Vth Semester

COURSE STRUCTURE FOR B TECH IN COMPUTER SCIENCE & ENGINEERING

Semester V			B. Tech. in Computer Science & Engineering										
Sr. No.	Course/ Lab Code	Course/Lab Name	Teaching Scheme					Examination Scheme					
								Theory			Practical		Total
			L	T	P	C	Hrs./ Week	CE	MS	ES	LW	LP/ Viva	Marks
1	20CP301T	Computer Network	3	0	0	3	3	25	25	50	-	-	100
2	20CP301P	Computer Network LAB	0	0	2	1	2	-	-	-	50	50	100
3	20CP302T	System Software & Compiler Design	3	0	0	3	3	25	25	50	-	-	100
4	20CP302P	System Software & Compiler Design LAB	0	0	2	1	2	-	-	-	50	50	100
5	20CP303T	Software Engineering	3	0	0	3	3	25	25	50			100
6	20CP304T	Information Security	2	0	0	2	2	25	25	50	-	-	100
7	20CP304P	Information Security LAB	0	0	2	1	2	-	-	-	50	50	100
8	20CP305P	Introduction to Web Technology LAB	0	0	4	2	4	-	-	-	50	50	100
9		CE-1	2	0	0	2	2	25	25	50	-	-	100
10		CE-1 LAB	0	0	4	2	4	-	-	-	50	50	100
11		OE-3	3	0	0	3	3	25	25	50			100
12	20HS301P	Communication Skills-III	0	0	2	1	2				50	50	100
		TOTAL	16	0	16	24	32						1200

CE- Continuous Evaluation, MS-Mid Semester; ES – End Semester Exam

Professional Core Electives-1

Sl. No.	Course Code	Course Name	Track
1.	20CP306T	Data Mining	Analytics
2.	20CP306P	Data Mining Lab	Analytics
3.	20CP307T	Computer Graphics	Image Processing
4.	20CP307P	Computer Graphics Lab	Image Processing
5.	20CP308T	Distributed Systems	Parallel & Distributed Computing
6.	20CP308P	Distributed Systems Lab	Parallel & Distributed Computing
7.	20CP309T	Software Project Management	Software Engineering
8.	20CP309P	Software Project Management Lab	Software Engineering
9.	20CP310T	Advanced Java	Programming
10.	20CP310P	Advanced Java Lab	Programming

Open Elective-3 (Anyone to be offered)

Sl. No.	Course Code	Course Name	Track
1.	20CP311T	Introduction to Computer Security	Security
2.	20CP312T	Introduction to Data Mining	Analytics

20CP301T					Computer Network					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	-	-	100

COURSE OBJECTIVES

- To understand the overall communication system from sender to receiver
- To understand the various physical network devices and their working procedure as per OSI and TCP/IP protocols
- To understand the responsibility to each layer of TCP/IP
- To understand the several network applications such as email, peer2peer etc.

UNIT 1 DATA LINK LAYER **11 Hrs.**

Introduction to computer networks and Internet, Layered Architecture (OSI and TCP/IP). Framing, Error Control Media access protocols (ALOHA, CSMA based), Ethernet 802.3, Token ring 802.5, Reliability Issue: sliding window.

UNIT 2 NETWORK LAYER **10 Hrs.**

Internetworking and Routing: Best effort Service, Switching, Virtual Circuits, IP Addressing, Routing Issues, Distance Vector and Link State routing, OSPF, BGP.

UNIT 3 TRANSPORT LAYER **12 Hrs.**

End to end delivery issues, Reliable data transfers, Congestion Control, Traffic engineering and Quality of service, TCP, UDP.

UNIT 4 APPLICATION LAYER **6 Hrs.**

DNS, FTP, HTTP, SMTP, Socket Programming, Peer to Peer file sharing

Max. 39 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Identify the components required to build different types of networks
CO2- Discuss the functionality at each layer for given application
CO3- Illustrate the topological and routing strategies for an IP based networking infrastructure
CO4- Analyze traffic congestion methods in networks.
CO5- Explain the flow of information from one node to other in simple network.
CO6- Discuss various chat application using socket programming.

TEXT/REFERENCE BOOKS

1. Andrew S Tanenbaum, “Computer Networks”, Pearson Education.
2. Behrouz A Forouzan, “Data Communication and Networking”, McGraw Hill
3. William Stallings, “Data and Computer Communication”, Pearson Education
4. James Kurose and Keith Rose, “Computer Networking: A Top Down Approach”, Pearson Education

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Part A: 10 Questions of 2 marks each-No choice 20 Marks
Part B: 2 Questions from each unit with internal choice, each carrying 20 marks 80 Marks

20CP301P					Computer Network LAB					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	-	-	-	50	50	100

COURSE OBJECTIVES

- To prepare LAN cables for communication between sender and receiver
- To understand the working procedure of various physical network devices
- To visualize the responsibility to each layer of TCP/IP Protocol
- To implement the several network applications such as email, file transfer, peer2peer etc.

LIST OF EXPERIMENTS:

1. Get the Demo of all the network hardware such as Hub, switch, router etc.
2. To study and prepare LAN cables (cross and straight), to configure LAN and perform Static Routing
3. Introduction to Socket Programming- Design and Implement client-server elements of a few network applications e.g. Echo client and server, Time client and server, Online Quiz and Buzzer Application, etc.
4. Configure DHCP in a small LAN and understand its functionality using Wireshark/ Packet Tracer
5. Configure DNS in a small LAN and understand its functionality using Wireshark/ Packet Tracer
6. Understand functionality of HTTP using Wireshark/ Packet Tracer
7. Understand functionality of TCP and UDP using Wireshark/ Packet Tracer
8. Configure virtual LAN and understand its functionality using Wireshark/ Packet Tracer
9. Configure OSPF and BGP in a small LAN
10. Simulation of TCP/UDP connections and performance analysis

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Choose different networking components as per the applications.
CO2- Use Wireshark tools to analyze network packets.
CO3- Apply the topological and routing strategies for an IP based networking infrastructure.
CO4- Analyze flow control methods in communication.
CO5- Create virtual network using Cisco packet tracer simulation tools.
CO6- Design various chat application using socket programming.

TEXT/REFERENCE BOOKS

1. Andrew S Tanenbaum, “Computer Networks”, Pearson Education.
2. Behrouz A Forouzan, “Data Communication and Networking”, McGraw Hill

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 2 Hrs**
Part A: Evaluate the continuous performance based on the lab work	50 Marks
Part B: Verify the performance using viva and critical experiment	50 Marks

20CP302T					System Software & Compiler Design					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	-	-	100

COURSE OBJECTIVES

- Define and learn system Software such as Assemblers, Loaders, Linkers, macro-preprocessors.
- Familiarize with source file, object file and executable file structures and libraries.
- Describe the front-end and back-end phases of compiler and their importance to students.
- Learn Lexical Analysis, Syntax Analysis and Semantic Analysis.
- Learn to generate Intermediate Code and code optimization.

UNIT 1 LEXICAL ANALYSIS **08 Hrs.**

Introduction to different phases of compiler, Alphabets And Tokens In Computer Languages, Representation, Token Recognition And Finite Automata, Implementation, Error Recovery.

UNIT 2 PARSERS, SDT **18 Hrs.**

Syntax Analysis- Introduction, Role Of Parsers, Context Free Grammars Top Down Parsers, Bottom-Up Parsers, Operator-Precedence Parsing, Semantic analysis-Syntax Directed Translation.

UNIT 3 CODE GENERATION AND ASSEMBLER **08 Hrs.**

Intermediate code generation and Code optimization, Introduction to System Software, Machine Architecture and m/c level representation of programs, Assemblers- MOT, Data structures in Pass1 and Pass2 assembler, forward and backward referencing, back-patching, target code generation

UNIT 4 LOADER AND LINKER **05 Hrs.**

Loaders and Linkers: Basic Loader Functions, Machine Dependent Loader Features, Machine Independent Loader Features, Loader Design Options, Implementation Examples.

Max. 39 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Explain different phases of compiler.
CO2- Discuss and compare different parsing algorithms.
CO3- Illustrate Intermediate code generation.
CO4- Analyze different types of code optimization techniques.
CO5- Explain the working of linker and loader.
CO6- Compare pass1 and pass2 of assembler algorithm.

TEXT/REFERENCE BOOKS

1. Alfred V Aho, M S. Lam, R Sethi, Jeffrey D. Ullman. Compilers-Principles, Techniques and Tools, Pearson.
2. D. M. Dhamdhere, System software and operating system, TMH

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hrs**
Part A: 10 Questions of 2 marks each-No choice	20 Marks
Part B: 2 Questions from each unit with internal choice, each carrying 20 marks	80 Marks

20CP302P					System Software and Compiler Design LAB					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	-	-	-	50	50	100

COURSE OBJECTIVES

- Define and learn system Software such as Assemblers, Loaders, Linkers, macro-preprocessors.
- Familiarize with source file, object file and executable file structures and libraries.
- Describe the front-end and back-end phases of compiler and their importance to students.
- Learn Lexical Analysis, Syntax Analysis and Semantic Analysis.
- Learn to generate Intermediate Code and code optimization.

LIST OF EXPERIMENT

Lexical analyzer, parser, intermediate code generation, code optimization, Pass1 and Pass2 of assembler.

1. Write a LEX program to recognize valid arithmetic expression. Identifiers in the expression could be only integers and operators could be + and *. Count the identifiers & operators present and print them separately.
2. Write YACC program to evaluate arithmetic expression involving operators: +, -, *, and /
3. Develop, Implement and Execute a program using YACC tool to recognize all strings ending with b preceded by n a's using the grammar an b (note: input n value)
4. Design, develop and implement YACC/ C program to construct Predictive / LL(1) Parsing Table for the expression grammar. Design, develop and implement YACC/C program to demonstrate Shift Reduce Parsing technique for the expression grammar rules and parse the sentence: id + id * id.
5. Design, develop and implement a C/Java program to generate the machine code using Triples for the statement A = -B * (C +D) whose intermediate code in three-address form:
   T1 = -B, T2 = C + D, T3 = T1 + T2, A = T3
6. Write a LEX program to eliminate comment lines in a C program and copy the resulting program into a separate file, Write YACC program to recognize valid identifier, operators and keywords in the given text (C program) file.
7. Implement Pass1 of Assembler and generate the Intermediate code and target code,

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Identify token in the given input string using any programming language.
CO2- Apply different parsing algorithms to check whether the given string is valid or not.
CO3- Calculate the value of a mathematical expression using parsing algorithms.
CO4- Analyze pass1 and pass2 assembler algorithms.
CO5- Apply optimization techniques related to target code generation.
CO6- Design demo compiler.

TEXT/REFERENCE BOOKS

1. Alfred V Aho, M S. Lam, R Sethi, Jeffrey D. Ullman. Compilers-Principles, Techniques and Tools, Pearson.
2. D. M. Dhamdhere, System software and operating system, TMH

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 2 Hrs**

Part A: Evaluate the continuous performance based on the lab work	50 Marks
Part B: Verify the performance using viva and critical experiment	50 Marks

20CP303T					Software Engineering					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	0	0	100

COURSE OBJECTIVES

- Understand systematic approach to the development, operation, maintenance, and retirement of software
- Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams
- Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes

UNIT 1 INTRODUCTION & REQUIREMENT ANALYSIS **10 Hrs.**

Introduction, Characteristics of Software, Software Myths, Software Development Life Cycles: Software Development Process, Requirement Analysis, Functional and non-functional requirements, The software requirements document and SRS standards, Requirements Engineering Process

UNIT 2 MODELLING & DESIGN **10 Hrs.**

Design Concepts, Design Model, Software Architecture, Object oriented design, Design Patterns

UNIT 3 TESTING & QUALITY MANAGEMENT **10 Hrs.**

Software Testing Strategies, Quality Concepts, Software Quality Assurance, The ISO 9000 quality standards, Software process improvement, CMMI Framework

UNIT 4 SOFTWARE MAINTENANCE & RISK MANAGEMENT **9 Hrs.**

Maintenance & Reengineering, Risk management: Reactive vs Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Max. 39 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Classify procedural, non-procedural and object-oriented programming language.
CO2- Identify software requirement of a project.
CO3- Apply software testing life cycle for software project.
CO4- Construct manual test cases for software project.
CO5- Explain software development process.
CO6- Describe various software maintenance & risk management strategies

TEXT/REFERENCE BOOKS

1. Roger S Pressman, Software engineering A practitioner's Approach, McGraw Hill
2. Ian Sommerville, Software Engineering, Pearson education.
3. Pankaj Jalote, Software Engineering, A Precise Approach, Wiley India.
4. Rajib Mall, Fundamentals of Software Engineering, PHI

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Part A: 10 Questions of 2 marks each-No choice 20 Marks

Part B: 2 Questions from each unit with internal choice, each carrying 20 marks 80 Marks

20CP304T					Information Security					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

COURSE OBJECTIVES

- To understand the concept of security requirements, security attacks, and security policy.
- To understand the mathematical concepts for cryptographic algorithms.
- To understand the security mechanisms available to protect the data.
- To understand the security analysis of cryptographic algorithms.

UNIT 1 INTRODUCTION AND NUMBER THEORY **10 Hrs.**

Basics of Information Security, Classical Ciphers and Cryptanalysis, Introduction to Steganography. Introduction to Number Theory.

UNIT 2 SYMMETRIC KEY CRYPTOGRAPHY **10 Hrs.**

Feistel Structure, Advanced Encryption Standard, Data Encryption Standard, Modern Block Ciphers, Modes of Operation, Synchronous and Asynchronous Stream Ciphers, Use of Modern Block Ciphers and Stream Ciphers.

UNIT 3 PUBLIC KEY CRYPTOGRAPHY **10 Hrs.**

Introduction to Public Key Cryptography, Diffie-Hellman Key Exchange, RSA Cryptosystem, RSA Cryptanalysis. Elliptic Curve Cryptography.

UNIT 4 HASH FUNCTION AND DIGITAL SIGNATURE **09 Hrs.**

Introduction to Hash Function, MD5, SHA, Message Authentication Code, Digital Signature, Authentication Protocols.

Max. 39 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Differentiate between cryptography and cryptanalysis.
CO2- Explain the mathematical concepts for cryptographic algorithms.
CO3- Apply symmetric encryption techniques for data security.
CO4- Analyze the security strength of public key cryptosystem.
CO5- Use Hashing algorithm for Digital signature.
CO6- Express the importance of authentication protocols.

TEXT/REFERENCE BOOKS

1. William Stallings, "Cryptography and Network Security Principles and Practice", Pearson Education
2. Atul Kahate, “Cryptography and Network Security”, Tata McGraw-Hill Education
3. Behrouz A. Forouzan, “Cryptography and Network Security”, McGraw-Hill Education
4. Wenbo Mao, “Modern Cryptography: Theory and Practice”, Prentice Hall.
5. Bruce Schneier, “Applied Cryptography: Protocols, Algorithms, and Source Code in C”, Wiley Computer Publishing.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Part A: 10 Questions of 2 marks each-No choice 20 Marks

Part B: 2 Questions from each unit with internal choice, each carrying 20 marks 80 Marks

20CP304P					Information Security LAB					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory		Practical			Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	-	-	-	50	50	100

COURSE OBJECTIVES

- To understand the concept of security requirements, security attacks, and security policy.
- To understand the mathematical concepts for cryptographic algorithms.
- To understand the security mechanisms available to protect the data.
- To understand the security analysis of cryptographic algorithms.

LIST OF EXPERIMENT

1. Download and Practice Cryptool.
2. Study and Implement program for Ceaser Cipher with Encryption, Decryption, Brute Force Attack, and Frequency Analysis functions.
3. Study and Implement a program for Transposition (Columnar) Cipher to encrypt and decrypt the message.
4. Study and Implement a program for Rail Fence Transposition Cipher to encrypt and decrypt the message.
5. Study and Implement a program for Vigenère Cipher to encrypt and decrypt the message.
6. Study and Implement a program for 6x6 Playfair Cipher.
7. Study and Implement a program for n-gram Hill Cipher.
8. Use Crypto++ library to implement encryption and decryption functions for different block ciphers.
9. Study and Implement RSA Encryption and Decryption function.
10. Use RSA for generation and verification of digital signature on file.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Apply mathematical concepts for cryptographic algorithms.
CO2- Apply symmetric encryption techniques for data security.
CO3- Analyze the security strength of public key cryptosystem.
CO4- Use hash algorithm to implement digital signature.
CO5- Examine the authentication and hash algorithms as per security requirements.
CO6- Evaluate different security attacks on public/private key crypto-system.

TEXT/REFERENCE BOOKS

1. William Stallings, "Cryptography and Network Security Principles and Practice", Pearson Education
2. Atul Kahate, “Cryptography and Network Security”, Tata McGraw-Hill Education
3. Behrouz A. Forouzan, “Cryptography and Network Security”, McGraw-Hill Education

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 2 Hrs**

Part A: Evaluation Based on the class performance and Laboratory book	50 Marks
Part B: Viva Examination based conducted experiments	50 Marks

20CP305P					Introduction to Web Technology LAB					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	4	2	4	--	--	--	50	50	100

COURSE OBJECTIVES

- Learn fundamentals of web development.
- Design the front-end of webpages.
- To introduce Client side scripting with Javascript.
- To introduce Server side programming with PHP and JSP.
- Demonstration of the data communication using AJAX, JSON and XML

Experiment Sessions using Programming would be based on following topics:
HTML, CSS, Javascript, PHP, XML Data Handling, AJAX technology, JSON objects, JSP

List of Experiments
1. Design the front pages of a website using HTML and CSS properties
2. Create the interactive webpages using Javascript
3. Install the LAMP stack
4. Implement the server-side scripting using PHP language
5. Create a web page that retrieves and displays information from the XML file.
6. Create a web page that retrieves and displays information from a JSON file.
7. Implement the web applications using PHP and add the AJAX feature into it.
8. Design the webpages using JSP

COURSE OUTCOMES
On completion of the course, student will be able to
CO1 – Learn the Web Design Concepts including WWW, HTTP protocol and Browser.
CO2 – Understand the design and style concepts of webpages using HTML and CSS
CO3 – Implement Javascript functionality to make interactive webpages
CO4 – Illustrate server side scripting with PHP and JSP.
CO5 – Assess the data communication delay between webserver and client using AJAX with XML and JSON.
CO6 – Build a complete web solution for a given problem statement

TEXT/REFERENCE BOOKS
1. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, Teach Yourself HTML, CSS & JavaScript Web publishing, Pearson Education, 2015
2. Steven Holzner, *The Complete Reference PHP*, Tata McGraw-Hill, 2008
3. Lorna Jane Mitchell, *PHP Web Services*, O'Reilly Media, 2013
4. Hans Bergsten, *Java Server Pages*, O'Reilly, 2003

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 2 Hrs**

Part A: Evaluation Based on the class performance and Laboratory book	50 Marks
Part B: Viva Examination based conducted experiments	50 Marks

Department Professional Electives- (V Semester)

20CP306T					Data Mining					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

COURSE OBJECTIVES

- To be familiar with mathematical foundations of data mining tools.
- Understand and implement classical models and algorithms in data mining
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- To develop skills for using recent data mining software to solve practical problems in a variety of disciplines.

UNIT 1 INTRODUCTION **7 Hrs.**

Introduction: What is Data Mining? Motivating Challenges; The origins of data mining; Data Mining Tasks. Types of Data; Data Pre-processing, Measures of Similarity and Dissimilarity.

UNIT 2 SUPERVISED LEARNING **7 Hrs.**

Classification: Preliminaries; General approach to solving a classification problem; Decision tree induction; Rule-based classifier; Multilinear and Logistic Regression.

UNIT 3 ASSOCIATIION ANALYSIS **6 Hrs.**

Problem definition, Frequent item set generation; Rule Generation; Compact representation of frequent item sets; Alternative methods for generating frequent item sets. FP-Growth algorithm, Evaluation of association patterns, Effect of skewed support distribution, Sequential patterns.

UNIT 4 UNSUPERVISED LEARNING & CLUSTERING **6 Hrs.**

Clustering, KNN, Clustering Review, Outlier Detection, Recent Trends in Data Mining.

Max. 26 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Understand the basic concepts of data mining along.
CO2- Apply measures of similarity and dissimilarity to find the proximity between data objects.
CO3- Analyze the performance of supervised and unsupervised models.
CO4- Choose suitable data mining algorithms to solve real world problems.
CO5- Classify interesting patterns from large amounts of data as information.
CO6- Explain different clustering algorithms.

TEXT/REFERENCE BOOKS

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining- Pearson Education.
2. Jiawei Han and Micheline Kamber, Data Mining–Concepts and Techniques- 2nd Edition, Morgan Kaufmann.
3. K.P. Soman, Shyam Diwakar, V. Ajay, Insight into Data Mining–Theory and Practice- PHI

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Part A: 10 Questions of 2 marks each-No choice 20 Marks
Part B: 2 Questions from each unit with internal choice, each carrying 20 marks 80 Marks

20CP306P					Data Mining LAB					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	4	2	4	-	-	-	50	50	100

COURSE OBJECTIVES

- To be familiar with mathematical foundations of data mining tools.
- Understand and implement classical models and algorithms in data mining
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- To develop skills for using recent data mining software to solve practical problems in a variety of disciplines.

LIST OF EXPERIMENTS

Practical list should be prepared based on the content of the subject. Preferred Programming Language: Python/R.
Assessment: Rubrics Based

1. Implement a decision tree for performing classification in the programming language of your choice
2. Implement a Rule based classifier for performing classification in the programming language of your choice
3. Implement a k-Nearest Neighbour classifier for performing classification in the programming language of your choice
4. Implement an Apriori algorithm for frequent item set generation using programming language of your choice
5. Implement FP growth algorithm for frequent item set generation using Programming language of your choice
6. Implement k-means clustering algorithm for clustering a group of objects using programming language of your choice
7. Implement Agglomerative Hierarchical clustering algorithm for clustering a group of objects using programming language of your choice
8. Implement DBSCAN clustering algorithm for clustering a group of objects using programming language of your choice
9 COURSE PROJECT: Students are required to submit a course project that involves development of a data-mining application using sample, realistic data sets and modern tools for societal challenges.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Develop supervised and un-supervised classification model.
CO2- Choose useful pattern using Market Basket Analysis.
CO3- Evaluate the performance of supervised and un-supervised model
CO4- Apply Apriori algorithm for frequent item set generation
CO5- Design Rule based classifier.
CO6- Develop a data-mining application using sample, realistic data sets and modern tools for societal challenges

TEXT/REFERENCE BOOKS

1. Reference Lab Manual- Data Mining.
2. Robert Layton, Learning Data Mining with Python - Second Edition, Packt Publishing, O'Reilly, 2017.
3. https://nptel.ac.in/courses/106/105/106105174/

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 2 Hrs**

Part A: Continuous Evaluation based on lab records and course project. 50 Marks
Part B: 2 Experiment conducted and Viva at final exam. 50 Marks

20CP307T					Computer Graphics					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

COURSE OBJECTIVES

- To introduce concept of computer assisted picture generation and manipulation
- To understand an overview of interactive computer graphics, two-dimensional system.
- To understand the most important algorithm for graphical primitives, transformation, clipping and filing for 2D objects
- To study curve generation, 3D picture generation, transformation and animation techniques

UNIT 1 GRAPHICS HARDWARE AND LINE DRAWING ALGORITHMS **7 Hrs.**

Graphics hardware, Line, circle, ellipse, and polygon drawing algorithms, Graphical user interface – Logical classification of input devices.

UNIT 2 TWO-DIMENSIONAL TRANSFORMATION AND VIEWING TRANSFORMATION **7 Hrs.**

Two-dimensional transformation, Viewing transformation, Clipping, Curve.

UNIT 3 THREE DIMENSIONAL OBJECT REPRESENTATIONS AND PROJECTIONS **6 Hrs.**

Three-dimensional object representations, Three-dimensional transformations. Projections, Visible surfaces.

UNIT 4 RENDERING AND COLOR MODELS **6 Hrs.**

Rendering, Colour models, Modelling techniques and fractals, surface and hierarchical modelling. Animation: Computer assisted animation and real time animation techniques.

Max. 26 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Understand the design and algorithms for 2D graphics primitives and attributes.
CO2- Apply Geometric transformations on both 2D and 3D objects.
CO3- Apply concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models.
CO4- Analyze the suitable hardware and software for developing graphics packages using OpenGL.
CO5- Demonstrate Interactive games using multimedia contents.
CO6- Discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications

TEXT/REFERENCE BOOKS

1. John F. Hughes, Andries van Dam, Morgan McGuire, David F. Sklar, James D. Foley, Steven K. Feiner, Kurt Akeley. Computer Graphics: Principles and Practice, 3rd Edition, Pearson education
2. David F. Rogers, Mathematical elements for computer graphics, 2nd edition, Tata McGraw Hill, 2001
3. Donald Hearn, Pauline Baker, Computer graphics with OpenGL, 3rd edition, pearson education, 2004

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Part A: 10 Questions of 2 marks each-No choice 20 Marks

Part B: 2 Questions from each unit with internal choice, each carrying 20 marks 80 Marks

20CP307P					Computer Graphics LAB					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
-	-	4	2	4	-	-	-	50	50	100

COURSE OBJECTIVES

- Understand the need of developing graphics application
- Learn algorithmic development of graphics primitives like: line, circle, polygon etc.
- Learn the representation and transformation of graphical images and pictures.

LIST OF EXPERIMENTS

1. Display 2D line drawing as Raster Graphics Display.
2. Display basic 2D geometric primitives.
3. Display a filled square, Display a series of concentric circles of varying radius.
4. Display line drawing as Raster Graphics Display.
5. Display circle drawing as Raster Graphics Display.
6. Draw a line using Bresenham line drawing algorithm
7. Draw a circle using Midpoint algorithm. Modify the same for drawing an arc and sector.
8. Rotate a point about origin.
9. Rotate a triangle about origin.
10. Scale the triangle using 2D transformation, Translate a triangle using 2D transformation.
11. Reflect a triangle 2D transformation.
12. Polygon filling as Raster Graphics Display, Line clipping and polygon clipping.
13. Display 3D objects as 2D display using perspective transformation
14. Rotation of a 3D object about arbitrary axis.

COURSE OUTCOMES

On completion of the course, student will be able to:
CO1 -Apply mathematics and logic to develop Computer programs for elementary graphic operations
CO2- Separate scene with different clipping methods and its transformation to graphics display device
CO3- Apply projections and visible surface detection techniques for display of 3D scene on 2D screen
CO4- Show projected objects to naturalize the scene in 2D view and use of illumination models
CO5- Apply the logic to develop animation and gaming programs
CO6- Develop the competency to understand the concepts related to Computer Vision and Virtual reality

TEXT/REFERENCES

1. Interactive Computer Graphics A Top-Down Approach with OpenGL, Edward Angel, Pearson, 5 th Edition, 2009
2. Donald Hearn, Pauline Baker, Computer graphics with OpenGL, 3rd edition, pearson education, 2004

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 2 Hrs**

Part A : Lab Work – Continuous Assessment 50 Marks
Part B: Lab Exam and Viva 50 Marks

20CP308T					Distributed Systems					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

COURSE OBJECTIVES

- Understand foundations of Distributed Systems.
- Introduce the idea of peer to peer services and file system.
- Understand in detail the system level and support required for distributed system.
- Understand current distributed system research literature.

UNIT 1 INTRODUCTION TO DISTRIBUTED SYSTEM **7 Hrs.**

Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges. Time and Global States: Introduction, Clocks Events and Process States, Synchronizing Physical Clocks, Logical Time and Logical Clocks, Global States, Distributed Debugging

UNIT 2 Distributed System Models **7 Hrs.**

Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication, Consensus and Related Problems. Inter Process Communication: Introduction, The API for the Internet Protocols, External Data Representation and Marshalling, Client-Server Communication, Group Communication, Case Study: IPC in UNIX.

UNIT 3 Distributed Architectures and File System **6 Hrs.**

Introduction, Communication between Distributed Objects, Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI. Distributed File Systems: Introduction, File Service Architecture, and Case Study 1: Sun Network File System, Case Study 2: The Andrew File System. Name Services: Introduction, Name Services and the Domain Name System, Directory Services, Case Study of the Global Name Services.

UNIT 4 Distributed System Design and Operations **6 Hrs.**

Distributed Shared Memory: Introduction, Design and Implementation Issues, Sequential Consistency and IVY Case study, Release Consistency, Munin Case Study, Other Consistency Models. Transactions and Concurrency Control: Introduction, Transactions, Nested Transactions, Locks, Optimistic Concurrency Control, Timestamp Ordering, Comparison of Methods for Concurrency Control. Distributed Transactions: Introduction, Flat and Nested Distributed Transactions, Atomic Commit Protocols, Concurrency Control in Distributed Transactions, Distributed Deadlocks, Transaction Recovery

Max. 26 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Understand design of distributed systems.
CO2- Discuss issues in distributed system such as synchronization, coordination and agreement, etc.
CO3- Analyze distributed shared memory with consistency models.
CO4- Apply remote procedure call mechanism in distributed environment.
CO5- Use various inter-process coordination techniques.
CO6- Understand distributed shared memory and its usage.

TEXT/REFERENCE BOOKS

1. George Coulouris, J Dollimore and Tim Kindberg, Distributed Systems, Concepts and Design, Pearson Education.
2. Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems, Principles and Paradigms, PHI.
3. Sukumar Ghosh, Chapman&Hall, Distributed Systems, An Algorithm Approach, CRC, Taylor & Fransis Group.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Part A: 10 Questions of 2 marks each-No choice 20 Marks

Part B: 2 Questions from each unit with internal choice, each carrying 20 marks 80 Marks

20CP308P					Distributed Systems LAB					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	4	1	4	-	-	-	50	50	100

COURSE OBJECTIVES

- To examine the fundamental principles of distributed systems, and provide students hands-on experience in developing distributed protocols.
- To emphasize on communication, process, naming, synchronization.
- To address consistency and replication, and fault tolerance in distributed systems.

LIST OF EXPERIMENTS:

1. Write a Program to implement Concurrent Echo Client Server Application.
2. Write the Programs for Remote Procedure call, Remote Method Invocation
3. Write the Programs for Thread Programming in JAVA.
4. Implementation of Clock Synchronization (logical/physical)
5. Implementation of Mutual Exclusion algorithms
6. Implementation of Election algorithm.
7. Program to demonstrate process/code migration.
8. Write a distributed application using EJB
9. Write a program using CORBA to demonstrate object brokering.
10. Mini Project : e.g. using SOA
11. Study of Web service programming, Study of Grid Services using various Tools.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Develop remote procedure call mechanism in distributed environment.
CO2- Apply distributed computing techniques, synchronous and processes management in distributed environment.
CO3- Apply Shared Data access and Files concepts.
CO4- Design a DS that fulfils requirements with regards to key distributed systems properties.
CO5- Understand Distributed File Systems and Distributed Shared Memory.
CO6- Apply Distributed web-based system.

TEXT/REFERENCE BOOKS

1. George Coulouris, J Dollimore and Tim Kindberg, Distributed Systems, Concepts and Design, Pearson Education, 2017
2. Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems, Principles and Paradigms, PHI, 2016.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 2 Hrs**

Part A: Evaluate the continuous performance based on the lab work	50 Marks
Part B: Verify the performance using viva and critical experiment	50 Marks

20CP309T					Software Project Management					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

COURSE OBJECTIVES

- To outline the need for Software Project Management.
- To highlight different techniques for software cost estimation
- To make the students to understand activity planning and risk management
- To make the students to manage and control projects

UNIT 1 PROJECT EVALUATION AND PROJECT PLANNING **7 Hrs.**

Importance of Software Project Management – Categorization of Software Projects –Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology– Strategic program Management – Stepwise Project Planning.

UNIT 2 PROJECT LIFE CYCLE AND EFFORT ESTIMATION **7 Hrs.**

Software process and Process Models – Choice of Process models - mental delivery – Rapid Application development – Agile methods – Extreme Programming – SCRUM –Effort and Cost estimation techniques –COCOMO II A Parametric Productivity Model

UNIT 3 ACTIVITY PLANNING AND RISK MANAGEMENT **6 Hrs.**

Objectives of Activity planning –Activities – Sequencing and scheduling –Network Planning models –Critical path (CRM) method– Risk identification – Assessment – Monitoring – PERT technique – Monte Carlo simulation –Creation of critical patterns – Cost schedules.

UNIT 4 PROJECT MANAGEMENT AND CONTROL **6 Hrs.**

Framework for Management and control – Collection of data Project termination – Visualizing progress – Cost monitoring – Earned Value Analysis- Project tracking – Change control- Software Configuration Management – Managing contracts – Contract Management

Max. 26 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Explain software project management and its use in in real time applications
CO2- Estimate cost and efforts required for design and development of software project
CO3- Explain activity planning and risk management
CO4- Compare software project management models.
CO5- Choose appropriate method for a given problem statement
CO6- Apply SDLC model and types of testing design and maintenance.

TEXT/REFERENCE BOOKS

1. Andrew Stellman, Jennifer Greene, Applied Software Project Management, OREILLY
2. Robert T. Futrell et. al. , Quality Software Project Management., OREILLY
3. Microsoft Project Standard 2019 by Microsoft

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration : 3 Hrs.**

Part A: 10 Questions of 2 marks each-No choice 20 Marks
Part B: 2 Questions from each unit with internal choice, each carrying 20 marks 80 Marks

20CP309P					Software Project Management LAB					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	4	2	4	-	-	-	50	50	100

COURSE OBJECTIVES

- To outline the need for Software Project Management.
- To highlight different techniques for software cost estimation
- To make the students to understand activity planning and risk management
- To make the students to manage and control projects

LIST OF EXPERIMENTS

1. Create Project Plan: Specify project name and start (or finish) date., Identify and define project tasks., Define duration for each project task., Define milestones in the plan, Define dependency between tasks
2. Define Project Parameters: Define project calendar, Define project resources, Specify resource type and resource rates, Assign resources against each task, Baseline the project plan
3. Execute and Monitor Project Plan
4. Generate Dashboard and Reports

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Apply software project management life cycle in real time applications
CO2- Compare software project management models.
CO3- Identify different project parameters.
CO4- Estimate cost and efforts required for design and development of software project
CO5- Develop an applications of software project management.
CO6- Design dashboard and generates reports of their project.

TEXT/REFERENCE BOOKS

1. Andrew Stellman, Jennifer Greene, Applied Software Project Management OREILLY
2. Robert T. Futrell et. al., Quality Software Project Management. OREILLY
3. Microsoft Project Standard 2019 by Microsoft

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 2 Hrs**

Part A: Evaluation Based on the class performance and Laboratory book 50 Marks
Part B: Viva Examination based conducted experiments 50 Marks

20CP310T					Advanced JAVA					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	-	-	100

COURSE OBJECTIVES

- Teach the Students for developing interactive user-friendly interfaces using the Swing and JDBC
- Explain the enterprise architectures and networking in Java
- Educate the students for developing web-based applications using Java Server Pages and Java Servlets.
- Demonstrate the use of Advanced Java Frameworks such as Spring and Hibernate.

UNIT 1 GUI PROGRAMMING AND DATABASE CONNECTIVITY **7 Hrs.**

Swing : JFC, MVC Architecture, GUI Components from Swing, Pluggable Look and Feel, JDBC: JDBC Architecture; JDBC Drivers, CURD operation Using JDBC

UNIT 2 JAVA NETWORKING AND J2EE **7 Hrs.**

Network Programming in Java using the java.net package; Establishing two-way communication between Server and Client using TCP and UDP; Features of Java Enterprise Edition; Architecture of Java EE; Working with EJB

UNIT 3 SERVER SIDE WEB PROGRAMMING **6 Hrs.**

Servlets: Servlet Life cycle; Servlet Programming, Session Tracking Mechanisms, Event Handling. Java Server Pages: Architecture of JSP, Life Cycle of JSP Page, Working with basic JSP Basic Tags, Tag Extension API in Java, Introduction to JSTL

UNIT 4 ADVANCED JAVA FRAMEWORKS **6 Hrs.**

Hibernate : Architecture of Hibernate; HQL; Setting up the development environment; Implementing O/R mapping with Hibernate, Spring MVC : Spring Framework Architecture, Spring's Web MVC Framework

Max. 26 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Explain basic architecture of JAVA.
CO2- Illustrate basic concepts of object-oriented programming and apply these concepts with the help of Java Language
CO3- Apply GUI programming and database connectively.
CO4- Simulate the networking in java.
CO5- Explain architecture of Servlets and hibernate.
CO6- Develop application using frameworks/technology such as Spring and Hibernate

TEXT/REFERENCE BOOKS

1. Herbert Schildt, "Java: The Complete Reference, 10th Edition", McGraw-Hill.
2. Java Server Programming Java EE 7 (J2EE 1.7) Black book, DreamTech Publication.
3. M.T. Savaliya, "Advance Java Technology", Kogent Learning Solutions Inc., DreamTech Publication.
4. Uttam Kumar Roy, "Advanced Java Programming", Oxford University Press.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Part A: 10 Questions of 2 marks each-No choice 20 Marks
Part B: 2 Questions from each unit with internal choice, each carrying 16 marks 80 Marks

20CP310P					Advanced JAVA LAB					
Teaching Scheme					Examination Scheme					
					Theory			Practical		
L	T	P	C	Hrs/Week	MS	ES	IA	LW	LE/Viva	Total Marks
0	0	4	2	4	--	--	--	50	50	100

COURSE OBJECTIVES

- Learn the techniques for developing interactive user-friendly interfaces
- Demonstrate the implementation of networking in Java
- Explain the development of web-based applications using JSP and Java Servlets.
- Provide the knowledge of Advanced Java Frameworks such as Spring and Hibernate.

LIST OF EXPERIMENTS

1. Create a simple calculator application using Swing in Java
2. Create a tic-tack-toe game in Swing GUI.
3. Implement Student information system using JDBC
4. Create chat application using TCP protocol and UDP protocol
5. Write a servlet that counts the number of times that web page is visited and displays the same information on that page.
6. Implement an employee payroll system using servlet technology.
7. Create a Login application using servlet and JSP,
8. Use JSTL to implement following objectives
   a) Create a web page that prints 1 to 10 using JSTL 8.2
   b) Create a custom JSP tag that prints current date and time. Use this tag into JSP page.
9. Create a hibernate application for employee payroll system.
10. Create an online appointment booking application using Spring Web MVC framework

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Use Java swing package to create user-friendly interfaces.
CO2- Connect database using Java program.
CO3- Develop an enterprise architecture solution using Java technology.
CO4- Execute the networking applications in java.
CO5- Develop web-based applications using Servlet, JSP and JSTL.
CO6- Build application using Java programming frameworks such as Spring and Hibernate

TEXT/REFERENCE BOOKS

1. Herbert Schildt, Java: The Complete Reference, McGraw-Hill. 11th Edition, 2018
2. Kogent Learning Solutions Inc., Java Server Programming Java EE 7 (J2EE 1.7) Black book, DreamTech Publication, 2014
3. M.T. Savaliya, Advance Java Technology, DreamTech Publication, 2011
4. Uttam Kumar Roy, Advanced Java Programming, Oxford University Press, 2015

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 2 Hrs**

Part A: Evaluation Based on the class performance and Laboratory book 50 Marks
Part B: Viva Examination based conducted experiments 50 Marks

Department Open Electives- (V Semester)

20CP311T					Introduction to Computer Security					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	-	-	100

COURSE OBJECTIVES

- To learn fundamental concepts of Security
- To study Internet Security
- To study Hardware and Software Security
- To study Cyber Security

UNIT 1 INTERNET SECURITY **10 Hrs.**

Overview of Network Security, Security services, attacks, Security Issues in TCP/IP suite- Sniffing, spoofing, ARP poisoning, ICMP Exploits, IP address spoofing, IP fragment attack

UNIT 2 SOFTWARE SECURITY **10 Hrs.**

Protection against Threats, intruders, Viruses and Worms, Malicious Software, Distributed Denial of Service Attacks, Security issues in Operating Systems, Intrusion Detection System Overview, Malware Detection and Prevention, Firewalls. Android, iOSMobile platform security models, Detecting Android malware in Android markets

UNIT 3 HARDWARE SECURITY **10 Hrs.**

Side-channel Attacks on Cryptographic Hardware: Basic Idea, Current-measurement based Side-channel Attacks, Design Techniques to Prevent Side-channel Attacks, Improved Side-channel Attack Algorithms (Template Attack, etc.), and Cache Attacks.

UNIT 4 CYBER SECURITY **9 Hrs.**

Internet Governance – Challenges and Constraints, Cyber Threats-Cyber Warfare-Cyber Crime-Cyber terrorism-Cyber Espionage, Need for a Comprehensive Cyber Security Policy.

Max. 39 Hrs

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Analyze different types of attacks on computer.
CO2- Apply various methods for securing data and network.
CO3- Apply cyber security solutions.
CO4- Compare various hardware security techniques
CO5- Determine software security problems
CO6- Design security solutions to real time problems.

TEXT/REFERENCE BOOKS

1. William Stallings, "Cryptography and Network Security Principles and Practice", Pearson Education.
2. Debdeep Mukhopadhyay, Rajat Subhra Chakraborty, "Hardware Security: Design, Threats, and Safeguards", CRC Press
3. Nina Godbole, Cyber Security, Wiley Publications

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

Part A: 10 Questions of 2 marks each-No choice 20 Marks
Part B: 2 Questions from each unit with internal choice, each carrying 20 marks 80 Marks

20CP312T					Introduction to Data Mining					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25			100

COURSE OBJECTIVES

- To be familiar with mathematical foundations of data mining tools.
- Understand and implement classical models and algorithms in data mining
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- To develop skills for using recent data mining software to solve practical problems in a variety of disciplines.

UNIT 1 INTRODUCTION **10 Hrs.**

Introduction: What is Data Mining? Motivating Challenges; The origins of data mining; Data Mining Tasks. Types of Data; Data Pre-processing, Measures of Similarity and Dissimilarity.

UNIT 2 SUPERVISED LEARNING **10 Hrs.**

Classification: Preliminaries; General approach to solving a classification problem; Decision tree induction; Rule-based classifier; Multilinear and Logistic Regression.

UNIT 3 ASSOCIATION ANALYSIS **10 Hrs.**

Problem definition, Frequent item set generation; Rule Generation; Compact representation of frequent item sets; Alternative methods for generating frequent item sets. FP-Growth algorithm, Evaluation of association patterns, Effect of skewed support distribution, Sequential patterns.

UNIT 4 UNSUPERVISED LEARNING & CLUSTERING **9 Hrs.**

Clustering, KNN, Clustering Review, Outlier Detection, Recent Trends in Data Mining.

Max. 39 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to
CO1- Understand the basic concepts of data mining along.
CO2- Apply measures of similarity and dissimilarity to find the proximity between data objects.
CO3- Analyze the performance of supervised and unsupervised models.
CO4- Choose suitable data mining algorithms to solve real world problems.
CO5- Classify interesting patterns from large amounts of data as information.
CO6- Explain different clustering algorithms.

TEXT/REFERENCE BOOKS

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar,Introduction to Data Mining- Pearson Education.
2. Jiawei Han and Micheline Kamber, Data Mining–Concepts and Techniques- 2nd Edition, Morgan Kaufmann.
3. K.P. Soman, Shyam Diwakar, V. Ajay, Insight into Data Mining–Theory and Practice- PHI

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hrs**
Part A: 10 Questions of 2 marks each-No choice	20 Marks
Part B: 2 Questions from each unit with internal choice, each carrying 20 marks	80 Marks

20HS301P					Communication Skills-III					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	0	2 hours per week	--	--	--	50	50	100

COURSE OBJECTIVES

1. Understand of the fundamental elements of communication in English language.
2. Know and understand different practices of verbal and non-verbal communication with inputs to improve basic language skills.
3. Students are expected to be better equipped in the following areas:
   - **Listening:** Understanding basic content in lectures and common everyday situations
   - **Speaking:** Correct expression in the English language at a basic level
   - **Reading:** Understanding, retaining, and critically analyzing technical/non-technical content
   - **Writing:** Using appropriate vocabulary, grammar, effective paragraph construction, writing in day-to-day scenarios, including digital platforms

UNIT 1 Writing research proposals, Writing technical projects **10 hrs**

UNIT 2 **15 hrs**

- The Art of Presentation
  - *Sapiens: A Brief History of Humankind* (2011), Yuval Noah Harari
  - *Thank You for Being Late: An Optimist's Guide to Thriving in the Age of Accelerations* (2016), Thomas L. Friedman
  - (Presentation in teams of 4 students each, not more than two from the same branch, with a view to promote cross-disciplinary research)

UNIT 3 **5 hrs**

Uploading portfolios on SlideShare

- ✓ Uploading Video modules

Max. 30 hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1 Confidence to listen, speak, read and write in English
- CO2 Being able to produce something new with the help of inputs
- CO3 Learning to critically analyze
- CO4 Preparing reports/critique with the help of collected data
- CO 5 Having a multi-dimensional/disciplinary perspective and approach
- CO6 Better improved and sharpened skills to present, convince and persuade to be an effective and successful professional.

TEXT/REFERENCE BOOKS

1. Kaul, Asha. Business Communication. Delhi: Prentice-Hall of India, 2006.
2. Maley, A. 'Literature in the Language Classroom', The Cambridge Guide to Teaching ESOL, Cambridge University Press, 2001.
3. Richards, Jack C., and Willy A. Renandya, eds. Methodology in Language Teaching: An Anthology of Current Practice. Cambridge University Press, 2002.
4. Sharma, Sangeeta and Binod Mishra. Communication Skills for Engineers and Scientists. New Delhi: PHI Learning Pvt. Ltd., 2009.

Assessment Tool	Marks	Assignments
Lab Work	50	• Business Proposal – 15, Research Project Proposal – 15 • Reviews on the two books – 20
Lab Exam/Viva	50	• Presentation on the reviews of the two books (Intra Branch) – 15 • Presentation on a technical topic (Inter Branch) – 15 • Slideshare/Video Modules (Prescribed Texts) – 20