

**Department of Information Science & Engineering****Course Outcomes and CO-PO-PSO Articulation Matrix****Batch 2016-20****Semester-I/II**

<b>Subject: Programming in C &amp; Data Structures</b>												<b>Subject Code: 15PCD13/23</b>			
<b>Course Outcomes</b>															
<b>C103.1</b>	Achieve Knowledge on computers and basic concepts of networks.														
<b>C103.2</b>	Apply the basic principles of design and development of C Programming.														
<b>C103.3</b>	Design and development of modular programming skills.														
<b>C103.4</b>	Demonstrate Arrays and Strings in C programming concepts.														
<b>C103.5</b>	Illustrate the basic concepts of Structures, unions, Pointers and Preprocessor Directives.														
<b>CO-PO-PSO Mapping</b>															
<b>COs</b>	<b>POs</b>												<b>PSOs</b>		
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>C103.1</b>	3	2	2										2		
<b>C103.2</b>	3	3	2	3									2		
<b>C103.3</b>	2	3	3	2	2								2		
<b>C103.4</b>	2	3	3	2									2		
<b>C103.5</b>	3	2	2	2									2		
<b>C103</b>	<b>2.6</b>	<b>2.6</b>	<b>2.6</b>	<b>2.25</b>	<b>2</b>								<b>2</b>		
<b>Subject: Computer Programming Lab</b>												<b>Subject Code: 15CPL16/26</b>			
<b>Course Outcomes</b>															
<b>C106.1</b>	Understand the knowledge on simple applications in C using conditional statements and looping concepts														
<b>C106.2</b>	Demonstrate and implement applications using arrays and strings														
<b>C106.3</b>	Apply knowledge on functions, recursions, pointers and structures.														
<b>CO-PO-PSO Mapping</b>															
<b>COs</b>	<b>POs</b>												<b>PSOs</b>		
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>C106.1</b>	3	2	2	2									3		
<b>C106.2</b>	3	3	2	2									3		
<b>C106.3</b>	3	3	3	3	1								3		
<b>C106</b>	<b>3.0</b>	<b>2.67</b>	<b>2.33</b>	<b>2.33</b>	<b>1.0</b>								<b>3</b>		

**Semester-III**

<b>Subject: Engineering Mathematics-III</b>											<b>Subject Code:15MAT31</b>				
<b>Course Outcomes</b>															
<b>C201.1</b>	Know the use of periodic signals and Fourier series to analyze circuits and systems communication.														
<b>C201.2</b>	Explain the general linear system theory for continuous - time signals and digital signal processing using the Fourier transform and z-transform.														
<b>C201.3</b>	Employ appropriate numerical methods to solve algebraic and transcendental equations.														
<b>C201.4</b>	Apply Green's theorem, Divergence theorem and Stokes theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems.														
<b>C201.5</b>	Determine the external of functional and solve the simple problems for calculus of variations. Utilize the concepts of functional and their variations in the applications of communication systems, decision theory, synthesis and optimization of digital circuits.														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C201.1	2	2													
C201.2	2	2													
C201.3	3	3													
C201.4	3	3													
C201.5	3	2													
C201	2.6	2													

<b>Subject: ANALOG AND DIGITAL ELECTRONICS</b>											<b>Subject Code:15CS32</b>				
<b>Course Outcomes</b>															
<b>C202.1</b>	Gain the knowledge about the JFETs and MOSFETs, Operational Amplifier circuits and their applications and its characteristics in the circuit configuration.														
<b>C202.2</b>	Implement the expressions in combinational logic circuits, simplification techniques using Karnaugh-Maps,Quine-Mcclusky technique and also study the related applications.														
<b>C202.3</b>	Analyze and discuss Operation of Decoders, Encoders, Multiplexers, Adders and Subtractors.														
<b>C202.4</b>	Ability to explain the significance of latches, flip-flops and designing Registers for different scenarios.														
<b>C202.5</b>	Ability to recognize the various complicated issues in respect to performance of Synchronous and Asynchronous counters in Sequential Circuits and design of A/D & D/A converters.														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C202.1	3	2	2										2		
C202.2	2	2		2									3		
C202.3	1			1	2								3		
C202.4	2		3	2	1								2		

C202.5	2	2		2									2		
C202	2	2	2.5	1.75	1.5								2.4		

<b>Subject: Data Structures</b>	<b>Subject Code: 15CS33</b>
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<b>Course Outcomes</b>	
<b>C203.1</b>	Able to understand fundamentals of C language and definition of data structures
<b>C203.2</b>	Analyze and demonstrate the stacks, queues operations and its applications
<b>C203.3</b>	Create data storage using linked lists concepts and demonstrate its applications
<b>C203.4</b>	Construct trees data structures and perform operations such as traversals, searching and expression evaluation.
<b>C203.5</b>	Use graph based data structures approach for storing, sorting ,searching of data and understand file handling basics

<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C203.1	2	2	2										1		
C203.2	2	2	2										2		
C203.3	3	2	3		2								3		
C203.4	2	2	3	2									2		
C203.5	1	2	3	3	2								2		
C203	2	2	2.6	2.5	2	1							2		

<b>Subject: COMPUTER ORGANIZATION</b>	<b>Subject Code: 15CS34</b>
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<b>Course Outcomes</b>	
<b>C204.1</b>	Explain the basic organization of a computer system.
<b>C204.2</b>	Examine the importance of I/O organization and interrupts in computer system
<b>C204.3</b>	Demonstrate functioning main memory and importance of virtual memory and secondary storage.
<b>C204.4</b>	Illustrate hardwired control and micro programmed control. pipelining, embedded and other computing systems
<b>C204.5</b>	Design and analyze simple arithmetic and logical units.

<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C204.1	3	3											2		
C204.2	2		3										2		
C204.3		3											2		

C204.4			3										2		
C204.5		2	3										2		
C204	2.5	2.6	3										2		

<b>Subject: UNIX SHELL PROGRAMMING</b>													<b>Subject Code: 15CS35</b>		
<b>Course Outcomes</b>															
C205.1	Understand the UNIX architecture, its basic features and types of files supported by UNIX.														
C205.2	Interpret UNIX Commands, Shell basics, and shell environments														
C205.3	Design and develop shell programming, Wild Card for Pattern Matching and Regular Expression														
C205.4	Understand the concepts of UNIX Processes and few system calls.														
C205.5	Design and develop Perl scripting.														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C205.1	2				3	3						3	2		
C205.2	3					3	3					2	2		
C205.3	3							2		3		3	2		
C205.4	2	2				2		2				3	2		
C205.5	2	2	2	2			3	3		2		2	2		
C205	2.5	2	2	2	3	3.3	3	2.3		2.5		2.6	2		

<b>Subject: Discrete Mathematical Structures</b>													<b>Subject Code: 15CS36</b>		
<b>Course Outcomes</b>															
C206.1	Verify the correctness of an argument using propositional and predicate logic and truth table.														
C206.2	Demonstrate the ability to solve problems using counting techniques and combinatorics in the context of discrete probability.														
C206.3	Solve problems involving recurrence relations and generating functions.														
C206.4	Construct proofs using direct proof, proof by contraposition, proof by contradiction, proof by cases, and mathematical induction.														
C206.5	Explain and differentiate graphs and trees.														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3

C206.1	3	2										2	3		
C206.2	3	3	2	3									2		
C206.3	2	3	3	2									3		
C206.4	2	3	3	2								1	2		
C206.5	3	2													
C206	2.6	2.6	2.6	2.3								1.5	2.5		

<b>Subject: ANALOG AND DIGITAL ELECTRONICSLABORATORY</b>	<b>Subject Code: 15CSL37</b>
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**Course Outcomes**

C207.1	Capable to Use of various Electronic devices like cathode ray oscilloscope, signal generators, digital trainer kit, multimeter and components like resistor, capacitor, opamp and integrated circuit.
C207.2	Design and demonstrate various combinational logic circuits
C207.3	Proficient to design and demonstrate various types of counters and Registers using Flip-flops
C207.4	competent to use of simulation package to design analog and digital circuits.
C207.5	Understand the working and implementation of ALU
C207.1	Capable to Use of various Electronic devices like cathode ray oscilloscope, signal generators, digital trainer kit, multimeter and components like resistor, capacitor, opamp and integrated circuit.

**CO-PO-PSO Mapping**

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C207.1	1		3						1				2		
C207.2			3	1					1	2			2		
C207.3			2	2					2				2		
C207.4	2				2								2		
C207.5	2		2										2		
C207	1.67		2.5	1.5	2				2	2			2		

<b>Subject: Data Structures Laboratory</b>	<b>Subject Code: 15CSL38</b>
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**Course Outcomes**

C208.1	Able to implement linear and non linear data structures and understand its application.
C208.2	Create and analyze searching algorithm in data structures.
C208.3	Demonstrate data structure for solving real world problem.

**CO-PO-PSO Mapping**

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C208.1	1	2											1		
C208.2		3	3											2	
C208.3			3											2	
C208	1	2.5	3										1	2	

**Semester-IV**

<b>Subject: Engineering Mathematics-IV</b>	<b>Subject Code: 15MAT41</b>
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**Course Outcomes**

<b>C201.1</b>	Solve first and second ordinary differential equations arising in flow problems using single step and multistep numerical methods.
<b>C201.2</b>	Solve problems of quantum mechanics employing Bessel's function relating to cylindrical polar coordinate systems and Legendre's polynomials relating to spherical polar coordinate systems.
<b>C201.3</b>	Understand the analyticity, potential fields, residues and poles of complex potentials in field theory and electromagnetic theory Describe conformal and bilinear transformation arising in aero foil theory fluid flow visualization and image processing
<b>C201.4</b>	Solve problems on probability distributions relating to digital signal processing, Determine joint probability distributions and stochastic matrix connected with multivariate correlation problems for feasible random events.
<b>C201.5</b>	Draw the validity of the hypothesis proposed for the given sampling distribution in accepting or rejecting the hypothesis, Define transition probability matrix of a Markov chain and solve problems related to discrete parameter random process.

**CO-PO-PSO Mapping**

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C201.1	3	2													
C201.2	3	1													
C201.3	2	1													
C201.4	3	3													
C201.5	3	3													
C201	2.8	2													

<b>Subject: SOFTWARE ENGINEERING</b>	<b>Subject Code: 15CS42</b>
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**Course Outcomes**

<b>C210.1</b>	Understand software Engineering methods, software process models, ethical and professional
<b>C210.2</b>	Analyze various system models in design and implementation
<b>C210.3</b>	Evaluate software to verify and validate using various testing methods
<b>C210.4</b>	Create a quality project plan for software development.
<b>C210.5</b>	Apply advanced software development methods like agile and extreme programming for better

software development practice															
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C210.1	2	2											2		
C210.2		2												1	
C210.3		2											2		
C210.4			2		2								2		
C210.5					2									1	
C210	2	2	2		2								2	1	

<b>Subject: Design and analysis of Algorithms</b>										<b>Subject Code: 15CS43</b>					
Course Outcomes															
C211.1	Describe computational solution to well known problems like searching, sorting graph problems														
C211.2	Describe computational solution to graph problems, numerical, geometrical, string processing etc.														
C211.3	Estimate the computational complexity (time complexity) of different algorithms.														
C211.4	Design an algorithm using appropriate design strategies for problem solving.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C211.1	2	3	3	2					1				2		
C211.2	2	3	3	2					1				2		
C211.3	2	3	3	2					1				2		
C211.4	2	3	3	2					1				2		
C211	2	3	3	2					1				2	0	

<b>Subject: Microprocessors and Microcontrollers</b>										<b>Subject Code: 15CS44</b>					
Course Outcomes															
C212.1	Differentiate between microprocessors and microcontrollers.														
C212.2	Design and develop assembly language code to solve problems.														
C212.3	Gain the knowledge for interfacing various devices to x86 family and ARM processor.														
C212.4	Demonstrate design of interrupt routines for interfacing devices.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3

C212.1	3		2	2			1					1		
C212.2	3	3	3	3	2								2	
C212.3	2	3	3	2	3	3	2					2	3	
C212.4	2	3	3		2								2	
C212	2.5	3.0	2.75	2.3	2.3	3	1.5					1.5	2.4	

<b>Subject: OBJECT ORIENTED CONCEPTS</b>	<b>Subject Code: 15CS45</b>
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<b>Course Outcomes</b>	
C213.1	Explain the object-oriented concepts using C++ and JAVA
C213.2	Develop computer programs to solve real world problems in C++.
C213.3	Develop computer programs to solve real world problems by using multithreading and exception handling, event handling in Java.
C213.4	Develop simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles using Applets and swings.

<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C213.1	2	3	2										1		
C213.2	2		2	1									1		
C213.3	3	2		1									1		
C213.4			2		2	2							1		
C213	2.33	2.5	2	1	2	2							1		

<b>Subject: Data Communication</b>	<b>Subject Code: 15CS46</b>
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<b>Course Outcomes</b>	
C214.1	Identify the different types of network topologies, layers functionalities, encoding schemes
C214.2	Compare and contrast conversion techniques (A/D, D/D), bandwidth utilization methods and types of switched networks
C214.3	Analyze error detection techniques; understand working of Data Link layer protocols.
C214.4	Examine MAC Protocols and Ethernet technologies
C214.5	Understand basics of wireless networks, internetworking principles and Internet protocols IPV4, IP6 and ICMP operations

<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C214.1	1	1											2		



C214.2	2	3														2		
C214.3	2	3														3		
C214.4	2	2														3		
C214.5	2	2														3		
C214	1.8	2.2														2.6		

<b>Subject: Design and analysis of Algorithms Lab</b>													<b>Subject Code: 15CSL47</b>		
<b>Course Outcomes</b>															
C215.1	Analyze the running time of asymptotic notations														
C215.2	Develop algorithms for sorting, searching , graph and string matching problems														
C215.3	Identify and apply the concept of computations intractability														
C215.4	Acquire knowledge in NP hard and complete problems.														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C215.1	2	3	3	2	3				1				2		
C215.2	2	3	3	2	3				1				2		
C215.3	2	3	3	2	3				1				2		
C215.4	2	3	3	2	3				1				2		
C215	2	3	3	2	3				1				2		

<b>Subject: Microprocessors and Microcontrollers Lab</b>													<b>Subject Code: 15CSL48</b>		
<b>Course Outcomes</b>															
C216.1	Apply and Learn 80x86 instruction sets by gaining the knowledge of how assembly language works.														
C216.2	Demonstrate, Design and implement assembly programs in 80x86 assembly language														
C216.3	Analyze the functioning of hardware devices and interfacing them to x86family														
C216.4	Evaluate and Choosing x86 processors for various kinds of applications and execute interfacing devices with 8086/ARM kit.														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C216.1	2	2	2					1					2		
C216.2		2	1	2									2		
C216.3			2		2				2				3		
C216.4			3	2	2					1			3		
C216	2.0	2.0	2.0	2.0	2.0			1.0	2.0	1.0			2.5		

Subject: Management and Entrepreneurship										Subject Code: 15CS51					
Course Outcomes															
C301.1	Able to find problems worth solving, advance their skills in customer development, customer validation, competitive analysis and iteration while utilizing design thinking and process tools to evaluate in real world problems and project														
C301.2	Identify secure customers, stakeholders and team members through networks, primary customer research and competitive and industry analysis in order to prioritize and pursue an initial target in real world projects														
C301.3	Effectively combine their understanding of technology and entrepreneurship in a cross disciplinary fashion to identify and develop attractive opportunities within their field of experience														
C301.4	Utilize the resources available effectively through ERP														
C301.5	Make use of IPRs and institutional support in entrepreneurship														

CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C301.1	2	2	2										2	2	
C301.2				2					3			3	1		2
C301.3					2							1		2	
C301.4										3	3		2	2	
C301.5						2	2	3					2	2	
C301	2	2	2	2	2	2	2	3	3	3	3	1	2	2	

Subject: COMPUTER NETWORKS										Subject Code: 15CS52					
Course Outcomes															
C302.1	Explain principles of application layer protocols														
C302.2	Recognize transport layer services and infer UDP and TCP protocols														
C302.3	Illustrate the working of Routing Algorithms in network layer														
C302.4	Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard														
C302.5	Examine Multimedia Network Applications with case studies														

CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C302.1	2	2											2		
C302.2	2	2											2		
C302.3	2	2											2		
C302.4	2	2											2		
C302.5	2	2											2		
C302.1	2	2											2		

Subject: Data Base Management Systems												Subject Code: 15CS53			
Course Outcomes															
C303.1	Illustrate the database design for applications														
C303.2	Make use of ER Diagrams and Normalization techniques in DB Applications														
C303.3	Apply concurrency control and recovery mechanism for data base problems														
C303.4	Apply various concepts in Query processing.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C303.1	3	3											2		
C303.2	2	3		2		3							2		
C303.3	3	3	3			2							2		
C303.4	2	2											1		
C303	2.5	2.6	3	2		2.5							1.75		

Subject: Automata Theory and Computability												Subject Code: 15CS54			
Course Outcomes															
C304.1	Understanding the fundamentals of computation theories, Concepts and techniques in automata and their formal languages.														
C304.2	Compare the Different models of Computation like Deterministic, Non-deterministic and Software models.														
C304.3	Describe and Design Grammars and Automata for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.														
C304.4	Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness.														
C304.5	Formulate a problem with respect to different models of Computation.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C304.1	2	2	1	3	-	-	-	-	-	-	-	-	2		
C304.2	2	3	2	2	-	-	-	-	-	-	-	-	2		
C304.3	2	3	2	1	-	-	-	-	-	-	-	-	2		
C304.4	3	2	2	2	-	-	-	-	-	-	-	-	2		
C304.5	2	2	2	2	-	-	-	-	-	-	-	-	2		
C304	2.2	2.4	1.8	2.0									2.0		

Subject: Advance JAVA and J2EE											Subject Code: 15CS553				
Course Outcomes															
C305.1	Understand Java Concepts like enumerations and strings in developing modular programs														
C305.2	Illustrate use of collection framework in developing modular programs.														
C305.3	Understand string handling mechanism														
C305.4	Develop web applications														
C305.5	Illustrate use of database connectivity														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C305.1	1	1											1		
C305.2	2	1	1										1		
C305.3		2	1	1									1		
C305.4		2	2		2				2				2		
C305.5		2	2		2				2				2		
C305	1.5	1.6	1.5	1	2				2				1.4		

Subject: DOTNET FRAMEWORK FOR APPLICATION											Subject Code: 15CS564				
Course Outcomes															
C306.1	Build applications on Visual Studio .NET platform by understanding the syntax and semantics of C#.														
C306.2	Demonstrate Object Oriented Programming concepts in C# programming language.														
C306.3	Design custom interfaces and leverage the available built-in interfaces in building complex applications.														
C306.4	Illustrate the use of generics and collections in C#.														
C306.5	Compose queries to query in-memory data.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C306.1	1		3		2									2	
C306.2	1	2											2		
C306.3		2	3	2									2		
C306.4		2	3										2		
C306.5		2	3										2		
C306	1	2	3	2	2								2	2	

Subject: Cloud Computing											Subject Code: 15CS565				
Course Outcomes															
C307.1	Explain the concepts and terminologies of cloud computing														
C307.2	Demonstrate Cloud framework and technologies														
C307.3	Define data intensive computing														
C307.4	Demonstrate cloud applications														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C307.1	3		1	1									2		
C307.2	1		2		3								2		
C307.3	2				1								3		
C307.4	1		2										2		
C307	1.75		1.66	1	2								2.25		

Subject: COMPUTER NETWORKS LABORATORY											Subject Code: 15CSL57				
Course Outcomes															
C308.1	Understand functionality of different topologies and analyse the network performance varying different parameters														
C308.2	Apply mathematical foundations to solve computational problems in computer networking														
C308.3	Demonstrate and interpret the working of routing algorithms														
C308.4	Compare and analyze transport layer protocols to evaluate congestion in the network														
C308.5	Demonstrate and interpret the working of wireless networks														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C308.1	3	3			3								2		
C308.2	3	3			3								2		
C308.3	3	3			3								2		
C308.4	3	3			3								2		
C308.5	3	3			3								2		
308	3	3			3								2		

Subject: Data Base Management Systems Lab											Subject Code: 15CSL58				
Course Outcomes															
C309.1	Infer database language commands to create simple database														
C309.2	Analyze the database using queries to retrieve records														
C309.3	Apply pl/sql for processing database														
C309.4	Analyze front ends tools to design forms,report and menus.														
C309.5	Develop solutions using database concepts for real time requirements.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C309.1	3	3			3								1		
C309.2	2	3		2	3	2							2		
C309.3	2	2			2	2		3					2		
C309.4	2	2	2	2	2	2							2		
C309.5	3	2	2	3	3	2							2		
C309	2.5	2.5	2	2.5	2.6	2		3					1.8		

### Semester-VI

Subject: Cryptography, Computer Networks & Cyber Law											Subject Code: 15CS61				
Course Outcomes															
C310.1	Discuss cryptography and its various applications.														
C310.2	Design and develop simple cryptography algorithms.														
C310.3	Analyze various authentication and key agreement protocols.														
C310.4	Compare different protocols used in wireless LAN.														
C310.5	Understanding the need for cyber Law.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C310.1	2	1							1			1	1		
C310.2	3	2	3	1	1						2		1	3	
C310.3	3	1	2	1									2		
C310.4	2	1	2	2	1							1	2		
C310.5	3	2	3					3		1		2	2	3	
C310	2.6	1.4	2.5	1.3	1			3	1	1	2	1.3	1.6	3	

<b>Subject: FILE STRUCTURES</b>	<b>Subject Code: 15IS62</b>
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**Course Outcomes**

<b>C311.1</b>	Retrieve and explain different techniques for organization and manipulation of data in secondary storage which include basic file structure concepts, file operations, secondary storage devices and system software
<b>C311.2</b>	Illustrate management of records and organization of files for performance by applying object oriented concepts.
<b>C311.3</b>	Compare primary and secondary indexing and construct model for implementing consequential processing and sorting large files.
<b>C311.4</b>	Construct B trees and illustrate indexed sequential access and prefix B+ trees with appropriate data structures.
<b>C311.5</b>	Discuss hashing and its methods and demonstrate collision resolution using different techniques.

**CO-PO-PSO Mapping**

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
<b>C311.1</b>	3					1						2	2		
<b>C311.2</b>	3	3	3			1		1			1	2	2		
<b>C311.3</b>	3	3	3	3		1		1	1		1	2	2		
<b>C311.4</b>	3	3	3	3		1		1	1		1	2	2		
<b>C311.5</b>	3	3	3	3		1		1	1		1	2	2	2	
<b>C311</b>	3	3	3	3	0	1	0	1	1	0	1	2	2	2	

<b>Subject: SOFTWARE TESTING</b>	<b>Subject Code: 15IS63</b>
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**Course Outcomes**

<b>C312.1</b>	Understanding basic terminologies of software testing methods
<b>C312.2</b>	Derive test cases for any given problem using black box and white box testing
<b>C312.3</b>	Understanding and apply different levels of testing
<b>C312.4</b>	Identify the needs of testing process framework
<b>C312.5</b>	Understanding the need of documenting and analysis and test

**CO-PO-PSO Mapping**

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
<b>C312.1</b>	1	1												<b>C312.1</b>	
<b>C312.2</b>		2	2										2	<b>C312.2</b>	
<b>C312.3</b>	2													<b>C312.3</b>	

C312.4	1	2												C312.4
C312.5									1					C312.5
C312	1.3	1.6	2						1				2	C312

<b>Subject: Operating System</b>													<b>Subject Code: 15CS64</b>		
<b>Course Outcomes</b>															
C313.1	Demonstrate need for OS and different types of OS														
C313.2	Apply suitable techniques for management of different resources														
C313.3	Use processor , memory, storage and file system commands														
C313.4	Define deadlock situation and solve deadlock scenarios in a OS														
C313.5	Realize the different concepts of OS in platform of usage through case studies														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C313.1	3	2	1	2									3		
C313.2	3	3	3	3											
C313.3	2	3	3	2			3			1			3		
C313.4	3	3	2	2			2					1	2	2	
C313.5	2		3												
C313	2.6	2.75	2.4	2.25			2.5			1		1	2.67	2	

<b>Subject: OPERATION RESEARCH</b>													<b>Subject Code: 15CS653</b>		
<b>Course Outcomes</b>															
C314.1	Formulate the Linear Programming and solve.														
C314.2	Select and apply optimization techniques for various problems.														
C314.3	Model the given problem as transportation and assignment problem and solve.														
C314.4	Apply game theory for decision support system.														
C314.5	Illustrate the application of metaheuristics														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C314.1	2	2	3	2		2						2	2		
C314.2	2	2	2	2		2						2	2		
C314.3	2	2	2	2	2							2	2		



C314.4	2	2	2	2					2		2	2	2		
C314.5	2	2	2	2			2	2		2		2	2		
C314	2	2	2.2	2	2	2	2	2	2	2	2	2	2		

<b>Subject: Python Application Programming</b>	<b>Subject Code: 15CS664</b>
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<b>Course Outcomes</b>	
<b>C315.1</b>	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
<b>C315.2</b>	Demonstrate proficiency in handling Strings and File Systems.
<b>C315.3</b>	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
<b>C315.4</b>	Interpret the concepts of Object-Oriented Programming as used in Python.
<b>C315.5</b>	Implement exemplary applications related to Network Programming, Web Services and Databases in Python

<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C315.1	2				1				1		1		1		
C315.2	2			1	1				1		1		1		
C315.3	2		2	1	1				1		1		1		
C315.4	2	2			1				1		1		2		
C315.5	2	2	3	2	2	2	1	1	2		2		2		
C315	2	2	2.5	1.33	1.2	2	1	1	1.2		1.2		1.4		

<b>Subject: SOFTWARE TESTING LABORATORY</b>	<b>Subject Code: 15ISL67</b>
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<b>Course Outcomes</b>	
<b>C316.1</b>	List out the requirements for the given problem
<b>C316.2</b>	Design and implement the solution for given problem in any programming language
<b>C316.3</b>	Apply the appropriate technique for the design test cases
<b>C316.4</b>	Derive test cases for any given problem
<b>C316.5</b>	Create appropriate document for test cases

<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C316.1	1	2											1		

C316.2		2	3	2									2		
C316.3			3	1									2		
C316.4		1	2	1									2		
C316.5									1	1	1		1		
C316	1	1.6	2.6	1.3					1	1	1		1.6		

<b>Subject: File Structures Laboratory with Mini Project</b>										<b>Subject Code: 15ISL68</b>					
<b>Course Outcomes</b>															
C317.1	Implement various operations such insert, search, delete and modify on files.														
C317.2	Design and develop record organization techniques on files.														
C317.3	Design and develop indexing techniques on files.														
C317.4	Design and develop co-sequential processing and merging concept for files.														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C317.1	2	1	1	1					1		1	2	2		
C317.2	2	1	1	2		1			1		1	2	2		
C317.3	2	1	3	2		1			1		1	2	2		
C317.4	2	1	1	2		1			1		1	2	2		
C317	2	1	1.5	1.7		1			1		1	2	2		

### Semester-VII

<b>Subject: Web Technology and its Applications</b>										<b>Subject Code: 15CS71</b>					
<b>Course Outcomes</b>															
C401.1	Illustrate the Semantic Structure of HTML and CSS														
C401.2	Compose forms and tables using HTML and CSS														
C401.3	Design Client-Side programs using JavaScript and Server-Side programs using PHP														
C401.4	Infer Object Oriented Programming capabilities of PHP														
C401.5	Examine JavaScript frameworks such as jQuery and Backbone														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C401.1	3		3										3		
C401.2		3	3	3									2		

C401.3		3	3										3		
C401.4	1	2	2	2									2		
C401.5			1										2		
C401	2	2.6	2.4	2.5	0	0	0	0	0	0	0	0	2.4		

<b>Subject: Software Architecture &amp; Design Patterns</b>											<b>Subject Code: 15IS72</b>				
<b>Course Outcomes</b>															
C402.1	Identify Design Patterns and state OO concepts														
C402.2	Recognize requirements, Design , implement conceptual classes and relationships														
C402.3	Apply Structural Patterns to develop software components														
C402.4	Illustrate the usage of MVC architecture														
C402.5	Implement OO system by applying suitable pattern														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C402.1		2	2										3		
C402.2		3	3										3		
C402.3		2	2										3		
C402.4		3	3										3		
C402.5		3	3										3		
C402		2.6	2.6										3		

<b>Subject: Machine Learning</b>											<b>Subject Code: 15CS73</b>				
<b>Course Outcomes</b>															
C403.1	Identify the problems for machine learning. And select the either supervised, unsupervised, reinforcement														
C403.2	Differentiate between supervised, unsupervised and reinforcement learning.														
C403.3	Investigate concept learning, ANN, Bayes classifier, k nearest neighbor, K-means														
C403.4	Explain theory of probability and statistics related to machine learning														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C403.1	2	2	2	1									2		
C403.2	2	2	3	2	2								2		
C403.3	2	3	3	2	2								2		
C403.4	2	1	2	1	2								2		

C403	2	2	2.5	1.5	2								2		
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<b>Subject: Unix System Programming</b>	<b>Subject Code: 15CS744</b>
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Course Outcomes	
C404.1	Understand the various Standards like ANSI C, POSIX and X/OPEN Standards. UNIX Kernel Support for Files.
C404.2	Design and Develop Commands using various API
C404.3	Explains about Process Creation and Controlling and Process Relationship
C404.4	Describes Unix Kernel support for Signals, Daemon Process & Characteristics
C404.5	Elaborate the need of Interprocess Communication, Message Queues, Semaphores, Shared Memory , Client Server Connections Functions.

CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C404.1	2											1	1		
C404.2	2	1	3								2		1		
C404.3	3	1	2										2		
C404.4	2	1	2										2		
C404.5	2	2	3									2	2		
C404	2.2	1.25	2.5								2	1.5	1.6		

<b>Subject: Storage Area Network</b>	<b>Subject Code: 15CS754</b>
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Course Outcomes	
C405.1	Identify key challenges in managing information and analyze different storage networking technologies and virtualization .
C405.2	Explain components and the implementation of NAS
C405.3	Describe CAS architecture and types of archives and forms of virtualization.
C405.4	Illustrate the storage infrastructure and management activities.
C405.5	Analyze the components of cloud computing showing how business agility in an organization can be created.

CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C405.1	2	2	2										2	1	
C405.2				2					1		1		1		
C405.3					2							1	1		

C405.4											1		2		
C405.5						1	1	1					2	1	

<b>Subject: Machine Learning Lab</b>											<b>Subject Code: 15CSL76</b>				
<b>Course Outcomes</b>															
C406.1	Understand the implementation procedures for the machine learning algorithms.														
C406.2	Design Java/Python Programs for various machine learning algorithms.														
C406.3	Apply appropriate datasets to the machine learning algorithms.														
C406.4	Identify and apply machine learning algorithms to solve real world problems.														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C406.1	3	2	3	2	2								2		
C406.2	2	2	2	2	1								2		
C406.3	1	2	2	2	1								2		
C406.4	1	3	3	2	1								2		
C406	1.75	2.25	2.5	2	1.25								2		

<b>Subject: WEB Programming Laboratory with Mini Project</b>											<b>Subject Code: 15CSL77</b>				
<b>Course Outcomes</b>															
C407.1	Design and develop static and dynamic web pages.														
C407.2	Familiarize with Client-Side Programming, Server-Side Programming, Active server Pages.														
C407.3	Learn Database Connectivity to web applications.														
<b>CO-PO-PSO Mapping</b>															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C407.1	3	3											2		
C407.2				3	1						1		2		
C407.3			3						3	2		1	2		
C407	3	3	3	3	1				3	2	1	1	2		

<b>Subject: Project Phase 1 + Seminar</b>											<b>Subject Code: 15CSP78</b>				
<b>Course Outcomes</b>															
C413.1	Discover Potential research areas in the field of IT.														
C413.2	Conduct a Survey of Several available literature in the preferred field of study.														
C413.3	Compare and contrast the several existing solutions for research challenge.														

C413.4	Demonstrate an ability to work in teams and manage the conduct of the research study.														
C413.5	Formulate and purpose a plan for creating a solution for the research plan identified and to report and present the findings of the study conducted in the preferred domain.														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C413.1	3	2	2	2							2	2	2		
C413.2	2	3	2	1	1						1	1	2		
C413.3	3	3	3	1	2						2	1	3		
C413.4	2	2	3								1	1	2		
C413.5	2	2	3	1							2	2	2		
C413	2.4	2.4	2.6	1.0							1.6	1.4	2.2		

### Semester-VIII

<b>Subject: Internet of Things Technology</b>												<b>Subject Code: 15CS81</b>			
Course Outcomes															
C409.1	Interpret the impact and challenges posed by IoT networks leading to new architectural models														
C409.2	Compare and contrast the deployment of smart objects and the technologies to connect them to network.														
C409.3	Discuss the role of IoT protocols for efficient network communication.														
C409.4	Understand the need for Data Analytics and Security in IoT.														
C409.5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry														
CO-PO-PSO Mapping															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C409.1	3	2	2	2	1								2		
C409.2	2	2		2									3		
C409.3	1	3	3	1									3		
C409.4	1	2	2	1	2								2		
C409.5	2	1	3	2									2		
C409	1.8	2	2.5	1.6	1.5								2.4		

<b>Subject: Big Data Analytics</b>												<b>Subject Code: 15CS82</b>			
Course Outcomes															
C410.1	Illustrate the concept of HDFS and MapReduce framework														

<b>C410.2</b>	Investigate Hadoop related tools for Big Data analytics and perform basic Hadoop administration
<b>C410.3</b>	Recognise the role of business intelligence, data warehousing and visualization in decision making
<b>C410.4</b>	Infer the importance of core data mining techniques for data analytics.
<b>C410.5</b>	Compare and contrast text mining, web mining, naïve-bayes analysis, support vector machines and social network analysis.

**CO-PO-PSO Mapping**

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
<b>C401.1</b>	3	2	2	2	2		1				1	1	3		
<b>C402.2</b>	2	3	1	1	2	1					1	1	3		
<b>C403.3</b>	2	2	2	1	1		1				1	1	3		
<b>C404.4</b>	2	1	2	3	2	1	1				1	1	3		
<b>C405.5</b>	2	2	2	3	1	2					2	1	3	1	
<b>C405</b>	2.2	2	1.8	2	1.6	1.33	1				1.2	1	3	1	

<b>Subject: System Simulation and Modeling</b>	<b>Subject Code: 15CS834</b>
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**Course Outcomes**

<b>C411.1</b>	Explain the system concepts and apply functional modeling method to model the activities of a static system
<b>C411.2</b>	Describe the behavior of a dynamic system and create an analogous model for a dynamic system
<b>C411.3</b>	Simulate the operation of a dynamic system and make improvement according to the simulation results.

**CO-PO-PSO Mapping**

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
<b>C411.1</b>	3			3									2		
<b>C411.2</b>	2			2									2		
<b>C411.3</b>			2	2	2								3		
<b>C411</b>	2.5		2	2.33	2								2.33		

<b>Subject: Internship / Professional Practice</b>	<b>Subject Code: 15IS84</b>
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**Course Outcomes**

<b>C412.1</b>	Apply domain knowledge in proposing solution for IT problem.
<b>C412.2</b>	Develop/implement the design with appropriate techniques, resources and contemporary tools and deliver solution with stipulated planning.

C412.3	Make the graduates work in collaboration/multidisciplinary environment.
C412.4	Construct an integrity and ethical behavior during preparation of Technical document/Report/development of solution.
C412.5	Discuss and make formal and informal communications with guide, make presentations and prepare technical document.

**CO-PO-PSO Mapping**

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C412.1	3	2	3										3		
C412.2	2	2		3									2		
C412.3	1			2					2				1		
C412.4	2			2	2								2		
C412.5	2							2				2	1		
C412.1	3	2	3										3		

<b>Subject: Project work phase II</b>	<b>Subject Code: 15CSP85</b>
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**Course Outcomes**

C413.1	Discover Potential research areas in the field of IT.
C413.2	Conduct a Survey of Several available literature in the preferred field of study.
C413.3	Compare and contrast the several existing solutions for research challenge.
C413.4	Demonstrate an ability to work in teams and manage the conduct of the research study.
C413.5	Formulate and purpose a plan for creating a solution for the research plan identified and to report and present the findings of the study conducted in the preferred domain.

**CO-PO-PSO Mapping**

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C413.1	3	2	2	2							2	2	2		
C413.2	2	3	2	1	1						1	1	2		
C413.3	3	3	3	1	2						2	1	3		
C413.4	2	2	3								1	1	2		
C413.5	2	2	3	1							2	2	2		
C413	2.4	2.4	2.6	1.0							1.6	1.4	2.2		

<b>Subject: Technical Seminar</b>	<b>Subject Code: 15ISS86</b>
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**Course Outcomes**

<b>C414.1</b>	Identify and Analyze information about emerging technologies with respect to current trends.
<b>C414.2</b>	Identify promising new directions of various cutting edge technologies with intrapersonal skills.
<b>C414.3</b>	Communicate effectively to a diverse audience, exhibit effective communication skills.
<b>C414.4</b>	Understand appropriate modern engineering and IT Tools in new innovations and inventions.
<b>C414.5</b>	Develop technique by imparting skills in preparing detailed report and describing the topic along with results.

**CO-PO-PSO Mapping**

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
<b>C414.1</b>	1	2		1					2			3	2		
<b>C414.2</b>	1	2		1					2			3	2		
<b>C414.3</b>	1	2		1					2	3		3	2		
<b>C414.4</b>	1	2		1					2			3	2		
<b>C414.5</b>	1	2		1					2			3	2		
<b>C414</b>	1	2		1					2	3		3	2		



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