



Nutan Maharashtra Vidya Prasarak Mandal's  
**NUTAN MAHARASHTRA INSTITUTE OF  
ENGINEERING & TECHNOLOGY**



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"Samarth Vidya Sankul", Vishnupuri, Telegaon Dabhade, Pune - 410507

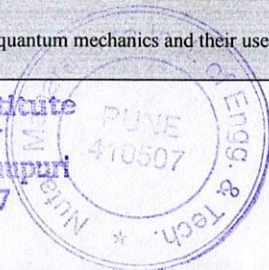
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Course Name	COS	New Course outcome Statements	PO a	PO b	PO c	PO d	PO e	PO f	PO g	PO h	PO i	PO j	PO k	PO l	PSO1	PSO2	
Engineering Mathematics I	FE101.1	Apply the essential tool of matrices and linear algebra in a comprehensive manner for analysis of system of linear equations, finding linear and orthogonal transformations, Eigen values and Eigen vectors applicable to engineering problems.	3	3	2	3	1								2	2	1
	FE101.2	Apply De-Moivre's theorem to determine roots of polynomial and can express hyperbolic, inverse hyperbolic functions.	3	3	2										2	1	
	FE101.3	Validate divergence & convergence of infinite series and evaluate higher order derivative of standard functions.	3	1	1	3									2	1	
	FE101.4	Apply Mean value theorems and Express the power series expansion of a function and evaluate limits by using Taylors and Maclaurin's series useful in the analysis of engineering problems.	3	3	2	2									3	1	
	FE101.5	Determine derivative of functions of several variables,composit function that are essential in various branches of Engineering and apply Euler's Theorem	3	2	2	2									3	1	
	FE101.6	Apply the concept of Jacobian to find partial derivative of implicit function and functional dependence and Use of partial derivatives in estimating error and approximation and finding extreme values of the function.	3	3	2	2									2	1	
		<b>AVG OF ALL COS</b>	<b>3</b>	<b>2.5</b>	<b>1.8</b>	<b>2.4</b>	<b>1</b>								<b>2.3</b>	<b>1.2</b>	<b>1</b>
Engineering Physics	FE102 .1	Analyze interference and diffraction of light and its engineering applications.	2	2	3	1	2					1			2	1	
	FE102 .2	Define and describe principles in Sound and their use in Engineering applications.	2	1	3	1						1			1	1	
	FE102 .3	Analyze working of lasers and polarization and their use in Modern applications.	3	2	2	2	2					1			2	2	1
	FE102 .4	Illustrate semiconductors and their applications in semiconductor devices	2	3	2	1	2					1			2	3	2
	FE102 .5	Examining principles in quantum mechanics and their use in Engineering applications.	2	1	3		1								1		

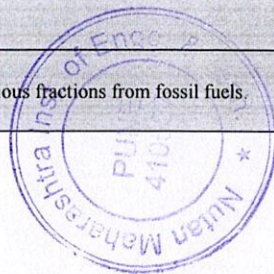
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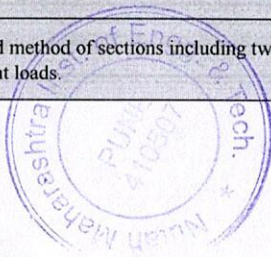
Basic Civil and Environmental Engineering	FE105.1	List out the basic areas in civil Engineering and describe roll of civil engineer in various civil engineering projects with interdisciplinary approach .	2	2	1			2	2	2			1	1	1	1
	FE105.2	List out the basic materials used in construction and classify the structure in substructure as well as superstructure ,with comparision automation with manual work.	3	2				2	2	2			1			
	FE105.3	Calculate area of irregular figure and elevation of various points with using Digital planimeter and dummy level.	2	1	3	2	2				2	1	1			
	FE105.4	Define and describe the concepts of environment and analyze impacts of pollution with the help of different methods.	2					2	2	1			1	1	1	1
	FE105.5	Construct & Draw a Building model plan using Building bye laws & provide solutions to Planning ,problems.	3	3	3	2				1			2	2		
	FE105.6	List out conventional and non conventional energy sources and illustrate various environmental pollutions with their causes and effects.	2						2	2				1	1	1
		<b>AVG OF ALL COs</b>	<b>2.3</b>	<b>2</b>	<b>2.3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1.6</b>	<b>2</b>	<b>1</b>	<b>1.2</b>	<b>1.3</b>	<b>1</b>	<b>1</b>
Engineering Graphics I	FE106.1	Discuss Drawing Instruments and Visualize and Draw Projection of line &Points inclined to Horizontal plane and Vertical plane with proper dimentioning by 1st angle method	3	3	2	1	2			1	2			2		
	FE106.2	Visualize and Draw Projection of Plane inclined to Horizontal plan and Vertical plane with proper dimentioning by 1st angle method	3	3	2	1	1			1	2			2		
	FE106.3	Interpret and Draw Projection of Solid including prism,pyramid,cylinder,cone and Engineering curves,Development of solid	3	3	2	1	1			1	2			2		
	FE106.4	Illustrate and Draw Engineering curves along with practical examples and there drawing with reduced and actual scales and Development of Solids	3	3	2	1	1			1	2			2		
	FE106.5	Observe,Interprete and draw Orthographic Projections of given pictorial view by 1st angle method, Sectional Orthographic Projection with proper dimentioning	3	3	2	1	1			1	2			2		
	FE106.6	Visualize and Construct Isometric scale ,projections of simple solids and objects, and Isometric view with proper dimentioning	3	3	3	1	1			1	2			2		
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>3</b>	<b>2.2</b>	<b>1</b>	<b>1.2</b>			<b>1</b>	<b>2</b>			<b>2</b>		
	FE107.1	Analyze different materials and its properties like workability, formability and machinability.	2		1					2	1			1	1	
	FE107.2	Adapt and develop hands on experince on wood working with hand tools and machines.	2		3		2			2	2	2		1		

Workshop Practices	FE107.3	Adapt and develop hands on experince of marking, cutting, shearing, drilling, tapping, etc.	1		3		2			2	2	2		1	1	
	FE107.4	Adapt and develop hands on experince on various types of joining processes.	1	3	2		2			2	2	2		1		
	FE107.5	Interpret safety in workshop practice and develop safe working habits.						3		2	2			1	1	
	FE107.6	Describe with different process like forging, molding, plumbing and PCB making.	1				2			2	2			1	1	
		<b>AVG OF ALL COs</b>	<b>1.4</b>	<b>3</b>	<b>2.3</b>		<b>2</b>	<b>3</b>		<b>2</b>	<b>1.8</b>	<b>2</b>		<b>1</b>	<b>1</b>	
Engineering Mathematics II	FE108.1	Determine the solution of Ordinary Differential Equation of First order First degree Differential Equation.	3	3	2	2								1	1	
	FE108.2	summarize various physical processes such as Newtons law of cooling, Electric Circuit, Rectilinear motion, Heat Tranfer in the form of Differential equation and solve it.	3	3	2	2								1	1	
	FE108.3	Evaluate Fourier series for continous and discrete systems and anlyze integrals functions for real time applications.	3	3	3	3								1	1	1
	FE108.4	Sketch Cartesian ,Polar ,Parametric Curves and measure their arc length using integral calculus.	3	3	2	1								1		
	FE108.5	Apply the concepts of solid geometry and Determine the equations of sphere, cone and cylinder in a comprehensive manner.	3	3	2	1								1	1	
	FE108.6	Evaluate multiple integrals and apply it to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.	3	3	2	1								1	1	
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>3</b>	<b>2.2</b>	<b>1.7</b>								<b>1</b>	<b>1</b>	<b>1</b>
Engineering Chemistry	FE109.1	Analyze and develop solutions to engineering problems using the concepts of Hardness & Alkalinities related to industrial and drinking water.	2	1	2	1								1		
	FE109.2	Examining electroanalytical techniques for rapid and reliable measurements & its applications by using concepts pH metric and conductometric titrations	2	1	1									1		
	FE109.3	Illustrate techniques of synthetic and speciality polymers	2	1	2											
	FE109.4	Apply the concepts of extraction ,purifications & isolation of various fractions from fossil fuels.	2	1	2											

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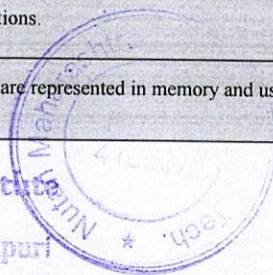
	FE109.5	Summarize & explain the chemistry of Carbon and hydrogen isotopes/ allotropes and illustration of its applications in preparation of various nanomaterials	2															
	FE109.6	Summarize concepts and mechanisms of wet and dry corrosion and develop solutions for preventing corrosions in industry.	2	1	1													
		<b>AVG OF ALL COs</b>	<b>2</b>	<b>1</b>	<b>1.6</b>	<b>1</b>								<b>1</b>				
Fundamentals of Programming Languages II	FE110.1	Illustrate the programming concepts using microprocessor & microcontroller.	3	2	1	2				1			1	2	3	2		
	FE110.2	Design & developed advanced programming skill using multiple framework	3	3	2	2	3			1			1	2	1	1		
	FE110.3	Describe different concept of operating system & fundamentals of data structure.	2	2	1	2	1			1			1	1	2	2		
	FE110.4	Apply to solve realtime problem using embedded programming concepts	3	3	3	2	2			1			1	2	2	1		
	FE110.5	Describe & implement basic of andriod SDK	3	3	3	1	2			1			1	2		1		
	FE110.6	Develop realtime android based application using embedded programming concept	3	3	3	1	2			1			1	2	1	1		
		<b>AVG OF ALL COs</b>	<b>2.8</b>	<b>2.7</b>	<b>2.2</b>	<b>1.7</b>	<b>2</b>			<b>1</b>			<b>1</b>	<b>1.8</b>	<b>1.8</b>	<b>1.3</b>		
Engineering Mechanics	FE111.1	Determine resultant force and moment of force for given system of forces and apply basic principles of mechanics to analyze force problems and Determine centroid of plane lamina and wire bends and apply laws of friction to calculate coefficient of friction.	3	3	3	2				2	1		1					
	FE111.2	Applying kinematical equations to determine unknown values of distance, time and velocity.	3	3	3	2						1						
	FE111.3	Calculate polar coordinates and range of projectiles .	3	3	3	3					2	1			1			
	FE111.4	Applying equations related to work,power ,energy,impulse ,momentum and impulse momentum principles of particle to determine the unknown values of distance ,time and velocity.	3	3	3	3					2					1		
	FE111.5	Calculate support reactions of simple and compound beam, detrmine resultant of concurrent and parallel space forces using conditions of equilibrium.	3	3	3	2					2							
	FE111.6	Analyze the plane trusses by method of joints and method of sections including two force members ,multiforce members and cables subjected to point loads.	3	3	3	3												



		<b>AVG OF ALL COs</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2.5</b>					<b>2</b>	<b>1</b>		<b>1</b>	<b>1</b>	
Basic Electronics Engineering	FE112.1	Define ,Describe and analyze basic electronic components such as semiconductors diodes	3									1		1	2	2
	FE112.2	Describe and analyze types of semiconductor diodes and distinguish BJT with MOSFET.	3	1								1		1	2	1
	FE112.3	Build and test analog circuits using OPAMP	3	2	2							1			2	2
	FE112.4	Build and test digital circuits using universal/basic gates and flip flops.	3	2	2							1		1	1	1
	FE112.5	select sensors for specific applications and describe power devices like SCR	3			1									1	2
	FE112.6	Define and describe basic principles of communication systems.	3												1	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>1.7</b>	<b>2</b>	<b>1</b>					<b>1</b>		<b>1</b>	<b>1.7</b>	<b>1.5</b>	
Basic Mechanical Engineering	FE113.1	Define ,discuss and distinguish functions of mechanical elements, mechanism of power transfer through belt, rope, chain and gear drives.	3	3								1		1		
	FE113.2	Illustrate engineering materials, their properties, and applications of these materials in engineering.	2	2								1		1		
	FE113.3	Review and Analyze manufacturing processes as casting, forging, sheet metal working.	2	2	2							1		1	1	
	FE113.4	Illustrate the functions and operations of machine tools including lathe, milling, shaping, drilling and grinding machines.	3	2	2		2					1		1	1	
	FE113.5	Discuss and describe the basics of thermodynamics with comparison of the temperature and pressure measurement equipments	2	2			1					1		1	1	
	FE113.6	Describe the basics of thermal power plant ,power producing devices and power absorbing devices.	3	2					1						1	
		<b>AVG OF ALL COs</b>	<b>2.5</b>	<b>2.2</b>	<b>2</b>		<b>1.5</b>	<b>1</b>			<b>1</b>		<b>1</b>	<b>1</b>	<b>1</b>	
	FE114.1	Interpret knowledge about CAD Software, its advantages and application	3	2	2	1	3								2	

Engineering Graphics II	FE114.2	Construct and draw various types of solids (3-D objects) using CAD	3	3	3	1	3											2			
	FE114.3	Construct and draw various types of engineering curves using CAD	3	2	3	2	2												2		
	FE114.4	Construct and draw various types of development of solids using CAD	3	3	3	2	3												2		
	FE114.5	Construct and draw various types of view of orthographics projections using CAD	3	2	3	1	2												2	1	1
	FE114.6	Construct and draw various types of Isometric views and projection using CAD	3	3	3	2	2												2		
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.5</b>	<b>2.8</b>	<b>1.5</b>	<b>2.5</b>											<b>2</b>	<b>1</b>	<b>1</b>	
Signals & Systems	EC201.1	Identify, classify basic signals and perform operations on signals.	3	3	1														3	3	2
	EC201.2	Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between two signals	3	2	1														2	3	2
	EC201.3	Analyze and resolve the signals in frequency domain using Fourier Series	3	2	2	1													2	3	2
	EC201.4	Analyze and resolve the signals in frequency domain using Fourier Transform.	3	2	2	1													2	3	2
	EC201.5	Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.	3	2	2														2	3	1
	EC201.6	Define and Describe the probability, random variables, random signals and compute the CDF and PDF.	3	2	2	2													2	3	1
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.2</b>	<b>1.7</b>	<b>1.3</b>												<b>2.2</b>	<b>3</b>	<b>1.7</b>	
	EC202L.1	Illustrate various configuration of JFET and its application as an amplifier	3	2	1		3					2	2						2	3	
	EC202L.2	Analyze MOSFETs for DC circuits.	3	3	1	1	3					2	2						2	3	3

Electronic Devices & Circuits	EC202L.3	Analyze small signal model of MOSFET for AC circuits and its role in VLSI.	3	3	1	1	3				2	2		2	3	3
	EC202L.4	Review various circuits using MOSFET.	2	1	1	1	2				2	2		1	3	3
	EC202L.5	Illustrate topologies of feedback amplifiers and different oscillators.	2	1	2	2	3				2	2		2	3	3
	EC202L.6	Design an adjustable voltage regulator circuits	3	2	3	3	3				2	2		2	3	3
		<b>AVG OF ALL COs</b>	<b>2.7</b>	<b>2</b>	<b>1.5</b>	<b>1.6</b>	<b>2.8</b>				<b>2</b>	<b>2</b>		<b>1.8</b>	<b>2.8</b>	<b>3</b>
Electrical Circuits and Machines	EC203L.1	Analyze basic AC , DC circuit for voltage, current and power by using KVL, KCL and network theorems.	3	3	3	3								3	3	3
	EC203L.2	Illustrate the basic knowledge of transformers,their types and design different types of transformer.	3	3	3	3								3	3	2
	EC203L.3	Describe the constructional details, characteristics, features and application areas of various types of DC motors.	3	3	3	3								3	3	3
	EC203L.4	Describe the constructional details, characteristics, features and application areas of various types of AC motors.	3	3	3	3								3	3	3
	EC203L.5	Describe the constructional details, characteristics, features and application areas of BLDC,reluctance and universal motors.	3	3	3	2								3	3	3
	EC203L.6	Describe the constructional details, characteristics, features and application areas of stepper, servo and single phase induction motors.	3	2	2	3								3	3	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.8</b>	<b>2.8</b>	<b>2.8</b>								<b>3</b>	<b>3</b>	<b>2.7</b>
Data Structures and Algorithms	EC204L.1	Discuss the computational efficiency of the principal algorithms such as sorting & searching.	3	2	3	2	2				2	3		3	3	2
	EC204L.2	Develop the programs that use arrays & pointers in C	3	3	3	2	2				2	3		3	3	2
	EC204L.3	Implement stacks & queues for various applications.	3	3	3	2	2				2	3		3	3	2
	EC204L.4	Describe how arrays, records, linked structures are represented in memory and use them in algorithms.	3	2	3	2	2				2	3		3	3	2

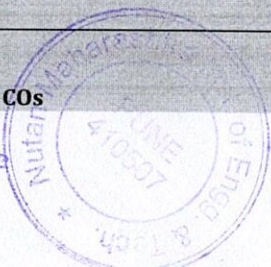


	EC204L5	Identify various terminologies and traversals of trees and use them for various applications.	3	3	3	2	2				2	3		3	3	2
	EC204L6	Identify various terminologies and traversals of graphs and use them for various applications.	3	3	3	2	2				2	3		3	3	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.7</b>	<b>3</b>	<b>2</b>	<b>2</b>				<b>2</b>	<b>3</b>		<b>3</b>	<b>3</b>	<b>2</b>
<b>Digital Electronics</b>	EC205L1	Realize Boolean expression using logic gates and Design Combinational circuits for a given functions using logic gates	3	3	3						3	3		3	3	2
	EC205L2	Design and implement synchronous and Asynchronous sequential circuits	3	3	3						3	3		3	3	2
	EC205L3	Analyze the various design steps in finite state machines and implement it	3	3	3						3	3		3	3	2
	EC205L4	Analyze the various logic families with their characteristics and Summarize the types of memory devices.	3	1	1							3		3	3	2
	EC205L5	Design the combinational logic circuits using Programmable Logic Devices.	3	1	2							3		3	3	2
	EC205L6	Illustrate the architecture and instruction set of microcontroller and its use for basic operations.	3	1	1		1				1	3		3	3	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2</b>	<b>2.2</b>		<b>1</b>				<b>3</b>	<b>3</b>		<b>3</b>	<b>3</b>	<b>2</b>
<b>Electronic Measuring Instruments &amp; Tools</b>	EC206L1	Illustrate the fundamental of various electrical parameters.	3	2							1			2	2	1
	EC206L2	Identify and describe specifications, features and capabilities of electronic instruments.	3	2	2						1			2	1	1
	EC206L3	Finalize the specifications of instrument and select an appropriate instrument for given measurement.	3	2	1		1				1			2	1	2
	EC206L4	Carry out required measurement using various instruments under different setups.	3	2	2	1	2				1			3	1	2
	EC206L5	Compare and contrast the measuring instruments for performance parameters	3	2	1	1					1			2	3	2
	EC206L6	Predict appropriate instrument for the measurement of electrical parameter professionally.	3	3	2						1			3	3	2



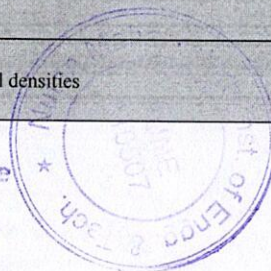
		AVG OF ALL COs										3	2.2	1.6	1	1.5			1		2.3	1.8	1.7			
		SEMESTER IV										PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
Engineering Mathematics III	EC207.1	Solve higher order linear differential equation using appropriate techniques for modelling and analyzing electrical circuits and control systems.	3	3	3	2	1					1	1								2	2	1			
	EC207.2	Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems.	3	2	2	2							1	1								2	2	1		
	EC207.3	Determine Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.	2	3	1	1									1							2			1	
	EC207.4	Perform vector differentiation, analyze the vector fields and apply to electro-magnetic fields & wave theory.	3	2	2	1									1							2	1			
	EC207.5	Perform vector integration, analyze the vector fields and apply to electro- magnetic fields & wave theory.	3	2	2	1									1							2	1			
	EC207.6	Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.	3	2	3	1									1	1						2	1	1		
		AVG OF ALL COs										2.8	2.3	2.2	1.3	1					1	1	2	1.4	1	
Integrated Circuits	EC208L.1	Describe the internal structure of Op-Amp and define its characteristics.	3	1	1		2							2	2							3	2	2		
	EC208L.2	Identify and Analyze linear applications of Op-Amp.	3	3	2	1	2							2	2							2	3	2		
	EC208L.3	Identify and Analyze nonlinear applications of Op-Amp.	3	3	2	1	2							2	2							2	3	2		
	EC208L.4	Analyze different converters using OP-AMP	3	2	2	1	2							2	2							2	3	2		
	EC208L.5	Apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators and design of various oscillators.	3	2	3	1	2							2	2							2	3	2		
	EC208L.6	Design active filters using opamps	3	1	3	1	2								2							2	3			
		AVG OF ALL COs										3	2	2.2	1	2					2	2	2.2	2.8	2	

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Control Systems	EC209.1	Identify and use models of physical systems in forms suitable for use in the analysis and design of control systems	3	3	3	3											2	3	2
	EC209.2	Perform time domain analysis and identify the order of control systems required for stability analysis.	3	3	3	3											2	3	2
	EC209.3	Apply Routh-Hurwitz Criterion and Root Locus Technique to find the stability of the control system.	3	3	3	3											2	3	2
	EC209.4	Apply Bode Plots, Polar Plots and Nyquist Plots to perform frequency domain analysis of control systems required for stability analysis.	3	3	3	3											2	3	2
	EC209.5	Illustrate and solve system equations in state variables in physical and phase variable form by using Laplace transform .	3	3	3	3											2	3	2
	EC209.6	Differentiate between various digital controllers and understand the role of the controllers in Industrial automation.	3	3	3	3											2	3	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>										<b>2</b>	<b>3</b>	<b>2</b>	
Analog Communication	EC210L.1	Illustrate and analyze the fundamental concepts and various types of AM systems.	3	2	2	2	3					2	3			3	3	3	
	EC210L.2	Distinguish and analyze the AM receivers	3	2	2	2						2	3			3	3	2	
	EC210L.3	Analyze and identify the fundamental concepts and various types of FM systems.	3	2	2	2	3					2	3			3	3	3	
	EC210L.4	Distinguish and analyze the FM receivers	3	1	2	2						2	3			3	3	2	
	EC210L.5	Analyze and evaluate noise in AM communication systems.	3	2	2	2						2	3			3	3	2	
	EC210L.6	Describe and analyze analog pulse modulation techniques and sampling theorem	3	1	2	2	3					2	3			3	3	3	
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>1.7</b>	<b>2</b>	<b>2</b>	<b>3</b>				<b>2</b>	<b>3</b>			<b>3</b>	<b>3</b>	<b>2.5</b>		
	EC211L.1	Describe and apply the principles of object oriented programming.	3	2	3	3	3					2	3			3		3	
	EC211L.2	Apply the concepts of data encapsulation, constructors, inheritance and polymorphism in C++.	3	3	3	3	3					2	3			3		3	

Object Oriented Programming	EC211L.3	Describe and apply the basic program constructs in Java	3	2	3	3	3				2	3		3		3
	EC211L.4	Apply the concepts of classes and objects to write programs in Java.	3	3	3	3	3				2	3		3		3
	EC211L.5	Develop the programs in JAVA using arrays, vectors and strings concepts based on inheritance, packages and interfaces.	3	3	3	3	3				2	3		3		3
	EC211L.6	Describe and use the concepts in Java to develop user friendly program	3	3	3	3	3				2	3		3		3
		<b>AVG OF ALL COs</b>	3	2.7	3	3	3				2	3		3		3
Employability Skill Development	EC212L.1	Develop & express essential communication skills (writing, verbal and non-verbal)									3	3		3		1
	EC212L.2	Identify the skills for aptitude tests & apply them.	1	2							3	3		3		1
	EC212L.3	Identify, develop and implement analytical abilities.	1	2							3	3		3		1
	EC212L.4	Develop the skill for correct usage of English grammar in writing.									3	3		3		1
	EC212L.5	Develop & implement presentation skill and be ready for facing interviews.					2				3	3	3	3		1
	EC212L.6	Develop team and lead it for problem solving.									3	3	3	3		1
		<b>AVG OF ALL COs</b>	1	2			2			3	3	3	3		1	
<b>SEMESTER V</b>			P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
Digital	EC301.1	Analyze the performance of a different types of digital communication techniques	3	2								1		3	3	2
	EC301.2	Analyze the baseband digital transmission systems	3	2	2							1		3	3	2
	EC301.3	Describe the random process and noise with their spectral densities	3	2								1		3	3	2

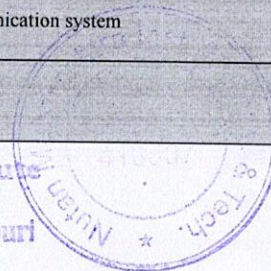


Communication	EC301.4	Describe Coherent Detection of binary signals in presence of noise using filters in baseband receivers.	3	2								1		3	3	2
	EC301.5	Analyze different pass band digital transmission systems with their power spectra	3	2								1		3	3	2
	EC301.6	Describe and analyze the digital communication system with spread spectrum modulation	3	2	2	1						1		3	3	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>						<b>1</b>		<b>3</b>	<b>3</b>	<b>2</b>
Digital Signal Processing	EC302.1	Analyze the basics of discrete time signal processing.	3	1	1									3	3	
	EC302.2	Analyze the discrete time signal using DFT.	3	3	3	2								3	3	1
	EC302.3	Analyze the LTI systems using Z transform	3	3	3	2								3	3	1
	EC302.4	Design and Implement IIR filters for different real world signals	3	3	3	2								3	3	1
	EC302.5	Describe and analyze different methods of FIR filters	3	3	3	2								3	3	1
	EC302.6	Describe different signal processing applications using DSP processor.	3											3	3	
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.6</b>	<b>2.6</b>	<b>2</b>								<b>3</b>	<b>3</b>	<b>1</b>
Electromagnetics	EC303.1	Describe the basic mathematical concepts related to electromagnetic vector fields and basic laws of Electromagnetics.	3	3	2	1								2	2	
	EC303.2	Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.	3	3	2	1								2	2	
	EC303.3	Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.	3	3	2	2								2	2	
	EC303.4	Describe and Analyze the concepts related to Faraday's law, induced emf and Maxwell's equations.	3	3	2	2								2	2	
	EC303.5	Analyze the parameters of transmission lines and illustrate the concept of smith chart.	3	3	2	3								2	2	

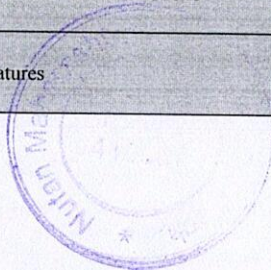
	EC303.6	Apply Maxwell's equations to analyze behaviour of uniform plane wave propagation.	3	3	2	2									2	2	
		<b>AVG OF ALL COs</b>	3	3	2	1.8									2	2	
Microcontrollers	EC304.1	Describe the MCS-51 architecture and its features with instructions.	3	2	2	1	1								3	3	2
	EC304.2	Interface the IO peripherals to MCS 51 microcontroller and study of hardware and software tools	3	3	2	3	3								3	3	3
	EC304.3	Interface the IO peripherals and sensors to MCS 51 microcontroller and design of DAS	3	3	3	3	3								3	3	3
	EC304.4	Illustrate the basic PIC Microcontroller Architecture and features	3			1									3	3	1
	EC304.5	Interface the IO peripherals to 8 bit PIC microcontroller	3	3	3	3	3								3	3	3
	EC304.6	Design of 8 bit microcontroller based system using serial protocols	3	3	3	3	3								3	3	3
		<b>AVG OF ALL COs</b>	3	2.8	2.6	2.3	2.6								3	3	2.5
Mechatronics	EC305.1	Describe and Identify the key elements of mechatronics system and its representation in terms of block diagram	3	2	1	2	1								3	3	1
	EC305.2	Describe the principle of sensors and transducers and analyze their characteristics	3	2	2	2	1								3	3	2
	EC305.3	Describe the concept of hydraulic system and actuators.	3	2	3	2	1								1	1	1
	EC305.4	Illustrate the concept of Pneumatic Systems	3	2	3	2	1								1	1	1
	EC305.5	Illustrate the electrical actuators and electron mechanical actuators	3	2	2	2	1								3	3	2
	EC305.6	Prepare case study of the mechatronics system	3		3	2	1								3	3	2
		<b>AVG OF ALL COs</b>	3	2	2.3	2	1								2.3	2.3	1.5

Signal Processing and Communications Lab	EC306.1	Simulate & Verify the sampling theorem, aliasing effect ,DFT properties of discrete time signal.	3	3	3	2	3				3	3		3	3	3
	EC306.2	Simulate a pole zero plot for a given transfer function and find convolution of discrete time signal.	3	3	3	2	3				3	3		2	3	3
	EC306.3	Simulate discrete time signal using DCT & IDCT.	3	3	3	2	3				3	3		2	3	3
	EC306.4	Analyze the digital modulation techniques and different types of line code.	3	2			3				3	3		3	3	3
	EC306.5	Analyze PN sequence, DSSS techniques and detection of digital base band signal in presence of noise.	3	2			3				3	3		2	3	3
	EC306.6	Simulate the digital modulation techniques and random processes.	3	2			3				3	3		3	3	3
	EC306.7	<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.5</b>	<b>3</b>	<b>2</b>	<b>3</b>				<b>3</b>	<b>3</b>		<b>2.5</b>	<b>3</b>	<b>3</b>
Microcontrollers and Mechatronics Lab	EC307.1	Implement fundamental programming concepts of 8 bit microcontrollers	3	2	2	2	3				3	3		3	3	2
	EC307.2	Interface peripherals to the 8 bit microcontrollers.	3	2	2	2	3				3	3		3	3	2
	EC307.3	Design microcontroller based system using serial protocols.	3	3	3	3	3				3	3		3	3	3
	EC307.4	Implement mechatronics system like servo motor position control, flow control, velocity measurement.	3	3	3	3	3				3	3		3	3	3
	EC307.5	Analyze the concept of Hydraulic Systems and Pneumatic Systems.	3	3	3	3	3				3	3		3	3	2
	EC307.6	Implement various data acquisition and control systems interfacing sensors and actuators.	3	3	3	3	3				3	3		3	3	3
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.7</b>	<b>2.7</b>	<b>2.7</b>	<b>3</b>				<b>3</b>	<b>3</b>		<b>3</b>	<b>3</b>	<b>2.5</b>
EC308L.1	EC308L.1	Apply the fundamental concepts and working principles of electronics devices to design electronics systems.	3	2	2						3	3		3	3	3
	EC308L.2	Examine the datasheets for appropriate selection of components and devices.	3	1	1	1					3	3		3	3	3

<b>Electronics System Design</b>	EC308L.3	Select appropriate transducer and signal conditioning circuit to design prototype of Data Acquisition system.	3	3	3	2	2					3	3		3	3	3
	EC308L.4	Design an electronic system/sub-system and validate its performance.	3	3	3	2	3					3	3		3	3	3
	EC308L.5	Sketch and simulate circuit schematic using EDA tool.	3	1	1	1	3					3	3		3	3	3
	EC308L.6	Create, manage the database and query handling using suitable tools.	3	3	3	2	3					3	3		3	3	3
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.2</b>	<b>2.2</b>	<b>1.6</b>	<b>2.8</b>					<b>3</b>	<b>3</b>		<b>3</b>	<b>3</b>	<b>3</b>
<b>SEMESTER VI</b>			<b>P01</b>	<b>P02</b>	<b>P03</b>	<b>P04</b>	<b>P05</b>	<b>P06</b>	<b>P07</b>	<b>P08</b>	<b>P09</b>	<b>P010</b>	<b>P011</b>	<b>P012</b>	<b>PS01</b>	<b>PS02</b>	
<b>Power Electronics</b>	EC309.1	Describe Construction and switching characteristics of power devices.	3	2	2	2									1	2	2
	EC309.2	Illustrate working and analyze waveforms of different AC-DC Power Converters .	3	2	2	1									3	2	2
	EC309.3	Describe working of inverters for different types of loads.	3	2	2	1									3	2	2
	EC309.4	Classify and describe different types of DC-DC converters.	3	2	2	1									3	3	2
	EC309.5	Describe Resonant Converters and various protection circuits for power devices.	3	2	3	1									2	3	2
	EC309.6	Illustrate the applications of Power Devices and describe the concept of motor drives.	3	2	3	2									3	3	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2</b>	<b>2.3</b>	<b>1.3</b>								<b>2.5</b>	<b>2.5</b>	<b>2</b>	
<b>Information Theory, Coding and</b>	EC310.1	Illustrate the concept of different source coding techniques in communication system	3	3	3	2	2								3	2	1
	EC310.2	Illustrate the concept of channel coding techniques in communication system	3	3	3	2	2								3	2	1
	EC310.3	Design a data compression scheme using cyclic codes.	3	3	3	2	2								3	2	1

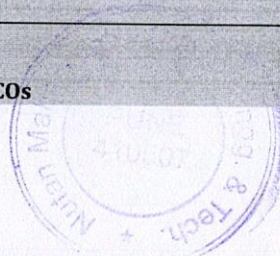


Communication Networks	EC310.4	Design channel coding schemes for communication system	3	3	3	2	2								3	2	1
	EC310.5	Describe the fundamental principles of data communication and networking.	3				2								3	2	1
	EC310.6	Apply flow and error control techniques in communication networks.	3		2	1	2								3	2	1
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>3</b>	<b>2.8</b>	<b>1.8</b>	<b>2</b>								<b>3</b>	<b>2</b>	<b>1</b>
Business Management	EC311.1	Describe Management Science aspects useful in business.	1	2	2				1	1		2			3	1	2
	EC311.2	Describe Quality Aspects for Systematically Running the Business.	1	2	2		2	2	1	1		2			3	1	2
	EC311.3	Describe the concepts of financial & project management	1	2	2		2	2	1	1		2	3	3	3	1	2
	EC311.4	Describe the recent trends in Human resource development	1	2	2			1	1	1	2	2			3	1	2
	EC311.5	Develop project management aspects and promote entrepreneurship.	1	2	2			1	1	1	1	2	1	3	3	1	2
	EC311.6	Describe marketing concepts online and offline.	1	2	2		2	2	1	1	1	2			3	1	2
		<b>AVG OF ALL COs</b>	<b>1</b>	<b>2</b>	<b>2</b>		<b>2</b>	<b>1.6</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	
Advanced Processors	EC312.1	Describe the ARM family microprocessor architectures and its features.	3	2											2	3	2
	EC312.2	Describe the ARM7 based microcontroller LPC2148 architecture and its features.	3	2	1	1	2								3	3	2
	EC312.3	Interface the advanced peripherals to ARM7 based microcontroller LPC2148	3	3	3	3	3								3	3	3
	EC312.4	Interface real world peripherals with ARM7 based microcontroller LPC2148	3	3	3	3	3								3	3	3
	EC312.5	Describe the DSP processor architectures and its features	3													3	3

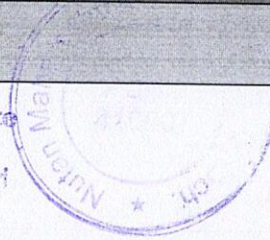




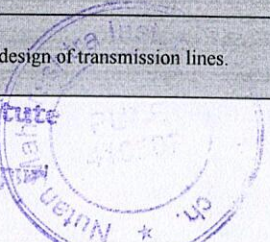
	EC312.6	Describe DSP Processors and resources for signal processing applications.	3		1													3	3	1	
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.5</b>	<b>2</b>	<b>2.3</b>	<b>2.7</b>											<b>2.8</b>	<b>3</b>	<b>2</b>	
<b>System Programming and Operating Systems</b>	EC313.1	Design assembler and macro processor .	3	3	3	3												2	1	2	
	EC313.2	Design compiler, linker and loader.	3	3	3	3												2	1	2	
	EC313.3	Describe fundamentals of operating system abstractions such as processes, threads, files and analyze important process scheduling algorithms	3	3	3	2	2												1	1	2
	EC313.4	Analyze the concept of concurrency , deadlock detection and prevention algorithms	3	3	3	3	2												1	1	2
	EC313.5	Describe memory management and analyze different page replacement algorithms.	3	3	2	2	2												1	1	2
	EC313.6	Describe I/O management, file management and disk scheduling algorithms.	3	2	2	2	2												1	1	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.8</b>	<b>2.7</b>	<b>2.5</b>	<b>2</b>											<b>1.3</b>	<b>1</b>	<b>2</b>	
<b>Power and ICT Lab</b>	EC314.1	Design and Implement source coding techniques for data compression.	3	2	2	1	3					2	2					3	2	2	
	EC314.2	Design and Implement channel coding techniques and their efficiency.	3	2	2	1	3					2	2					3	2	2	
	EC314.3	Apply fundamental concepts of data communication and networking.	3	2	2	1	3					2	2					3	2	2	
	EC314.4	Analyse voltage and current relationship for power devices.	3	2	1	1	2					2	3					3	3	3	
	EC314.5	Explore output voltage waveforms for converters, inverters and controllers	3	2	1	1	2					2	3					2	3	3	
	EC314.6	Implement line and load regulation of SMPS	3	2	1	1	2					2	3					3	3	3	
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2</b>	<b>1.5</b>	<b>1</b>	<b>2.5</b>					<b>2</b>	<b>2.5</b>					<b>2.8</b>	<b>2.5</b>	<b>2.5</b>	



Advanced Processors and System Programming Lab	EC315.1	Interface the advanced peripherals to ARM7 based microcontroller LPC2148	3	3	2	2	3				2	3		2	2	2
	EC315.2	Design of embedded system for real world applications using ARM7 based microcontroller LPC2148	3	3	3	2	3	1			2	3		2	2	2
	EC315.3	Implement DSP algorithms using DSP development board and CCS.	3	3	2	2	3				2	3		1	2	2
	EC315.4	Implement Lexical Analyzer, Assembler, Macro pass-I	3	3	2	2	3				2	3		2	2	2
	EC315.5	Describe and Implement different job scheduling algorithm, Banker's algorithm and page replacement algorithm.	3	3	2	2	3				2	3		2	2	2
	EC315.6	Illustrate case study for Android mobile operating system.	3	1	1	2	3				2	3		2	2	2
	<b>AVG OF ALL COs</b>			<b>3</b>	<b>2.7</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>1</b>		<b>2</b>	<b>3</b>		<b>1.8</b>	<b>2</b>	<b>2</b>
Employability Skills and Mini Project	EC316L.1	Plan, execute and develop a Mini Project with team	3	3	2	2	3	2	1	1	3	3	2	3	2	2
	EC316L.2	Implement electronic hardware by learning PCB artwork design, soldering techniques and testing and troubleshooting etc	3	3	2	2	3	2	1	1	3	3	2	3	2	2
	EC316L.3	Describe PCB artwork design using an appropriate EDA tool	3	3	2	2	3	2	1	1	3	3	2	3	2	2
	EC316L.4	Test the project with hardware and software simulation	3	3	2	2	3	2	1	1	3	3	2	3	2	2
	EC316L.5	Prepare a technical report based on the Mini project	3	3	2	2	3	2	1	1	3	3	2	3	2	2
	EC316L.6	Describe a technical seminar based on the Mini Project work carried out	3	3	2	2	3	2	1	1	3	3	2	3	2	2
	<b>AVG OF ALL COs</b>			<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>
<b>SEMESTER VII</b>			<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PS01</b>	<b>PS02</b>
EC401.1	Develop effective HDL codes for digital design.	3	3	3		1								3	3	3

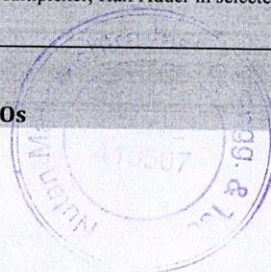


VLSI Design & Technology	EC401.2	Apply knowledge of real time issues in digital design.	3	2	1													3	3	2		
	EC401.3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.	3	3	2	2													3	3	3	
	EC401.4	Design CMOS circuits for specified applications.	3	3	3	2	1												3	3	3	
	EC401.5	Analyze various issues and constraints in design of an ASIC.	3	2	2	2	1												3	3	2	
	EC401.6	Apply knowledge of testability in design and Build In Self Test (BIST) circuit.	3	2	1														3	3	2	
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.5</b>	<b>2</b>	<b>2</b>	<b>1</b>											<b>3</b>	<b>3</b>	<b>2.5</b>		
Computer Networks & Security	EC402.1	Define and Describe the fundamental underlying principles of computer networking	3	3	2	1													3	3	3	
	EC402.2	Describe and analyze the hardware, software, components of a network and their interrelations	3	3	2	1													3	3	3	
	EC402.3	Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies	3	3	2	2													3	3	3	
	EC402.4	Illustrate the basic concept of installation and configuration for different networking applications.	3	3	2	1													3	3	3	
	EC402.5	Illustrate and identify the deficiencies in existing protocols, and then go onto select new and better protocols.	3	2	2	1														3	3	3
	EC402.6	Describe and Analyze the aspects of Cryptography & Network Security.	3	3	1	1														3	3	3
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.8</b>	<b>1.8</b>	<b>1.2</b>												<b>3</b>	<b>3</b>	<b>3</b>		
Radiation & Microwave	EC403.1	Apply the fundamentals of electromagnetics to derive free space propagation equation and distinguish various performance parameters of antenna.	3	3	2	2													2	2	1	
	EC403.2	Analyze various radiating elements and arrays.	3	3	3	2	2													2	1	
	EC403.3	Apply the knowledge of waveguide fundamentals in design of transmission lines.	3	3	3	2	2													2	1	


  
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**Telegoa Bhubane, 751007**

Microwave Techniques	EC403.4	Explore construction and working of principles passive microwave devices/components.	3	3	3	2											1	1		
	EC403.5	Explore construction and working of principles active microwave devices/components.	3	3	3	2												1	1	
	EC403.6	Know the various microwave systems, devise set ups of microwave measurement devices and Identify the effect of radiations on environmental sustainability	3	2	3	2												1	2	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.8</b>	<b>2.8</b>	<b>2</b>	<b>2</b>										<b>1.5</b>	<b>1.7</b>	<b>1.2</b>	
Elective I- Digital Image and Video Processing	EC404A.1	Develop and implement basic mathematical operations on digital images.	3	3	3													2	2	1
	EC404A.2	Analyze and solve image enhancement and image restoration problems.	3	3	3													2	2	1
	EC404A.3	Identify , design and predict image processing techniques for object segmentation and recognition.	3	3	3													2	2	1
	EC404A.4	Represent objects and region of the image with appropriate method.	3	1	1													2	2	1
	EC404A.5	Apply 2-D data compression techniques for digital images.	3	3	3													2	2	1
	EC404A.6	Describe video signal representation and different algorithm for video processing.	3															2	2	1
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.6</b>	<b>2.6</b>												<b>2</b>	<b>2</b>	<b>1</b>	
Elective II - Electronics Product Design	EC405B.1	State and explain design flow of design of electronics product.	3	3	3	2	1											3	3	3
	EC405B.2	Illustrate hardware design process and testing methods.	3	3	3	2	2											3	3	3
	EC405B.3	Illustrate software development and testing methods	3	3	3	2	3											3	3	3
	EC405B.4	Summarize printed circuit boards and different parameters	3	3	3	2	3											3	3	3
	EC405B.5	Illustrate steps of product debugging & testing	3	3	3	2	3											3	3	3

	EC405B.6	Describe special design considerations and importance of documentation	3	2	2	2	2			1			3	3	3
		<b>AVG OF ALL COs</b>	3	2.8	2.8	2	2.3						3	3	3
Lab Practice -I (CNS+ RMT)	EC406.1	Analyze the structure and organization of computer networks, including the division into network layers, role of each layer, and relationships between the layers.	3	3	3	2	3	1		2	3		3	3	2
	EC406.2	Analyze the basic concepts of application layer protocol design; and implementing client/server models, peer to peer models, and network naming.	3	3	3	2	3	1		2	3		3	3	2
	EC406.3	Describe transport layer concepts and protocol design; including connection oriented and connection-less models and implements the techniques to provide reliable data delivery and algorithms for congestion control and flow control.	3	3	3	2	3	1		2	3		3	3	2
	EC406.4	Design, simulate and compare performance of microwave antennas and Distinguish various antenna performance parameters .	3	3	3	3	3	1		1	3		2	3	3
	EC406.5	Analyze and verify working principles of passive microwave devices/components.	3	3	2	1	3			1	3		2	3	2
	EC406.6	Analyze and verify working principles of active microwave devices/components.	3	3	3	1	3			1	3		2	3	2
		<b>AVG OF ALL COs</b>	3	3	2.8	1.8	3	1		2	3		2.5	3	2.2
Lab Practice -II (VLSI + Elective I)	EC407.1	Implement basic operations on images and image analysis techniques.	3	3	3		3			3	3		3	2	2
	EC407.2	Design image enhancement and image restoration techniques	3	3	3		3			3	3		3	2	2
	EC407.3	Implement data compression techniques for effective use of resources such as storage and bandwidth .	3	3	3		3			3	3		3	2	2
	EC407.4	Develop VHDL code and testbench code for ALU,Universal Shift Register,FIFO,LCD Interface.	3	3	2	3	3	1		3	3		3	3	3
	EC407.5	Synthesis and Implementaion of VHDL code on PLD.	3	3	2	3	3	1		3	3		3	3	3
	EC407.6	Design and simulate CMOS layout of NAND,NOR, 2:1 Multiplexer, Half Adder in selected technology	3	3	3	3	3	1		3	3		3	3	3
		<b>AVG OF ALL COs</b>	3	3	2.7	3	3	1		3	3		3	2.5	2.5




Project Stage I	EC408.1	Identify a real world problem, review literature, suggest its solution and Demonstrate profound technical knowledge of the project.	3	3	3	3	3									3	3	
	EC408.2	Demonstrate solutions to complex engineering problems utilizing a systems approach and Provide solutions to meet the specified needs of the society.	3	3	3	3	3	3									3	3
	EC408.3	Create a system and validate its conformance and Perform data analysis, interpret and provide valid conclusions.	3	3	3	3	3										3	3
	EC408.4	Assess health, safety and legal relevant to professional engineering practices and Comply the environmental needs and sustainable development.									3	3					2	2
	EC408.5	Justify ethical principles in engineering practices and Perform multi-disciplinary task as an individual and / or team member to manage the project/task.									3	3		3			3	3
	EC408.6	Comprehend the Engineering activities with effective presentation and report and Interpret the findings with appropriate technological / research citation.									3		3		3		2	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2.7</b>	<b>2.7</b>	
<b>SEMESTER VIII</b>			<b>P01</b>	<b>P02</b>	<b>P03</b>	<b>P04</b>	<b>P05</b>	<b>P06</b>	<b>P07</b>	<b>P08</b>	<b>P09</b>	<b>P010</b>	<b>P011</b>	<b>P012</b>	<b>PS01</b>	<b>PS02</b>		
Mobile Communication	EC409.1	Describe the Switching techniques for voice and Data and control of swtching system.	3	3	2	1									3	3		
	EC409.2	Describe and analyze the concept of telecommunication traffic system and signalling techniques.	3	3	2	1		1							3	3		
	EC409.3	Explore the concept of cellular system and Propagation Mechanism.	3	3	2	1									3	3	1	
	EC409.4	Explore the architecture of GSM.	3	1	2	1		2							3	3	1	
	EC409.5	Illustrate the concept of GSM Channels and Services with Multiple Access Techniques	3	1	2	1		2							3	3		
	EC409.6	Illustrate the concept of evolution of Mobile Generation and distinguish between different generations of mobile technologies	3	1	2	1		2	1						3	3	1	
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>		<b>2</b>	<b>1</b>					<b>3</b>	<b>3</b>	<b>1</b>		
	EC410.1	Illustrate the optical fiber system with various channel impairments like losses and dispersions.	3	3	3	1									3	2	2	

<b>Broadband Communication Systems</b>	EC410.2	Perform Link power budget and Rise Time Budget by appropriate selection of components and check its viability.	3	3	3	3												1	1	1	
	EC410.3	Analyze the Operational principle of WDM and its network elements with their applications.	3	2	3	2													1	1	1
	EC410.4	Calculating the look angles for satellite communication and analyzing the fundamentals of orbital mechanics with different launchers	3	3	3	2													3	2	1
	EC410.5	Describing the Telemetry ,Tracking , commands, monitoring and power systems for satellite communication	3	2	2														1	1	
	EC410.6	Perform Satellite Link design for Up Link and Down Link.	3	3	3	3													1	2	1
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.7</b>	<b>2.8</b>	<b>2.2</b>												<b>1.7</b>	<b>1.5</b>	<b>1.2</b>	
<b>Elective III - PLCs and Automation</b>	EC411B.1	Describe Process Control & Automation	3		1				1										1	2	
	EC411B.2	Illustrate transmitters & analog/digital signal conditioning for sensors	3		1				2										2	2	1
	EC411B.3	Illustrate controllers and actuators.	3	2	1				2										2	2	1
	EC411B.4	Analyze PLC architecture and develop PLC ladder programs for simple industrial applications	3	3	3			3	3										2	2	2
	EC411B.5	Design of Automation systems for industrial applications	3	1	1				1										1	2	1
	EC411B.6	Illustrate the CNC and describe industrial communication protocols.	3						2										1	2	1
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2</b>	<b>1.4</b>	<b>3</b>	<b>1.8</b>											<b>1.5</b>	<b>2</b>	<b>1.2</b>	
	EC412C.1	Describe various concepts and terminologies used in WSN	2	3	3	2						2			2					3	
	EC412C.2	Describe importance and use of radio communication and link management in WSN	3	3	1	2			2	2										3	
	EC412C.3	Analyze wireless standards and protocols associated with WSN	3	3	1	1	3		1												2

<b>Elective IV- Wireless Sensor Networks</b>	EC412C.4	Recognize importance of localization and routing techniques used in WSN	2	3	2				2					2	2	
	EC412C.5	Illustrate the different techniques of data aggregation and importance of security in WSN	2	3	2			2						2	2	2
	EC412C.6	Examine the issues involved in design and deployment of WSN	3	3	3	3	3			1				3	3	
		<b>AVG OF ALL COs</b>	<b>2.5</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>		<b>2</b>	<b>2.5</b>	<b>2.6</b>	<b>2</b>
<b>Lab Practice -III (MC+BCS)</b>	EC413.1	Perform an experiment to explain PSTN TST switch, AT commands for call operation and VoIP call routing process	3		1		2				1	3		3	3	3
	EC413.2	Simulate speech coding and decoding technique,GMSK modulation and CDMA used in mobile Communication.	3	3	2	2	3				1	3		3	3	3
	EC413.3	Write a program to measure bit error rate in presence of AWGN model and illustrate the concept of Mobile Telephone Switching Office (MTSO)	3	3	2	2	3				1	3		3	3	3
	EC413.4	Examine and verify characteristics of sources and detectors, measurement of attenuation and estimating the numerical aperture of Optical fiber communication system.	3	3	3	2					1	3		3	2	2
	EC413.5	Analyze and establish an optical digital link.	3	2	2						1	3		3	2	2
	EC413.6	Analyze and establish satellite link for signal transmission.	3	3	3	2	3				1	3		3	2	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2.8</b>	<b>2.2</b>	<b>2</b>	<b>2.8</b>			<b>1</b>	<b>3</b>		<b>3</b>	<b>2.5</b>	<b>2.5</b>	
<b>Lab Practice -IV ( Elective III)</b>	EC414.1	Demonstrate the speed and position control of servo motor using PLC.	3	2	2	1	1					2		1	2	
	EC414.2	Implement temperature control system using RTD & PLC	3	2	2	1	1					2		2	1	
	EC414.3	Interfacing of PLC with VFD to control the speed of AC 3φ motor	3	2	2	1	1					2		1	1	
	EC414.4	Design & simulate 3 Cylinder piston based pump kit.	3	2	2	2	1					2		1	2	2
	EC414.5	Interface PLC with industrial softwares like HMI/SCADA.	3	2	2	2	2							1	2	1



	EC414.6	Interface Ethernet with PLC to exchange data	3	2	2	1	1						2		1	2	1		
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1.3</b>	<b>1.2</b>						<b>2</b>		<b>1.2</b>	<b>2</b>	<b>1.2</b>		
<b>Project Stage II</b>	EC415.1	Identify a real world problem, review literature, suggest its solution and Demonstrate profound technical knowledge of the project.	3	3	3	3	3									3	3		
	EC415.2	Demonstrate solutions to complex engineering problems utilizing a systems approach and Provide solutions to meet the specified needs of the society.	3	3	3	3	3	3									3	3	
	EC415.3	Create a system and validate its conformance and Perform data analysis, interpret and provide valid conclusions.	3	3	3	3	3											3	3
	EC415.4	Assess health, safety and legal relevant to professional engineering practices and Comply the environmental needs and sustainable development.								3	3							2	2
	EC415.5	Justify ethical principles in engineering practices and Perform multi-disciplinary task as an individual and / or team member to manage the project/task.									3	3		3				3	3
	EC415.6	Comprehend the Engineering activities with effective presentation and report and Interpret the findings with appropriate technological / research citation.										3	3		3		3	2	2
		<b>AVG OF ALL COs</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2.7</b>	<b>2.7</b>	

  
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