CO2	2	2	3	-	-	-	-	-	-	-	-	-	-	2
		CO3	-	2	-	2	2	-	-	-	-	-	-	3	2	-
		CO4	2	2	-	-	2	-	-	-	-	-	-	2	-	-
		CO5	2	-	-	2	-	-	-	-	-	-	-	3	-	2
		CO6	2	-	-	2	-	-	-	-	-	-	-	3	-	2

R16121	Electrical And Mech Tech	CO1	To learn the basic principles of electrical law's and analysis of networks.													
		CO2	To understand the principle of operation and construction details of DC machines													
		CO3	To understand the principle of operation and construction details of transformer													
		CO4	To understand the principle of operation and construction details of alternator and 3-Phase induction motor													
		CO5	To Understand the principles and construction of various measuring instruments													
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	2	3	2	2	-	-	-	-	-	-	-	-	2	-
		CO2	2	2	3	-	-	-	-	-	-	-	-	-	-	2
		CO3	-	2	-	2	2	-	-	-	-	-	-	3	2	-
		CO4	2	2	-	-	2	-	-	-	-	-	-	2	-	-
		CO5	2	-	-	2	-	-	-	-	-	-	-	3	-	2
		CO6	2	-	-	2	-	-	-	-	-	-	-	3	-	2

R16 1221	Engl ish-	CO1	Learn to make informed opinions considering pros and cons of a given situation or topic.
		CO2	Understand group dynamics and participate in Group Discussions.

		CO3	Make oral presentation using tools like MS PowerPoint.
		CO4	Prepare for an interview with the help of FAQs.
		CO5	Draft resume's and emails for career with effective expressions.

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

R161227	Applied Chemistry Lab	CO1	Use of chemicals in day to day life particularly in engineering is required to bring awareness in material chemistry (Nanomaterials , liquid crystals, spinels thermosetting plastics like Bakelite).
		CO2	Knowledge about electro chemicals in pH metry, potentiometry and conductivity cells in conductometry
		CO3	Knowledge about water quality analysis like pH turbidity(TDS),hardness, conductivity.

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

R161228	C.Programming Lab	CO1	Design solutions to the various problems in the field of computer science.
		CO2	Implement the concepts of arrays and strings.
		CO3	Analyze the concepts of modular programming and develop solutions.
		CO4	Implement Programs with pointers and comprehend the dynamic memory allocation functions.
		CO5	Develop programs that perform operations using derived data types
		CO6	Implement programs for data transfers between files

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	3	1	1	-	-	-	-	-	-	-	3	3
CO2	2	2	2	2	-	-	-	-	-	-	-	-	3	2
CO3	2	2	3	2	2	-	-	-	-	-	-	-	3	2
CO4	2	2	2	3	2	-	-	-	-	-	-	-	3	3
CO5	1	2	3	2	2	-	-	-	-	-	-	-	3	2
CO6	1	2	3	2	2	-	-	-	-	-	-	-	3	2

B.Tech 2nd Year., I – semester

R16 2104	Electronic Devices And Circuits	CO1	Understand the basic concepts of semiconductor physics, which are useful to understand theoperation of diodes and transistors
		CO2	Explain the operation and characteristics of PN junction diode and special diodes.
		CO3	Ability to understand operation and design aspects of rectifiers
		CO4	Understand the characteristics of various transistor configurations and FETs
		CO5	Be familiar with different biasing, stabilization, compensation techniques used intransistor circuits.
		CO6	Develop a transistor linear circuit model at low frequencies thus explore the frequency responseof Amplifiers

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

		CO5	-	3	-	-	-	-	-	-	-	-	-	-	-	2
		CO6	-	-	2	-	-	-	-	-	-	-	-	-	-	2

R1621042	Switching Theory And LogicDesign	CO1	**Understand** the different number systems, binary arithmetic operations, r's complement representation, binary codes, logic gates and K-maps.
		CO2	Apply different switching algebra theorems for logic functions and perform the reduction of logic functions
		CO3	Evaluate the combinational logic circuits: Decoder, Encoder, Multiplexer, Comparator and etc.
		CO4	Memorize the combinational circuit design procedure and Apply the procedure to Design simple applications like PROM, PAL and PLA.
		CO5	Analyse an element, different latches, flip-flops, registers and Design different modulus counters
		CO6	Design the state machines and to perform simple projects with a few flip-flops.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-	-	2	1	2
CO2	-	-	2	-	-	-	-	-	2	-	-	-	2	1
CO3	-	-	3	-	-	-	-	-	-	-	-	2	2	2
CO4	-	3	-	-	-	-	-	-	-	-	-	-	2	1
CO5	-	-	-	3	-	-	-	-	-	-	-	2	2	2
CO6	-	-	-	3	-	-	-	-	-	-	-	-	2	1

R1621043	Signals And Systems	CO1	Describe signals mathematically and understand how to perform different operations on signals, understand principles of vector spaces, Concept of orthgonality.
		CO2	Analyse the continuous-time signals and continuous-time systems using Fourier series.
		CO3	Analyse the continuous-time signals and continuous-time systems using Fourier series.
		CO4	Classify systems based on their properties and determine the response of LTI system. Understand
		CO5	Compute Laplace transforms to analyze continuous time signals and systems and understand the concept of region of convergence.
		CO6	Calculate z-transform to analyze discrete-time signals and systems, and understand the concept of region of convergence

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	-	2	3	3
CO2	3	-	2	-	-	-	-	-	-	-	-	-	3	3
CO3	-	-	3	-	-	-	-	-	-	-	-	3	2	2
CO4	3	-	-	-	-	-	-	-	-	-	-	-	2	3
CO5	-	2	-	-	-	-	-	-	-	-	-	2	3	3
CO6	-	2	-	-	-	-	-	-	-	-	-	2	3	3

R1621 044	Network Analysis	CO1	Use different circuit solving techniques like mesh analysis, nodal analysis, voltage division and cur
		CO2	Analyze and design series and parallel A.C. circuits using different design parameters
		CO3	Analyze and design series and parallel A.C. circuits using different design parameters
		CO4	Solve D.C. and A.C. circuits using different theorems like Thevinin's, Norton's, Maximum Power transfer theorems.
		CO5	Create different two port networks using two port network parameters like Impedance.
		CO6	Analyze the switching behavior of both inductor and capacitor in time and Laplace domains

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

		CO6	3	-	-	-	-	-	-	-	-	-	-	3	3	3

R1621045 — **Random Variables And StochasticProcesses**

CO1	Mathematically **model** the random phenomena and solve simple probabilistic problems
CO2	**Identify** different types of random variables and **compute** statistical averages of single random variables
CO3	Analyse various properties of different density and distribution functions for single and multiple random variables.
CO4	Characterise the time and frequency domain characteristics of Random Processes.
CO5	Design linear systems for random inputs.
CO6	Construct and analyse the mathematical modelling of noise sources. **Apply** these techniques to analyze the LTI systems in the presence of different types of noise

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	-	-	2	-	-	-	-	-	-	-	-	1
CO2	2	1	-	-	2	-	-	-	-	-	-	-	1	-
CO3	1	2	1		3	-	-	-	-	-	-	-	-	2
CO4	2	2	2	1	2	-	-	-	-	-	-	-	2	2
CO5	2	2	2	2	3	-	-	-	-	-	-	-	2	2
CO6	2	2	2	2	3	-	-	-	-	-	-	2	2	2

R1621026 — **MEFA**

CO1	Introduce Managerial Economics to engineering students, concepts of demand like law determinants
CO2	Evaluate the student knowledge of production & cost estimation.
CO3	Introduce markets, theory of the firm and pricing policies in different markets.
CO4	Know the different forms of business organization and their merits and demerits
CO5	Understand the different accounting systems preparation of financial statements.
CO6	Understand the concepts of capital, capitalization techniques used to evaluate capital investment.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	2	-	-	-	-	-	-	1	2	1
CO2	2	2	2	-	2	-	-	-	-	-	-	1	2	2
CO3	1	2	2	1	1	-	-	-	-	-	-	1	2	1
CO4	1	2	2	2	2	-	-	-	-	-	-	1	2	2
CO5	1	2	2	2	2	-	-	-	1	-	1	1	2	1
CO6	1	2	2	2	2	-	-	-	1	-	1	1	2	2

R1621046 — **Electronic Devices AndCircuits Lab**

CO1	Provides an ability to recognize and verify functioning of various passive elements, CRO probes and multimeters.
CO2	Understand the characteristics of various diodes like PN- Junction diode, Zener diode and LED's
CO3	Verify the working of different transistors and identifies the procedure of doing the experiment.
CO4	Design the power supply circuits with basic semiconductor devices (active & passive elements)
CO5	Ability to measure and record the experimental data, analyze the results, and prepare a formula
CO6	Observe various amplifiers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	3	2	-	2	-	-	-	-	-	-	3	-
CO2	-	-	3	2	-	2	-	-	-	-	-	-	3	-
CO3	-	-	3	2	-	-	-	-	-	-	-	-	2	-
CO4	-	-	3	2	-	-	-	-	-	-	-	-	-	2
CO5	-	-	3	3	-	3	-	-	-	-	-	-	-	2
CO6			3	3										2

R1621044	Networks & Electricaltechnology	CO1	Understand the electrical network theorems.
		CO2	Explain the time response of RL/RC Networks.
		CO3	Understand the Two port network parameters analytical verification.
		CO4	Understand about the operation and performance of DC Machines.
		CO5	Understand about the operation and performance of Transformers.
		CO6	Understand about performance characteristics of AC Machines.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	-	1	-	-	-	1	1	-	-	-
CO2	2	2	1	1	-	-	-	-	-	1	1	1	-	-
CO3	2	1	1	-	-	-	-	-	-	1	-	-	-	-
CO4	2	1	1	-	-	1	-	1	-	-	--	-	-	-
CO5	3	2	1	-	-	-	1	-	-	1	1	-	-	-
CO6	2	1	-	1	-	-	-	-	-	1	-	-	-	-

B.Tech 2nd Year – II Semester

R1622041	ECA	CO1	Analyze and Remember the different parameters of BJT and FET at high frequencies
		CO2	Design the multistage amplifiers under different coupling techniques
		CO3	Identify the type of negative feedback technique and formulate the Gain, Input and OutputImpedances of different negative feedback Techniques
		CO4	Understand and Design low frequency Oscillators using BJT and FET
		CO5	Classify the Power amplifiers and Compare them in terms of efficiency.
		CO6	Explain the different types of Tuned Amplifiers and their effects of Cascading.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	-	-	-	3	2
CO2	3	3	-	2	-	-	-	-	-	-	-	-	3	2
CO3	3	2	-	3	-	-	-	-	-	-	-	-	2	3
CO4	-	-	-	3	3	-	-	-	-	-	-	-	3	2
CO5	2	3	-	3	-	-	-	-	-	-	-	-	3	2
CO6	-	3	-	2	3	-	-	-	-	-	-	-	2	3

		CO1	Understand the concepts of open loop and closed loop systems, mathematical models of mechanics
R1622041	Control Systems	CO2	Develop the acquaintance in analyzing the system response in time-domain and frequency domains
		CO3	Analyze the system in terms of absolute stability and relative stability by different approaches.
		CO4	Design the control systems for various applications using time-domain and frequency domain analysis
		CO5	Design compensators in time and frequency domain.
		CO6	Determine the controllability and observability of the control system using the concepts of state variable analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	-	-	-	-	-	-	-	-	-	3	2
CO2	3	-	-	-	-	-	-	-	-	-	-	2	2	3
CO3	-	2	-	2	-	-	-	-	-	-	-	-	2	2
CO4	-	-	2	-	-	-	-	-	-	-	-	2	2	3
CO5	-	-	2	-	-	-	-	-	-	-	-	2	2	3
CO6	3	3-	-	2	-	-	-	-	-	-	-	-	2	2

R1622043	EM Waves And Transmission Lines	CO1	**Define** primary electric quantities and the basic laws in static electric fields and applying them to different engineering situations.
		CO2	**Analyze** the basic laws in static magnetic fields, Maxwell's equation in different forms and applying them to different engineering situations.
		CO3	**Understand** the Electromagnetic wave characteristics in different mediums and derive the Wave equations in those mediums.
		CO4	**Analyze** the EM wave propagation in different mediums by applying boundary conditions.
		CO5	**Understand** the parameters, constants, types and characteristic impedance of transmission lines
		CO6	**Analyze** electromagnetic wave propagation in generic transmission line geometries and to use smith chart for impedance measurements.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	2	3	2
CO2	3	3	-	-	-	-	-	-	-	-	-	2	3	2
CO3	2	-	-	2	-	-	-	-	-	-	-	-	2	2
CO4	2	-	-	2	-	-	-	-	-	-	-	-	2	2
CO5	-	3	2	-	-	-	-	-	-	-	-	2	3	3
CO6	-	3	-	3	-	-	-	-	-	-	-	2	3	3

R1622044	Analog Communications	CO1	To understand the concepts of analog communication systems
		CO2	To analyse the different amplitude modulation and demodulation schemes in terms of spectral
		CO3	To discriminate frequency modulation and amplitude modulation
		CO4	To design various functional blocks of transmitters and receivers
		CO5	To evaluate the signal to noise ratios of various modulation techniques
		CO6	To determine various pulse modulation schemes and multiplexing techniques

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	2	-	-	-	-	-	-	-	-	-	3	2
CO2	-	3	2	-	-	-	-	-	-	-	-	-	3	2
CO3	-	2	3	-	-	-	-	-	-	-	-	-	2	2
CO4	-	-	3	-	-	-	-	-	-	-	-	-	2	3
CO5	2	3	-	-	-	-	-	-	-	-	-	-	2	3
CO6	2	2	-	-	-	-	-	-	-	-	-	2	2	2

R1622045	Pulse & Digital Circuits	CO1	**Understand** the working of linear wave shaping circuits and analyze the responses of RC, RLC circuits for various inputs.
		CO2	**Develop** nonlinear circuits like clippers and clampers using active and passive elements.
		CO3	**Examine** the concept of switching characteristics of diodes and transistors.
		CO4	**Analyze** various Multi-vibrator circuits and their applications..
		CO5	**Describe** the concepts of Voltage time base generators.
		CO6	**Design** Logic Gates using Discrete Components and describe the functionality of Sampling Gates.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	2	3	3
CO2	3	3	-	-	-	-	-	-	-	-	-	2	3	3
CO3	3	2	3	-	-	-	-	-	-	-	-	-	3	2
CO4	3	2	3	-	-	-	-	-	-	-	-	-	3	3
CO5	3	-	-	-	-	-	-	-	-	-	-	-	2	2
CO6	-	2	-	-	-	-	-	-	-	-	-	-	2	2

R1622026 — Management Science

CO1	Understanding basics of management & organization
CO2	Remembering principles of management and applying the concepts of work study
CO3	Analyze the functions of HRM and marketing.
CO4	Applying PERT & CPM techniques to solve project management problems.
CO5	Evaluating SWOT Analysis for formulating and implementing strategies.
CO6	Creating awareness about modern or contemporary management practices.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	2	2	2	-	-
CO2	-	-	-	-	-	-	-	-	-	2	2	2	-	-
CO3	-	-	-	-	-	-	-	-	2	3	2	2	-	-
CO4	-	-	2	-	-	-	-	-	-	2	3	2	-	-
CO5	-	-	-	-	-	-	-	-	-	2	2	2	-	-
CO6	-	-	-	-	2	-	-	-	-	2	2	2	-	-

R1622046 — Electronic Circuits And Analysis Lab

CO1	**Analyze** and **Remember** the different parameters of BJT and FET at high frequencies.
CO2	**Design** the multistage amplifiers under different coupling techniques
CO3	**Identify** the type of negative feedback technique and **Formulate** the Gain, Input and Output Impedances of different negative feedback Techniques
CO4	**Understand** the Oscillators and **Solve** for the frequency of oscillations using BJT and FET
CO5	**Classify** the Power amplifiers and **Compare** them in terms of efficiency.
CO6	**Explain** the different types of Tuned Amplifiers and their effects of Cascading

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	2	2	-	3	-	-	-	-	-	2	2	3
CO2	-	-	2	2	-	3	-	-	-	-	-	-	2	-
CO3	-	-	3	2	-	-	-	-	-	-	-	2	3	-
CO4	-	-	3	2	-	3	-	-	-	-	-	2	3	-
CO5	-	-	3	3	-	3	-	-	-	-	-	2	-	3
CO6			3	3									3	

R1622047 — Analog Communications Lab

CO1	**Analyze** different Analog modulation techniques & demodulation techniques.
CO2	**Understand** various pulse analog modulation techniques.
CO3	**Execute** the sampling theorem.
CO4	**Understand** Pre-emphasis and De-emphasis
CO5	**Execute** programs in MATLAB to implement various analog modulation techniques.
CO6	**Construct** MATLAB simulink models to implement various analog modulation techniques

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	2	-	3	-	-	-	-	-	-	2	2	3
CO2	-	-	2	-	3	-	-	-	-	-	-	-	2	-
CO3	-	-	3	-	-	-	-	-	-	-	-	2	3	-
CO4	-	-	3	-	3	-	-	-	-	-	-	2	3	-
CO5	-	-	3	-	3	-	-	-	-	-	-	2	-	3
CO6			3	-	3	-	-	-	-	-	--	-	3	-

B.Tech 3rd Year., I – semester

R1631042 — LICA

CO1	Understand the differential amplifier configurations to perform AC and DC analysis.
CO2	Explain the terminal characteristics of op-amps and analyze fundamental circuits based on OP- Amps
CO3	Analyze and experiment various linear and nonlinear circuits using OP-Amps
CO4	Design and synthesize different active filters using OP-Amps.
CO5	Demonstrate different operations of 555 timer and PLL and explore their applications.
CO6	Classify and Design different types of ADC's and DAC's.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	-	2	-	-	-	-	-	-	-	-	2	2
CO2	-	2	3	-	-	-	-	-	-	-	-	2	2	2
CO3	3	-	3	-	-	-	-	-	-	-	-	2	3	3
CO4	3	2	-	-	-	-	-	-	-	-	-	-	3	3
CO5	2	3	-	-	-	-	-	-	-	-	-	-	2	2
CO6	3	2	3	-	-	-	-	-	-	-	-	2	3	2

R1631043 — DICA

CO1	Analyze different types of logic families and Infer them about suitable IC platform
CO2	Understand the basics of HDL and State various levels of abstraction in digital circuit design.
CO3	Apply different programming approaches and Model the digital circuits.
CO4	Model the combinational logic designs using VHDL and Develop them using relevant digital ICs
CO5	Analyze, Design and Implement the sequential logic structures using VHDL and digital ICs.
CO6	Analyze, Design and Implement the syncronous and asynchronous sequential circuits.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	3	2	-	-	-	-	-	-	-	-	2	2
CO2	2	-	-	-	3	-	-	-	-	-	-	2	3	2
CO3	-	-	-	3	3	-	-	-	-	-	-	-	3	2
CO4	2	-	-	3	3	-	-	-	-	-	-	-	3	2
CO5	2	-	-	3	3	-	-	-	-	-	-	-	3	2
CO6	2	-	-	3	3	-	-	-	-	-	-	-	3	2

R1631041 — CAO

CO1	**Understand** the basic operational concepts and functional units of a computer.
CO2	**Understand** different instructions and addressing modes, **memorize** stack and queue
CO3	**Apply** the basic logic operations and **distinguish** addressing modes with I/O operations
CO4	**Analyze** interrupts and DMA, **compare** serial, parallel ports
CO5	**Understand** different types of memories, **memorize** the different storage devices
CO6	**Recall** processing unit and **analyze** micro programmed control.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-		-	-	-	-	-	-	-	-		2	2
CO2	-	-	3	-	-	-	-	-	-	-	-		2	2
CO3	-	-	3	-	-	-	-	-	-	-	-		3	2
CO4	-	-	2	-	-	-	-	-	-	-	-		2	3
CO5	-	-	2	-	-	-	-	-	-	-	-		3	2
CO6	-	-		-	-	-	-	-	-	-	-		3	2

R1631045	**Antennas Wave And Propagation**	CO1	Understand & Remember the fundamentals of antenna theory for designing various Antennas
		CO2	Evaluate the Electric and Magnetic Field Equations for basic antennas at Far Field conditions
		CO3	Construct the basic array system in antennas and Draw the Radiation Mechanisms for different types of arrays.
		CO4	Design different structures for Microstrip Antennas and helical antennas.
		CO5	Analyze the operation of VHF, UHF and Microwave Antennas.
		CO6	Identify and Explain the atmospheric and terrestrial effects on radio wave propagation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	-	-	2	-	-	-	-	-	-	-	3	2
CO2	3	2	-	-	3	2	1	-	-	-	-	-	3	3
CO3	3	-	3	-	-	1	-	-	-	-	-	2	2	3
CO4	-	-	3	-	-	-	-	-	-	-	-	3	3	3
CO5	-	-	2	3	3	2	1	-	-	-	-	-	2	3
CO6	2	-	-	3	3	1	-	-	-	-	-	-	2	3

R1631044	**DC**	CO1	**Demonstrate** the role of different waveform coding techniques for the generation PCM signals.
		CO2	**Distinguish** different pulse digital modulation techniques
		CO3	**Analyze** various digital modulation techniques and calculate their error probabilities
		CO4	**Understand** the concept of amount of information and entropy
		CO5	**Apply** the concept of entropy to different source coding techniques
		CO6	**Evaluate** different error control coding schemes for the reliable transmission of digital informationover the channel

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	1	-	-	-	-	1	3	2
CO2	3	2	1	-	-	-	1	-	-	-	-	1	3	2
CO3	3	2	2	-	-	-	1	-	-	-	-	1	2	3
CO4	3	2	2	-	-	-	1	-	-	-	-	2	3	2
CO5	3	2	1	-	-	-	1	-	-	-	-	3	3	2
CO6	3	2	1	-	-	-	1	-	-	-	-	3	2	2

R1631048	**DICA Lab**	CO1	Understand the internal logical structure of Digital Integrated CircuitsLearn the IEEE Standard Hardware Description Language.
		CO2	Develop VHDL/Verilog HDL Source code for Digital Integrated Circuits at several levels of abstractions, behavioural, structural
		CO3	Design and analyze basic digital circuits with combinatorial and sequential logic circuits using VHDL Perform simulation and analyze synthesis results using Equivalent Industry Standard
		CO4	Software.
		CO5	Verify and implement the logical operations on the latest FPGA Hardware.
		CO6	Understand the internal logical structure of Digital Integrated CircuitsLearn the IEEE Standard Hardware Description Language.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	3	-	-	-	3	2
CO2	-	3	-	-	-	-	-	-	3	-	-	-	3	2
CO3	-	-	3	-	-	-	-	-	3	-	-	-	2	3
CO4	-	-	3	-	-	-	-	-	3	-	-	-	3	2
CO5	-	-	-	-	3	-	-	-	3	-	-	3	2	3
CO6	-	-	3	-	2	-	-	-	2	-	-	3	2	3

R1631046	**PDC Lab**	CO1	Understand the concept of Linear & Non-Linear wave shaping circuits
		CO2	Learn the Switching Characteristics of transistor
		CO3	Understand fundamentals of basic logic gates and design applications
		CO4	Understand Sampling Gates and to Design NAND and NOR gates using various logic families.
		CO5	Design and analyze various multivibrator circuits
		CO6	Design different Time-base circuits.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	-	-	-	-	-	-	-	-	-	3	1
CO2	3	2	-	-	-	-	-	-	-	-	-	-	2	3
CO3	2	2	3	-	-	-	-	-	-	-	-	-	3	2
CO4	-	2	2	-	-	-	-	-	-	-	-	-	3	2
CO5	-	2	2	-	-	-	-	-	-	-	-	-	2	3
CO6	-	2	2	-	-	-	-	-	-	-	-	-	2	2

R1631047	**LICA Lab**	CO1	Understand the basic Mathematical operations of Operational AmplifierDesign and Observe the frequency response of Active Filters.
		CO2	Measure the theoretical and practical frequency of oscillations of oscillators using OperationalAmplifier
		CO3	Construct different Waveform Generators using Operational Amplifier and 555 TimerExperiment with different Voltage Regulators IC's.
		CO4	Build different Analog –Digital Converters and Digital – Analog Converters
		CO5	Understand the basic Mathematical operations of Operational AmplifierDesign and Observe the frequency response of Active Filters.
		CO6	Measure the theoretical and practical frequency of oscillations of oscillators using OperationalAmplifier

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	-	-	-	-	-	-	-	-	-	3	1
CO2	3	2	-	-	-	-	-	-	-	-	-	-	2	3
CO3	2	2	3	-	-	-	-	-	-	-	-	-	3	2
CO4	-	2	2	-	-	-	-	-	-	-	-	-	3	2
CO5	-	2	2	-	-	-	-	-	-	-	-	-	2	3
CO6	-	2	2	-	-	-	-	-	-	-	-	-	2	2

B.Tech 3rd Year., II – semester

R1632041 — MICRO PROCESSORS AND MICRO CONTROLLERS

CO1	Understand the basic concepts of architecture of microprocessor and microcontroller
CO2	Develop programs for different addressing modes and problem solutions
CO3	Perform 8086 interfacing with different peripherals and implement programs
CO4	Illustrate the design aspects of I/O and memory interfacing circuits.
CO5	Design a microcontroller for simple applications.
CO6	Understand the different types of advanced architectures and its advantages

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	1	3	-
CO2	-	2	3	-	-	-	-	-	-	-	-	-	3	-
CO3	-	3	-	2	-	-	-	-	2	-	-	-	-	-
CO4	-	-	-	-	-	3	-	-	-	1	-	-	-	3
CO5	-	-	-	2	-	3	-	-	-	-	3	-	-	3
CO6	3	-	-	-	-	-	-	-	-	-	-	-	-	3

R1632042 — MICROWAVE ENGINEERING

CO1	Understand fundamental electrical characteristics of rectangular waveguides and transmission lines through electromagnetic field analysis.
CO2	Apply the fundamental electrical characteristics of circular waveguides and cavity resonators through electromagnetic field analysis.
CO3	Design the basic properties of waveguide components and Ferrite materials composition and calculate S-matrix for various waveguide components and splitting the microwave energy in a desired direction
CO4	Study the complete knowledge about Microwave devices such as amplifiers.
CO5	Develop complete knowledge about Microwave devices such as oscillators.
CO6	Analyze the gain complete knowledge about Microwave devices such as solid state devices and Test the Microwave test bench setup for measurements.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	2	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	3	-	-	-	-	-	-	-	-	-
CO6	3	3	-	-	3	-	-	-	-	-	-	-	-	-

R1632043 — VLSI-DESIGN

CO1	Identify the trends in MOS Technology, and how it impacts on fabrication and basic electrical properties.
CO2	Distinguish the MOS layers, stick diagrams, layouts, and fabrication design rules involved in MOS and Bi-CMOS circuit design process
CO3	Illustrate the basic circuit concepts like MOS transistor switching and to be aware of scaling of MOS circuits.
CO4	Categorize Chip Input and Output circuits and Design for Testability.
CO5	Design of digital systems on FPGA platform and synthesis.
CO6	Assess the concepts related to Low Power VLSI Design.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	-	1	-	-	-	-	-	-	-	1	1
CO2	-	2	-	-	1	-	-	-	-	-	-	-	2	2
CO3	-	3	3	3	2	-	-	-	1	-	-	-	3	2
CO4	1	3	3	3	2	-	-	-	-	-	-	-	3	2
CO5	1	3	3	3	2	-	-	-	-	-	-	-	3	2
CO6	2	2	2	-	-	-	-	-	-	-	-	-	2	1

R1632044 — DSP

CO1	Analyze the Discrete Time Signals and systems.
CO2	Illustrate the importance of FFT algorithms for computation of Discrete Fourier Transform.
CO3	Compare the various digital filter structures.
CO4	Design the FIR and IIR Filter design procedures.
CO5	Construct multi-rate sampling conversion.
CO6	Experiment the digital filters with DSP processors

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	3	-	-	-	-	-	-	-	-	-	-	2
CO3	1	1	3	-	3	-	-	-	-	-	-	-	3	3
CO4														
CO5														
CO6	1	2	3	-	-	-	-	-	-	-	-	-	3	3

R1632046 — MPMC LAB

CO1	Understand about basic Programming through MASM/TASM for 8086 microprocessor
CO2	Implement 8086 assembly language programs using software interrupts and various assembler directives of Arithmetic operation and Stack operations
CO3	Experiment programming through microprocessor for different interfacing with 8086 microprocessor
CO4	Understand assembly language programs using 8051 microcontroller.
CO5	Experiment assembly language programs for various applications using 8051 microcontroller
CO6	Examine Switches, 7- Segment Displays, Stepper motor Interfacing, Traffic light controller using 8051 microcontroller interfacing

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2						2				3	1
CO2	3		3						3				2	1
CO3	3		3						3				2	1
CO4	3		2						2				2	2
CO5	3		3						3				3	1
CO6	2		3						3				3	1

R1632047 — VLSI LAB

CO1	Build the Logic gates using CMOS
CO2	Implement Combinational circuits using CMOS
CO3	Design and simulate Memory circuits like latch using CMOs
CO4	Analyze the behavior of Static RAM using CMOS
CO5	Design counters using CMOS
CO6	Study the behavior of R-2R DAC

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			2		3								2	3
CO2			2		3								2	3
CO3			1		3							1	1	3
CO4			2		3							2	2	3
CO5		2	1		3							1	2	3
CO6		2	3		3							2	3	3

R1632048	DC LAB	CO1	**Demonstrate** the various Digital Pulse Modulation and Demodulation Techniques
		CO2	**Develop** various bandpass digital modulation techniques.
		CO3	**Solve** compressor and expander operations with the help of Companding System
		CO4	**Understand** the process of multiplexing and de-multiplexing of signals
		CO5	**Evaluate** the Source coding techniques for measuring efficiency
		CO6	**Analyze** performance of various channel coding techniques.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3		2	2								3	3
CO2	2	3			2								3	3
CO3	2	3											2	2
CO4	2	3											2	3
CO5	3	3		2	3								3	3
CO6	3	3		2	3								3	3

R163204A	OOPS THROUGH JAVA	CO1	**Understand** Java programming concepts and learn different data types.
		CO2	**Write,** compile, execute and trouble shoot Java programming
		CO3	**Use** inheritance, packages, exception handling for advanced Java programming
		CO4	**Develop** Java applications for distributed environment
		CO5	**Design** and develop multi-tier applications
		CO6	**Identify** and analyze enterprise applications

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2	2										
CO2	3		2	3										
CO3	3		2	3										
CO4	3		3	3										
CO5	3		3	3										
CO6	3		3	3										

B.Tech 4th Year., I– semester

R1641041	Radar Systems	CO1	**Develop** the Radar range equation and **Solve** analytical problem.
		CO2	**Explain** the working of CW & FMCW Radar and its applications.
		CO3	**Describe** the working of MTI and Pulse Doppler Radar and its performance
		CO4	**Discuss** the concept of tracking and different tracking techniques.
		CO5	**Analyze** the characteristics of matched filter receiver performance.
		CO6	**Evaluate** the various components of radar receivers and their displays.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										2	2	3
CO2	3	2										2	2	3
CO3	3	2										2	2	3
CO4	3	2										2	2	3
CO5	3	2										2	3	3
CO6	3	2										2	3	3

R1641042 — **Digital Image Processing**

CO1	**Understand** the need for image transforms and their properties
CO2	**Apply** appropriate technique for image enhancement both in spatial and frequency domains.
CO3	**Analyze** the effects of image degradation models and apply restoration techniques
CO4	**Demonstrate** color image enhancement and compare different color models.
CO5	**Analyze** different spatial, frequency and wavelet based image compression techniques
CO6	**Experiment with** all morphological operations on images and can be able to do image segmentation.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	-	-	-	-	-	-	-	-	-	2	2
CO2	2	3	-	-	-	-	-	-	-	-	-	-	2	3
CO3	3	2	-	-	-	-	-	-	-	-	-	-	3	2
CO4	3	2	-	-	2	-	-	-	-	-	-	3	3	2
CO5	3	3	-	-	3	2	-	-	-	-	-	3	3	3
CO6	3	3	-	-	3	2	-	-	-	-	-	3	3	3

R1641043 — **Computer Networks**

CO1	**Summarize** the basic terminology and various protocols used in the networking as well as standards existed in the networking technology.
CO2	**Demonstrate** various techniques used in physical transmission of data without errors and various formats used in the packetization of data.
CO3	**Explain** the design issues and protocols related to data transfer.
CO4	**Compare** and **select** the appropriate protocols used for controlling the medium access amongst nodes on a shared medium and controlled data transmission.
CO5	**Apply** various network layer techniques for designing subnets and **Analyse** packet flow on basis of routing algorithms and congestion control methods.
CO6	**Examine** various transport layer protocols and **analyse** the application areas of networking such as domain name space and electronic mail.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3	1										1	1
CO2	2													3
CO3	2	2	3										3	
CO4	2		3										3	2
CO5			3	3										3
CO6				3								2		3

R1641044 — **Optical Communications**

CO1	**Describe** the functionality of various components in fiber optic communication system.
CO2	**Demonstrate** losses and dispersion in optical fibers.
CO3	**Choose** appropriate optical fiber connectors and acquire understanding on splicing techniques
CO4	**Use** different types of photo detectors, optical test equipment to **analyze** optical fiber and light wave systems
CO5	**Design** and **analyze** optical receivers
CO6	**Evaluate** link power budget in optical system design

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

		CO4	3	3	1										3	3
		CO5	2	2	3										2	2
		CO6	3	2	2										3	2

R164104D	Embedded Systems	CO1	Describe the characteristics of embedded system and could classify them.
		CO2	Understand the concepts of different embedded hardware units like timers and counting devices.
		CO3	Differentiate various embedded firmware approaches for the design of embedded system.
		CO4	Understand how to integrate hardware and firmware of on embedded.
		CO5	Have knowledge about simulators used in the embedded system development.
		CO6	Analyze the implementation of embedded systems by testing them.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											2	3
CO2			3		3								2	2
CO3			2	3	3								3	3
CO4			3		3							3	2	3
CO5				3	3								3	3
CO6				3	3							3	3	3

R164104c	System Design Through Verilog	CO1	Understand language constructs and conventions to write verilog program
		CO2	Design basic circuits with gate level modelling
		CO3	Write verilog program in behavioral modelling with different design constructs
		CO4	Construct verilog program in data flow level and switch level modelling
		CO5	Analyze verilog for combinational and sequential logics
		CO6	Develop verilog modules for microprocessor and microcontrollers

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2												3	3
CO2	3		3	3	3	2						3	2	3
CO3	3		3	3	3	2						3	3	3
CO4	3		3	3	3	2						3	2	3
CO5					3							3	3	3
CO6	2												3	3

R1641047	MWE & OPTICAL LAB	CO1	Understand the characteristics of Gunn diode and Reflex klystron and Microwave components.
		CO2	Interpret Microwave measurements like VSWR, Attenuation, Waveguide parameters etc.
		CO3	To measure the S-Parameters of Microwave Passive Components.
		CO4	Analyze the characteristics of optical devices like LED and LASER.
		CO5	Measurement of parameters like Numerical Aperture, Losses in Optical fiber link etc.
		CO6	Analyze the behavior of various antennas

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**2**							2			**2**	2	2

		CO2	**3**	**3**							2			**2**	2	2
		CO3	**3**	**3**							2			**2**	3	3
		CO4	**3**	**3**							2			**2**	2	3
		CO5	**3**	**3**							2			**2**	3	3
		CO6	**3**	**2**			**3**				2			**2**	2	3

R1641048	**Digital Signal Processing Lab**	CO1	Understand the architecture of DSP chips
		CO2	Distinguish various convolution techniques
		CO3	Design various FIR filters using different windows
		CO4	Implement IIR filter (LP/HP) on DSP Processor
		CO5	Generate sum of sinusoidal signals and to find frequency response of analog LP/HP filters using MATLAB
		CO6	Implement FFT of given 1-D signal and plot using MATLAB

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**												3	1
CO2	**3**												2	3
CO3	**3**				**3**								1	3
CO4	**3**				**2**								1	2
CO5	**3**				**2**								2	2
CO6	**3**				**3**								2	3

B.Tech 4th Year., II – semester

R1642041	**CMC**	CO1	Understand inner workings of cellular system and Describe the elements of cellular systems.
		CO2	Categorize different interferences.
		CO3	Distinguish the frequency management and channel assignments in cellular system and Analyse signal coverage in various environments.
		CO4	Evaluate different antennas using at cell site and mobile units.
		CO5	Generalize and Plan the handoffs in cellular systems.
		CO6	Develop and Design various architectures and new technologies in cellular systems.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2		2							3	3	2
CO2			3		3								2	2
CO3		3	3		3								3	3
CO4		3	3	3	2								2	2
CO5			3	3	3								3	3
CO6		3	3		3							3	3	3

R1642042	**EMI**	CO1	**Select** the instrument to be used based on the requirements.
		CO2	**Understand** and **Analyze** different signal generators and wave analyzers
		CO3	**Illustrate** the design of oscilloscopes for different applications
		CO4	**Analyze** various bridges and its applications
		CO5	**Choose** different transducers for measurement of different parameters
		CO6	**Measure** the physical parameters like pressure, humidity, velocity etc.

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

		CO5			3		2							3	3	3
		CO6	2		3									3	3	2

R1642043	SC	CO1	**Understand** the origin, basic concepts of satellite communications, **Categorize** look angles, and **Discuss** launches, launch vehicles and orbital effects in satellite communications
		CO2	**Analyse** the various satellite subsystems and their functionalities.
		CO3	**Evaluate** the concepts of satellite link design and calculation of C/N ratios.
		CO4	**Apply** the concepts of multiple access and various types of multiple access techniques in satellite systems.
		CO5	**Explain** earth station technology and **Distinguish** LEO and GEO systems
		CO6	**Develop** the concepts of satellite navigation, architecture and applications of GPS.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-	-	3	2	3
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	3
CO3	-	3	3	-	-	-	-	-	-	-	-	-	3	2
CO4	-	3	2	-	-	-	-	-	-	-	-	-	3	3
CO5	3	-	3	-	-	-	-	-	-	-	-	-	2	2
CO6	3	-	3	-	-	-	-	-	-	-	-	-	2	2

R164204A	WSN	CO1	**Understand** the definitions and architectures of wireless sensor networks.
		CO2	**Categorize** the various networking technologies and how to operate and real time applications importance for current generation.
		CO3	**Evaluate** the MAC protocol for wireless networks to evaluate the power and speed consumption in a network.
		CO4	**Distinguish** various routing protocols comparison and evaluate its shortest routing using various algorithms.
		CO5	**Discuss** the transport layer and security protocol to secure the data from one node to another node in the network**.**
		CO6	Ability to **Analyze** the security in Wireless Sensor Networks and its applications

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3									2	3	3
CO2	3								3				3	2
CO3		3	3						3				2	2
CO4		2			2							3	2	2
CO5			3		2							3	3	3
CO6	2		3									3	3	2

R1642045	Seminar	CO1	**List** the promising new directions of various cutting edge technologies.
		CO2	**Understand** the advanced technology and research in engineering.
		CO3	**Discuss** and **apply** critical thinking about topics of current intellectual importance.
		CO4	**Analyze** the detailed literature survey
		CO5	**Develop** technical writing skills to build a document with respect to technical publications.
		CO6	**Develop** effective presentation skills.

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

		CO3		3	2	3	2	-	-	-	-	-	-	2	2	2
		CO4		3		3	-	-	-	-	-	-	-	2	2	3
		CO5	-	-	-	-	3	-	-	-	-	-	-	3	3	2
		CO6	-		-	-	3	-	-	-	-	-	-	3	3	2
R1642046	Project	CO1	**Understand** the advanced technology and research in engineering.													
		CO2	Collaborate with team members in analyzing the requirements of the project to be developed													
		CO3	Build necessary design specifications and documents for the chosen project(L5)													
		CO4	Develop apt domain and technical knowledge to implement/code the application(L3)													
		CO5	Test and deploy the project after implementation(L4)													
		CO6	Demonstrate the project comprehensively with necessary tools(L3)													
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	3	3					1	1	3	2	2	2	3	-
		CO2	1	3					1	-	-	3	3	3	3	2
		CO3	1	3					-	-	2	3	1	1	2	3
		CO4	-	3					1	-	1	1	2	-	2	2
		CO5	-	2					1	-	-	2	2	-	3	1