

R16 Articulation Matrix

I-I

ENGLISH-I	CO1	Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English (L3)													
	CO2	Formulate sentences using proper grammatical structures and correct word forms and take notes while listening to a talk/lecture to answer questions (L3)													
	CO3	Speak clearly on a specific topic using suitable discourse markers in informal discussions (L3)													
	CO4	Write summaries based on global comprehension of reading/listening texts (L3)													
	CO5	Produce a coherent paragraph interpreting a figure/graph/chart/table (L4)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	1	-	-	
CO3	-	-	-	-	-	-	-	-	2	3	-	1	-	-	
CO4	-	-	-	-	-	-	-	-	2	3	-	1	-	-	
CO5	-	-	-	-	-	-	-	-	2	3	-	1	-	-	

MATHEMATICS-I	CO1	Understand the first order ordinary Differential equations and analyze their applications. (L2)													
	CO2	Classify and solve the higher order ordinary differential equations and its applications. (L2)													
	CO3	Apply Laplace transformations and Evaluate the improper integral. (L3)													
	CO4	Remember partial differentiation and Compute extreme values. (L3)													
	CO5	Construct the Partial differential equations and Solve first order partial differential equations. (L4)													
	CO6	Classify the nature of higher order partial differential equations. (L2)													
		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	-	-	

Mathematics-II (Mathematical Methods)	CO1	Appropriate Numerical methods to find roots of algebraic & transcendental equations. (L3)														
	CO2	Understand the interpolation and extrapolation techniques. (L2)														
	CO3	Apply different numerical methods to Solve differential equations. (L2)														
	CO4	Interpret Fourier series analysis which is central to many applications in engineering apart.(L2)														
	CO5	Solving of Higher order Partial differential equations and their application. (L4)														
	CO6	Apply Fourier transforms to Evaluate improper integrals. (L3)														
		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	-	-		
Applied Physics	CO1	Apply knowledge of Interference concepts of light. (L3)														
	CO2	Apply knowledge of Diffraction concepts of light. (L3)														
	CO3	Summarize the applications of Lasers. (L2)														
	CO4	Interpret EMW wave propagation and its applications. (L2)														
	CO5	Analyze technicalities in solving problems related to Quantum mechanics. (L4)														
	CO6	Experiment Laws and principles of Semiconductor Physics design by analyzing Laws and principles of Semiconductor Physics. (L4)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-	
	CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-	
	CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-	
	CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-	
	CO6	3	2	-	-	-	-	-	-	-	-	-	1	-	-	

Computer Programming	CO1	Understanding basic jargon of Computer and formulating algorithmic solutions to problems. (L3)														
	CO2	Understanding programming style in C. (L2)														
	CO3	Understanding branching & iteration in Problem solving. (L4)														
	CO4	Build program blocks using Modular programming approach. (L4)														
	CO5	Develop solutions to problems using Arrays & Strings. (L4)														
	CO6	Comprehension of group data using structures and File Management. (L4)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	2	2	2	-	2	-	-	-	-	-	-	-	2	-	
	CO2	1	1	1	-	2	-	-	-	-	-	-	-	2	-	
	CO3	2	2	2	2	-	-	-	-	-	-	-	-	2	2	
	CO4	1	2	3	3	-	-	-	-	-	-	-	-	2	2	
	CO5	2	3	2	2	1	-	-	-	-	-	-	-	2	2	
CO6	2	3	3	3	-	-	-	-	-	-	-	-	2	2		
Engineering Drawing	CO1	To draw various Engineering curves & polygons. (L3)														
	CO2	To understand different scales used in the industry, to recognize principles of projection & to draw Orthographic projections of points. (L3)														
	CO3	To interpret the projection principles to draw projections of straight lines. (L2)														
	CO4	To understand the various ways to draw projections of planes. (L3)														
	CO5	To draw the projections of solids by applying principles of Orthographic projections. (L3)														
	CO6	To convert isometric views into orthographic views and vice versa.(L4)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	1	1	1	-	-	-	-	-	-	-	-	1	-	-	
	CO2	2	2	2	-	-	-	-	-	-	-	-	1	-	-	
	CO3	2	2	2	-	-	-	-	-	-	-	-	1	-	-	
	CO4	2	2	2	-	-	-	-	-	-	-	-	1	-	-	
	CO5	2	2	2	-	-	-	-	-	-	-	-	1	-	-	
CO6	3	3	3	-	-	-	-	-	-	-	-	1	-	-		

I-II

I-II															
English-II	CO1	Read and comprehend English stories and texts. (L2)													
	CO2	Write effectively using appropriate format and transfer verbal information into nonverbal information and vice versa. (L3)													
	CO3	Improve listening skills particularly related to Technical English and speak in English without Inhibition. (L3)													
	CO4	Expand vocabulary range and use it effectively and grammatically for English communication. (L3)													
	CO5	Improve life skills and core skills necessary for effective communication and critically respond in English to a real life situations. (L3)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	-	-	-	-	-	-	-	-	2	3	-	1	-	-
	CO2	-	-	-	-	-	-	-	-	2	3	-	1	-	-
	CO3	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	1	-	-	
CO5	-	-	-	-	-	-	-	-	2	3	-	1	-	-	
Mathematics-III	CO1	Solve the system of linear equations and Analyze their applications. (L4)													
	CO2	Compute an Eigen values and eigen vectors. (L4)													
	CO3	Evaluate double and Triple integrals and Apply to find surface area and volumes of solids. (L4)													
	CO4	Compare definite integral with special functions. (L2)													
	CO5	Differentiate the scalar and vector functions. (L2)													
	CO6	Understand line, surface and volume integrals and Establish vector integral theorems. (L2)													
		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	-	-	

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. (L2)													
	CO2	Recognize specific characteristic properties of fuels including calorific value determination, Ranking and Analysis of coal by proximate and ultimate methods. (L1)													
	CO3	Understanding the principles, construction and working of galvanic cells, electrode potentials, concentration cells, rechargeable batteries. Apply the knowledge of electro chemistry to corrosion, distinguish various types of corrossions and able to solve corrosion problems. (L3)													
	CO4	Discovery of advanced materials i.e. nano materials, liquid crystals, super conductors and Illustrate the applications of cleaner and greener synthetic methods adapt in industries for healthy living. (L3)													
	CO5	Understanding the structures of solid crystalline structures, synthesis of ultra pure semiconductors, working of rectifiers and transistors, insulating materials, distinguish various ferro and ferromagnetic materials. (L1)													
	CO6	Recognize on conventional energy sources, construction & working of photovoltaic cell, design of hydropower plant, tidal power, geothermal energy, bio gas for green environment. (L3)													
		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	1	-	-	
CO6	2	2	-	-	-	-	-	-	-	-	1	2	-	-	

Applied / Engineering Chemistry Lab	CO1	Estimate the amount of metal ions present in different solutions (L5)													
	CO2	Analyze the quality parameters of water (L4)													
	CO3	Determine the strength of different solutions by using different instrumentation techniques (L3)													
		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	-	-	
English - Communication Skills Lab - 2	CO1	Prioritize information from reading texts after selecting relevant and useful points and paraphrase short academic texts using suitable strategies and conventions. (L3)													
	CO2	Make formal structured presentations on academic topics using PPT slides with relevant graphical elements. (L3)													
	CO3	Participate in group discussions using appropriate conventions and language strategies. (L3)													
	CO4	Prepare a CV with a cover letter to seek internship/ job. (L2)													
	CO5	Collaborate with a partner to make presentations and Project Reports. (L2)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	1	-	-	
CO2	-	-	-	-	-	-	-	-	2	3	-	1	-	-	
CO3	-	-	-	-	-	-	-	-	2	3	-	1	-	-	
CO4	-	-	-	-	-	-	-	-	2	3	-	1	-	-	
CO5	-	-	-	-	-	-	-	-	2	3	-	1	-	-	
Object Oriented Programming Lab	CO1	Demonstrate the basic Problem solving techniques through C++. (L5)													
	CO2	Implement polymorphism, inheritance & virtual functions. (L3)													
	CO3	Apply exceptions and standard template libraries. (L3)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	2	-	-	-	-	-	-	-	2	2	-	
CO2	1	2	2	2	-	-	-	-	-	-	-	2	2	-	
CO3	-	2	2	2	-	-	-	-	-	-	-	2	2	-	

II-I

II-I															
Statistics with R Programming	CO1	Infers the concepts of Vectors and Lists for programming. (L2)													
	CO2	Extends and generalizes functions & pointers. (L3)													
	CO3	Demonstrates the application of statistics over data sets. (L3)													
	CO4	Discriminates the statistic results graphically. (L4)													
	CO5	Differentiates probability distribution functions. (L4)													
	CO6	Differentiates linear models.(L4)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	2	3	-	-	-	-	-	-	-	-	2	2	-	-
	CO2	2	3	2	-	-	-	-	-	-	-	2	2	2	1
CO3	2	3	3	-	-	-	-	-	-	-	2	2	3	2	
CO4	2	3	3	-	-	-	-	-	-	2	2	2	2	2	
CO5	2	3	3	2	-	-	-	-	2	2	2	2	3	2	
CO6	2	3	3	2	-	-	-	-	2	2	2	2	2	2	
Mathematical Foundations of Computer Science	CO1	Define the fundamental discrete mathematical structures. (L1)													
	CO2	Apply logical reasoning to solve a variety of problems. (L3)													
	CO3	Understand the functions concepts and distinguish different types of functions. (L2)													
	CO4	Demonstrate the ability to solve problems using counting techniques and combinatory in the context of discrete probability. (L2)													
	CO5	Exposure of Graphs, their representations, and solving problems using Graph Theory. (L2)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	2	-	-	-	-	-	1	-	-	-	-	-	2	1
	CO2	3	3	2	-	-	-	-	-	2	-	-	-	2	2
	CO3	3	2	2	1	-	-	2	-	-	-	-	-	3	3
CO4	-	1	-	2	-	-	-	-	-	-	-	-	1	-	
CO5	3	2	2	-	-	-	3	-	3	-	-	-	-	-	

Digital Logic Design	CO1	Understand the basics of Digital electronics, number systems and digital codes. (L2)														
	CO2	Understand Boolean algebra to analyze the logic functions using k maps. (L2)														
	CO3	Analyze the design procedure for different combinational circuits. (L4)														
	CO4	Understand different synchronous sequential circuits and state machines. (L2)														
	CO5	Design different types of registers and counters. (L6)														
	CO6	Understand and design different programmable logic devices. (L6)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	1	
	CO2	2	2	-	-	-	-	-	-	-	-	-	-	2	1	
CO3	2	2	3	-	-	-	-	-	-	-	-	-	3	2		
CO4	2	2	-	-	-	-	-	-	-	-	-	-	2	1		
CO5	2	-	3	-	-	-	-	-	-	-	-	-	2	1		
CO6	2	-	2	-	-	-	-	-	-	-	-	2	2	1		
Python Programming	CO1	Comprehends how software easily to be build right out of the box. (L2)														
	CO2	Demonstrates the use of an interpreted language for problem solving through control statements including loops and conditionals. (L3)														
	CO3	Practice with data structures for quick programming solutions. (L2)														
	CO4	Demonstrates software building for real needs by breaking out code into reusable functions and modules. (L3)														
	CO5	Ensure and to show the software reliability through exception handling. (L3)														
	CO6	Use of python standard library for problem solving and Identifies the necessity of testing software. (L2)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	-	-	3	2	2	-	-	-	2	-	-	-	2	-	
	CO2	2	2	2	2	2	-	-	-	2	-	-	-	2	-	
CO3	2	2	2	2	3	-	-	-	2	-	-	-	2	-		
CO4	2	1	2	2	2	-	-	-	3	2	-	-	1	1		
CO5	-	3	3	2	3	-	-	-	3	2	-	-	2	1		
CO6	-	2	2	3	3	-	-	-	2	-	-	-	2	1		

Data Structures through C++Lab	CO1	Able to understand various applications of data structures. (L2)														
	CO2	Capable to identify the appropriate data structure for given problem. (L3)														
	CO3	Able to implement data structure algorithms through C++. (L3)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	1	3	2	3	1	-	-	-	-	-	-	1	1	2	
	CO2	2	2	3	1	2	-	-	-	-	-	-	1	1	2	
CO3	3	1	3	-	2	-	-	-	-	-	-	-	1	1		
Python Programming Lab	CO1	Comprehend how software can easily be build right out of the box. (L2)														
	CO2	Demonstrate the use of an interpreted language for problem solving through control statements including loops and conditionals. (L4)														
	CO3	Apply data structures for quick programming solutions.(L4)														
	CO4	Demonstrate software building for real needs by breaking out code into reusable functions and modules. (L4)														
	CO5	Produce software reliability through exception handling. (L5)														
	CO6	Use of python standard library for problem solving and Identifies the necessity of testing software.(L2)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO1	-	-	3	2	2	-	-	-	2	-	-	-	2	-		
CO2	2	2	2	2	2	-	-	-	2	-	-	-	2	-		
CO3	2	2	2	2	3	-	-	-	2	-	-	-	2	-		
CO4	2	1	2	2	2	-	-	-	3	2	-	-	1	1		
CO5	-	3	3	2	3	-	-	-	3	2	-	-	2	1		
CO6	-	2	2	3	3	-	-	-	2	-	-	-	2	1		

II-II

II-II															
Software Engineering	CO1	Infer the basic software engineering methods, processes, process models and their applications. (L2)													
	CO2	Apply the knowledge of requirements gathering methods to create an SRS document for a defined problem. (L3)													
	CO3	Comprehend various Software Design, UI design Techniques and apply that knowledge for a defined problem. (L2)													
	CO4	Analysis and implement concepts such as modularity, coding principles, Testing strategies and coding standards. (L4)													
	CO5	Infer the Software Reliability, Quality and CASE tools by practicing Ethics & Team Work. (L2)													
	CO6	Infer the maintenance process models and software reuse. (L2)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	-	-	3	2	2	-	-	-	2	-	-	-	2	-
	CO2	2	2	2	2	2	-	-	-	2	-	-	-	2	-
CO3	2	2	2	2	3	-	-	-	2	-	-	-	2	-	
CO4	2	1	2	2	2	-	-	-	3	2	-	-	1	1	
CO5	-	3	3	2	3	-	-	-	3	2	-	-	2	1	
CO6	-	2	2	3	3	-	-	-	2	-	-	-	2	1	
Java Programming	CO1	Understand basic principles of OOP while learning the syntactic elements of java for problem solving. (L2)													
	CO2	Construct basic object oriented entities and methods. (L4)													
	CO3	Use of class hierarchies, packages, interfaces, exceptions. (L2)													
	CO4	Analyze the behavior of Threads and I/O Stream in java. (L4)													
	CO5	Demonstrate event handling through Applets. (L4)													
	CO6	Construct simple GUI applications using AWT & SWINGS. (L6)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	1	3	3	-	-	-	-	-	-	-	-	-	3	3
	CO2	1	3	3	-	-	-	-	-	-	-	-	3	3	3
CO3	-	3	3	3	-	-	-	-	-	-	-	3	3	3	
CO4	-	3	3	3	-	-	-	-	-	-	-	2	1	3	
CO5	-	-	3	-	3	-	-	-	-	-	-	3	1	3	
CO6	-	-	3	-	3	-	-	-	-	-	-	3	-	3	

Advanced Data Structures	CO1	Describe external sorting algorithms like K – way merge sort. (L2)													
	CO2	Generate code for Dictionary like applications using Hash functions. (L4)													
	CO3	Apply Priority Queues to applications like Selection & Simulation problems. (L3)													
	CO4	Outline the need of balanced trees and respective operations. (L2)													
	CO5	Apply amortized analysis on multi way trees. (L3)													
	CO6	Relate algorithms in a variety of areas, including linear programming and duality, string matching, game-theory. (L4)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	3	2	3	1	-	-	-	-	-	-	-	-	3	1
	CO2	2	3	1	2	-	-	-	-	-	-	-	-	3	3
	CO3	1	3	1	2	-	-	-	-	-	-	-	-	3	3
CO4	2	2	1	1	-	-	-	-	-	-	-	-	2	2	
CO5	2	2	1	1	-	-	-	-	-	-	-	-	2	2	
CO6	3	2	3	1	-	-	-	-	-	-	-	-	3	1	
Computer Organization	CO1	Understand the modern computers with their processing units and also performance measurement of the computer system. (L2)													
	CO2	Understand the fundamentals of different addressing modes and instruction sets. (L2)													
	CO3	Compare different processors and their instruction types and addressing modes respectively. (L4)													
	CO4	Analyze the concepts of interfacing the I/O devices using different types of buses. (L4)													
	CO5	Understand the concepts of memory systems and their mapping functions. (L2)													
	CO6	Analyze and design processing unit and micro programmed control unit.(L4)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	1	1	1	-	-	2	2	-	2	2	2	-	2	2
	CO2	3	2	3	2	-	2	2	-	2	2	3	3	2	2
	CO3	3	1	2		-	3	2	-	2	2	2	-	2	3
CO4	1	1	2	1	-	2	2	-	2	2	2	1	1	2	
CO5	-	-	1	-	-	3	2	-	2	2	2	3	1	1	
CO6	1	2	3	3	-	2	2	-	2	2	2	1	1	2	

Java Programming Lab	CO1	Describe the installation process of java application. (L2)														
	CO2	Demonstrate how to write, compile and execute the java programs.(L2)														
	CO3	Develop the knowledge of OOP concepts.(L3)														
	CO4	Use of interfaces, threads and exceptions.(L3)														
	CO5	Use of Applets and events.(L3)														
	CO6	Create a simple GUI based application.(L6)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	-	2	-	-	-	-	-	-	-	-	-	2	2	-	
	CO2	3	3	3	-	-	-	-	-	-	-	-	2	3	2	
CO3	2	3	3	2	-	-	-	-	-	-	-	2	3	2		
CO4	2	3	3	3	-	-	-	-	-	-	-	2	3	2		
CO5	2	3	3	3	-	-	-	-	2	-	2	2	3	2		
CO6	2	3	3	3	-	-	-	-	2	-	2	2	2	2		
III-I																
Compiler Design	CO1	Comprehend the process involved in compilers, linkers, loaders, and phases of a compiler. (L2)														
	CO2	Comprehend various top down and bottom-up parsers. (L2)														
	CO3	Interpret syntax directed translation schemas. (L3)														
	CO4	Demonstrate various methods to generate the intermediate code. (L4)														
	CO5	Comprehend runtime environments and issues in generation of target code. (L4)														
	CO6	Demonstrate various code optimization techniques. (L4)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	2	2	1	-	-	-	-	-	-	-	-	-	2	2	
	CO2	2	1	3	2	-	-	-	-	-	-	-	-	3	3	
CO3	3	1	3	1	-	-	-	-	-	-	-	-	3	3		
CO4	1	-	2	2	-	-	-	-	-	-	2	1	3	3		
CO5	2	2	2	3	-	-	-	-	-	-	-	-	2	3		
CO6	1	2	-	2	-	-	-	-	-	-	2	1	2	3		

Unix Programming	CO1	Infer the importance of Unix operating system by learning its history, salient features and using basic utilities. (L2)														
	CO2	Use File and Directory related utilities aptly for operations, with a strong understanding on UNIX file system. (L2)														
	CO3	Implement various features of Shell for navigation, execution and customization as per requirements. (L3)														
	CO4	Create/develop scripts using grep, sed and awk to produce the desired effects in data processing. (L6)														
	CO5	Create shell scripts using the syntactic constructs of shell for producing the desired effects. (L6)														
	CO6	Use process management features of UNIX for job control at shell level.(L3)														
		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		
Object Oriented Analysis and Design using UML	CO1	Ability to find solutions to the complex problems using object oriented approach. (L3)														
	CO2	Build classes, responsibilities and states using UML notation. (L4)														
	CO3	Identify classes and responsibilities of the problem domain. (L3)														
	CO4	Identify basic Interactions, Use cases of the problem domain. (L3)														
	CO5	Understand advanced behavioral modeling using UML notation.(L2)														
	CO6	Understand components of the problem domain. (L2)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	2	2	3	2	2	2	3	-	2	2	2	-	2	2	
	CO2	2	2	3	1	2	2	2	-	2	2	3	-	2	2	
CO3	3	1	2	-	3	3	2	-	2	2	2	-	2	3		
CO4	1	3	3	2	2	2	3	-	2	2	2	-	1	2		
CO5	-	-	3	-	2	-	-	-	2	2	2	-	1	1		
CO6	-	2	2	-	-	2	-	-	2	2	2	-	1	2		

Design and Analysis of Algorithms	CO1	Infer asymptotic notations and analyze worst-case running times of algorithms. (L4)														
	CO2	Infer amortized analysis and different methods (aggregate analysis, accounting and potential method). (L2)														
	CO3	Infer the divide-and-conquer paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.(L4)														
	CO4	Infer the greedy paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems.(L3)														
	CO5	Infer the dynamic-programming paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems.(L4)														
	CO6	Infer the backtracking paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems.(L4)														
	CO7	Infer the branch and bound paradigm and its context. Recite algorithms that employ this paradigm. Apply this paradigm to design algorithms for apt problems.(L4)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	3	2	-	1	-	-	-	-	-	-	-	-	3	-	
CO2	2	3	-	-	-	-	-	-	-	-	-	-	1	3		
CO3	-	2	1	-	-	-	-	-	-	-	-	2	3	-		
CO4	3	-	-	-	-	-	-	-	-	-	-	2	-	3		
CO5	2	3	-	3	-	-	-	-	-	-	-	-	3	1		
CO6	-	2	3	3	-	-	-	-	-	-	-	2	-	2		
CO7	3	-	3	1	-	-	-	-	-	-	-	-	3	3		
Software Testing Methodologies	CO1	Infer the fundamentals of software testing by exploring one of the primary structural testing strategies, the Flow graph and Path based testing. (L2)														
	CO2	Implement rigorous structural and functional testing techniques by using Dataflow and Transaction Flow Testing methods. (L3)														
	CO3	Apply domain and path reduction techniques while performing comprehensive testing of applications.(L3)														
	CO4	Design test cases using BNF grammar, decision table and KV Charts. (L6)														
	CO5	Implement transition testing using state graphs and matrix based testing where ever applicable. (L3)														
	CO6	Explore various automation testing tools, choose apt tool as per the requirement application demand and perform testing. (L4)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO1	2	1	2	-	-	-	-	-		-	-	-	2	-		
CO2	-	2	2	-	-	-	-	-	1	-	-	-	2	-		
CO3	1	2	2	-	-	-	-	-	1	-	-	-	2	-		
CO4	1	2	2	-	-	-	-	-	2	-	-	-	2	-		
CO5	1	2	2	-	-	-	-	-	1	-	-	-	2	-		
CO6	-	-	2	-	2	-	-	-	2	-	-	-	2	2		

Open Elective - Artificial Intelligence	CO1	Understand a given problem in the language. (L2)														
	CO2	Represent which AI methods may be suited to solving a given problem. (L2)														
	CO3	Understand framework of different AI methods (eg., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc). (L2)														
	CO4	Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a problem. (L4)														
	CO5	Understand Basic AI algorithms. (L2)														
	CO6	Construct Implement basic AI algorithms (eg., standard search algorithms or dynamic programming). (L6)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	2	-	1	-	-	-	-	-	-	-	-	1	-	2	
	CO2	3	2	1	-	-	-	-	-	-	-	-	-	2	1	
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2	1		
CO4	3	2	1	-	-	-	-	-	-	-	-	-	2	1		
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-		
CO6	2	1	1	-	-	-	-	-	-	-	-	2	2	3		
Network Programming Lab	CO1	Developing the C/S applications using Sockets API. (L6)														
	CO2	Implementing the Computer Network related routing, encryption algorithms in java. (L6)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	2	
CO2	3	2	2	-	-	-	-	-	-	-	-	-	2	1		
Software Testing Lab	CO1	To Design test cases using White box testing techniques to solve the problems.(L6)														
	CO2	Take any system and Analyze its system specifications and report the various bugs. (L4)														
	CO3	Design test cases for any known application (L6)														
	CO4	Create a test plan document for any application (L6)														
	CO5	Understand Testing Tool and its implementation like Win Runner and selenium (L2)														
	CO6	Apply Win Runner and selenium testing tool implementation in any real time applications (L3)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	2	2	2	-	-	-	-	-	2	-	2	-	2	1		
CO2	2	2	2	-	-	-	-	-	2	-	2	-	2	1		
CO3	2	2	2	-	1	-	-	-	2	-	2	-	2	1		
CO4	-	2	2	-	2	-	-	-	2	-	2	-	2	1		
CO5	-	-	-	-	3	-	-	-	2	-	2	-	2	1		
CO6	-	1	1	-	3	-	-	-	2	-	3	-	2	1		

Data Warehousing and Mining Lab	CO1	Demonstrates Data Pre-processing Techniques. (L3)													
	CO2	Demonstrates and Discovers Knowledge using Classification Methods. (L3)													
	CO3	Demonstrates and Discovers Knowledge using Association Methods. (L3)													
	CO4	Demonstrates and Discovers Knowledge using Clustering Methods. (L3)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	-	3	1	1	-	3	-	-	-	-	-	-	-	3
	CO2	-	3	1	1	-	3	-	-	-	-	-	-	-	3
	CO3	-	3	1	1	-	3	-	-	-	-	-	-	-	3
	CO4	-	3	1	1	-	3	-	-	-	-	-	-	-	3
IV-I															
Cryptography and Network Security	CO1	Identify security threats, services and solve modular and linear congruence equations. (L2)													
	CO2	Distinguish stream ciphers, block ciphers and Algebraic Structures. (L4)													
	CO3	Apply number theory in public key cryptographic algorithms. (L3)													
	CO4	Illustrate Hash Algorithms and Digital Signatures for Online Authentication. (L3)													
	CO5	Analyze various mail security protocols and e-commerce transaction protocols. (L4)													
	CO6	Protect the system by firewall and understand various password protection mechanisms. (L2)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	3	2	-	2	-	-	-	2	--	-	2	-	1	-
	CO2	2	2	1	-	2	-	1	-	-	2	2	-	2	-
CO3	3	2	1	-	1	-	-	3	-	-	-	-	-	3	
CO4	2	1	-	-	1	-	-	2	1	1	2	1	2	1	
CO5	-	-	-	-	-	-	-	-	-	-	2	2	2	2	
CO6	1	-	-	-	2	1	-	3	-	-	2	2	2	2	
Software Architecture & Design Patterns	CO1	Understand the architecture, creating it and moving from one to any, different structural patterns. (L2)													
	CO2	Analyze the architecture and build the system from the components. (L4)													
	CO3	Design creational patterns. (L6)													
	CO4	Design structural patterns. (L6)													
	CO5	Learn about behavioral patterns. (L1)													
	CO6	Do a case study in utilizing architectural structures and design patterns. (L6)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	3	3	--	--	--	--	--	-	--	--	--	--	3	--
	CO2	2	--	2	-	2	--	--	--	--	--	--	--	2	2
CO3	2	2	2	2	2	--	--	1	--	--	--	2	2	2	
CO4	1	3	3	-	-	--	--	--	--	--	--	2	2	2	
CO5	2	2	2	2	2	--	--	1	--	--	--	2	2	2	
CO6	2	2	2	2	2	--	--	1	--	--	--	2	2	2	

Web Technologies	CO1	Understand Basic HTML tags and able to create web pages. (L2)														
	CO2	Create web pages using XHTML and Cascading Styles sheets. (L6)														
	CO3	Understand web services using AJAX. (L2)														
	CO4	Create client-server applications using PHP. (L6)														
	CO5	Understand PERL and Ruby programming. (L2)														
	CO6	Create web application to access server Database. (L6)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	1	1	1	-	-	-	-	-	-	-	2	3	1	2	
	CO2	2	-	1	-	-	-	-	-	-	-	2	2	2	1	
CO3	2	-	2	-	-	-	-	-	-	-	2	2	2	2		
CO4	1	2	1	-	-	-	-	-	-	-	2	3	1	2		
CO5	2	-	2	-	-	-	-	-	-	-	2	2	2	2		
CO6	1	1	2	-	-	-	-	-	-	-	2	3	2	2		
Managerial Economics and Financial Analysis	CO1	Understanding basics of Managerial Economics and concepts of demand. (L2)														
	CO2	Remembering the concepts of production & cost and applying breakeven analysis to determine breakeven point. (L1)														
	CO3	Analyzing different market structures to determine pricing. (L4)														
	CO4	Evaluating different forms of business organization. (L5)														
	CO5	Applying accounting principles to know the financial position of the business organization. (L3)														
	CO6	Create awareness about capital budgeting method to determine project worth. (L2)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	-	-	-	-	-	-	-	-	-	-	2	2	3	2	
	CO2	-	2	-	-	-	-	-	-	-	-	2	2	3	3	
CO3	-	-	-	-	-	-	-	-	-	-		2	3	2		
CO4	-	-	-	-	-	3	2	-	-	-	2	2	3	3		
CO5	-	-	2	2	-	-	-	-	-	2	2	2	3	2		
CO6	-	-	-	2	2	-	-	-	-	-	3	2	3	3		
Target		2	2	2	2	3	2			2	2.2	2	3	2.5		

Elective-I (Big Data Analysis)	CO1	Applying Java concepts required for developing map reduce programs. (L6)														
	CO2	Deriving business benefits from structured and unstructured data. (L6)														
	CO3	Preparing for data summarization, query, and analysis. (L4)														
	CO4	Applying data modeling techniques to large data sets. (L3)														
	CO5	Creating applications for Big Data analytics. (L6)														
	CO6	Building a complete business data analytic solution. (L6)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	2	
	CO2	2	-	2	-	2	-	-	-	-	-	-	-	3	2	
CO3	2	2	2	2	2	-	-	1	-	-	-	2	1	2		
CO4	1	3	3	-	-	-	-	-	-	-	-	2	2	2		
CO5	2	2	2	2	2	-	-	1	-	-	-	2	2	1		
CO6	2	2	2	2	2	-	-	1	-	-	-	2	2	2		
Elective-II(Cloud Computing)	CO1	Explains the key dimensions of the challenge of Cloud Computing. (L2).														
	CO2	Analyzes the economics, financial and technological implications for selecting cloud computing for own organization. (L4)														
	CO3	Analyzes the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications. (L4)														
	CO4	Evaluation of own organizations' needs for capacity building and training in cloud computing-related IT areas. (L5)														
	CO5	Describes about the cloud resources management and various scheduling in the cloud. (L2)														
	CO6	Explains about the storage concepts in Cloud. (L2)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	1	1	-	-	-	-	1	-	-	-	-	-	1	-		
CO2	2	2	1	-	-	-	-	-	-	-	-	-	-	-		
CO3	2	2	2	-	-	-	1	-	-	-	-	-	1	1		
CO4	2	1	1	-	-	-	-	-	-	1	-	-	1	-		
CO5	1	1	-	-	-	-	-	-	1	-	-	-	-	1		
CO6	2	2	1	-	1	-	-	-	-	-	1	-	1	1		

Software Architecture & Design Patterns Lab	CO1	Understand interrelationships, principles and guidelines governing architecture and evolution over time. (L2)														
	CO2	Analyze the architecture and build the system from the components. (L4)														
	CO3	Prepare creational patterns that deal with object creation mechanisms. (L3)														
	CO4	Prepare structural patterns that ease the design by identifying a simple way to realize relationships among entities. (L3)														
	CO5	Learn behavioral patterns that identify common communication patterns between objects and realize these patterns. (L1)														
	CO6	Classify various case studies. (L4)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	3	2	1	-	-	-	-	-	-	-	-	-	3	2	
	CO2	2	3	1	-	-	-	-	-	-	-	-	-	3	2	
	CO3	1	2	3	-	2	-	-	-	-	-	-	-	3	3	
	CO4	1	2	3	-	2	-	-	-	-	-	-	-	3	3	
	CO5	3	2	1	-	-	-	-	-	-	-	-	-	3	2	
CO6	1	2	3	-	-	-	-	-	-	-	-	-	3	2		
Web Technologies Lab	CO1	Create web pages using XHTML and Cascading Styles sheets. (L6)														
	CO2	Build dynamic web pages using Javascript and PHP. (L6)														
	CO3	Develop web application to access Database. (L6)														
	CO4	Develop applications through Ruby and PERL. (L6)														
	CO5	Develop an interactive web application. (L6)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	2	1	1	-	-	-	-	-	-	-	2	3	1	1	
	CO2	2	-	1	-	-	-	-	-	-	-	2	2	1	2	
	CO3	2	-	2	-	-	-	-	-	-	-	2	2	2	2	
	CO4	1	2	1	-	-	-	-	-	-	-	2	3	2	2	
	CO5	2	-	2	-	-	-	-	-	-	-	2	2	2	2	

IV-II

IV-II															
Distributed Systems	CO1	Able to understand the nature of distributed systems and the common design problems, issues in the descriptive models. (L2)													
	CO2	Able to acquire knowledge on the characteristics of protocols for inter-process communication in a distributed environment and to support communication patterns. (L2)													
	CO3	Able to describe the features and applications of programming models in distributed systems.(L2)													
	CO4	Able to describe the operating system supports the middleware layer in providing invocations upon shared resources.(L2)													
	CO5	Able to understand the distributed file systems architectures and implementations, how a set of processes can coordinate their actions. (L2)													
	CO6	Able to understand the mechanisms for concurrency control and the role of replication in distributed environment. (L2)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	2	2	-	3	-	-	-	-	2	-	-	2	2	2
	CO2	2	3	-	3	-	-	-	-	2	-	-	2	1	1
CO3	2	2	-	2	-	-	-	-	3	-	-	2	1	3	
CO4	2	2	-	3	-	-	-	-	2	-	-	2	3	2	
CO5	2	2	-	1	-	-	-	-	2	-	-	2	2	1	
CO6	2	1	-	3	-	-	-	-	1	-	-	2	1	2	
Management Science	CO1	Understanding basics of management and organization. (L2)													
	CO2	Remembering principles of management and applying the concepts of work study and SQC to improve productivity. (L3)													
	CO3	Analyze the functions of HRM and marketing. (L4)													
	CO4	Applying PERT & CPM techniques to solve project management problems. (L3)													
	CO5	Evaluating SWOT Analysis for formulating and implementing strategies. (L5)													
	CO6	Creating awareness about modern or contemporary management practices. (L2)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	-	-	-	-	-	-	-	-	2	2	2	2	-	2
	CO2	-	-	-	-	-	-	-	-		2	2	2	-	2
CO3	-	-	-	-	-	-	-	-	2	3	2	2	-	2	
CO4	-	-	2	-	-	-	-	-	-	2	3	2	-	2	
CO5	-	-	-	-	-	-	-	-	-	2	2	2	-	2	
CO6	-	-	-	-	2	-	-	-	-	2	2	2	-	2	

Machine Learning	CO1	Understand the fundamental issues and challenges of machine learning - data, model, tasks and features. (L2)														
	CO2	Understand the underlying process of Classification – Linear, Binary and Multi class classifications. (L2)														
	CO3	Apply concept learning on algorithms like Decision trees, Association rules. (L3)														
	CO4	Apply linear models like linear regression and distance based models like KNN, SVM for supervised and unsupervised learning problems. (L3)														
	CO5	Implement ensembling algorithms.(L3)														
	CO6	Understand concept behind neural networks for learning non-linear functions.(L2)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	2	2	-	-	-	-	-	-	-	-	-	1	1	2	
	CO2	1	2	-	-	-	-	-	-	-	-	-	1	1	2	
CO3	2	2	2	-	-	-	-	-	-	-	-	-	1	2		
CO4	2	2	2	-	-	-	-	-	-	-	-	-	1	2		
CO5	-	2	-	-	-	-	-	-	-	-	-	1	1	2		
CO6	1	2	2	-	-	-	-	-	-	-	-	2	1	2		
Elective-III (Artificial Neural Networks)	CO1	Illustrate basic neural network architecture. (L4)														
	CO2	Compare different learning algorithms. (L4)														
	CO3	Develop classification algorithms using Preceptron as a patter classifier.(L3)														
	CO4	Design single and multi-layer feed forward neural networks.(L6)														
	CO5	Develop radial basis function networks.(L6)														
	CO6	Design of classification technique by using SVM. (L3)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
	CO1	2	1	1	1	1	1	-	-	-	-	1	1	2	2	
	CO2	2	2	2	2	2	2	-	-	-	-	1	1	2	2	
CO3	2	2	2	2	2	2	-	-	-	-	1	1	2	2		
CO4	2	2	2	2	3	2	-	-	-	-	2	-	2	3		
CO5	2	2	3	3	2	2	-	-	-	-	2	-	2	3		
CO6	2	2	2	2	2	2	-	-	-	-	2	-	3	3		
Seminar	CO1	Access information in a variety of ways, by using library collections and services and other search tools and databases. (L2)														
	CO2	Demonstrate effective writing skills by employing various techniques of academic writing. (L4)														
	CO3	Understand the role that effective presentations have in public/professional contexts and gain experience in formal/ informal presentation.(L2)														
	CO4	Demonstrate the ability to collaborate with others as they work on reading, writing, speaking, researching skills. (L4)														
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3	2	-	3	-	-	-	-	-	-	-	3	2	2		
CO2	-	-	-	-	-	-	-	2	3	3	-	2	-	-		
CO3	3	-	-	-	-	-	-	-	-	-	-	2	3	-		
CO4	2	-	-	2	2	-	-	-	-	2	-	3	2	-		

Project	CO1	Able to collaborate with team members in analyzing the requirements of the project to be developed. (L2)													
	CO2	Able to generate necessary design specifications and documents for the chosen project.(L6)													
	CO3	Able to gain proper domain and language knowledge to implement/code the application.(L3)													
	CO4	Able to test and deploy the project after implementation.(L6)													
	CO5	Able to demonstrate the project comprehensively with necessary tools.(L2)													
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	3	3	2	3	3	2	3	2	3	2	2	2	3	-
	CO2	1	3	3	2	2	-	3	-	-	3	3	3	3	2
	CO3	1	3	2	2	-	-	3	-	2	3	1	1	2	3
CO4	-	3	3	2	1	1	2	-	1	1	2	-	2	2	
CO5	-	2	1	2	1	2	3	-	-	2	2	-	3	1	

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