T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E.(Information Technology)							**T.E.(SEM :** V)		
Course Name : Microcontroller And Embedded Programming							**Course Code : ITC501**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	
4	-	-	4	4	20	80	--	--	**100**

IA: In-Semester Assessment- Paper Duration – **1Hours**
ESE : End Semester Examination- Paper Duration - **3 Hours**
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).

Prerequisite: Computer Organization & Architecture, Microprocessor and Assembly programming language

Course Objective: The course intend to deliver the fundamentals of architecture of embedded systems, microcontroller 8051, microcontroller interface and apply to know about ARM architecture, concepts of real-time operating system, design platforms used for an embedded systems application.

Course Outcomes: Upon completion of the course student will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Explain the embedded system concepts and architecture of embedded system.	L1, L2
2	Describe the architecture of 8051 microcontroller and write embedded program for 8051 microcontroller.	L1, L2
3	Design the interfacing for 8051 microcontroller.	L1, L2, L3, L4
4	Understand the concepts of ARM architecture.	L1, L2,L3
5	Demonstrate the open source RTOS and solve the design issues for the same.	L1, L2, L3, L4
6	Select elements for an embedded systems tool.	L1, L2, L3, L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
0	**Prerequisite** Revision of microcomputer system terminologies, High level, Machine level and Assembly level programming language , difference between microprocessor and microcontroller	**01**	L1, L2
1	**Introduction to Embedded systems** Overview of Embedded System Architecture, Application areas, Categories of embedded systems, specialties of embedded systems. Recent trends in embedded systems. Brief introduction to embedded microcontroller cores CISC, RISC, ARM, DSP and SoC.	**05**	L1, L2
2	**The Microcontroller Architecture and Programming of 8051** Introduction to 8051 Microcontroller, Architecture, Pin configuration, Memory organization, Input /Output Ports, Counter and Timers, Serial communication, Interrupts. Instruction set, Addressing modes, Development tools, Assembler Directives, Programming based on Arithmetic & Logical Operations, I/O parallel and serial ports, Timers & Counters, and ISR.	**12**	L1, L2

3	**Interfacing with 8051Microcontroller**	**06**	L1, L2, L3, L4
	Interfacing ADC, DAC, Stepper motor, LCD, KBD matrix, 8255 PPI.		
4	**ARM 7 Architecture**	**11**	L1, L2, L3
	Architectural inheritance, Detailed study of Programmer's model, ARM Development tools, Instruction set: Data processing, Data Transfer, Control flow. Addressing modes. Writing simple assembly language programs. Pipelining, Brief introduction to exceptions and interrupts handling.		
5	**Open source RTOS**	**09**	L1, L2, L3, L4
	Basics of RTOS: Real-time concepts, Hard Real time and Soft Real-time, differences between general purpose OS & RTOS, basic architecture of an RTOS, scheduling systems, inter-process communication, performance Matrix in scheduling models, interrupt management in RTOS environment, memory management, file systems, I/O systems, advantage and disadvantage of RTOS. POSIX standards, RTOS issues – selecting a Real Time Operating System, RTOS comparative study.		
6	**Introduction to Embedded target boards**	**08**	L1, L2, L3, L4
	Introduction to Arduino, Raspberry Pi, ARM Cortex etc. Open- source prototyping platforms. Basic Arduino programming; Extended Arduino libraries; Arduino-based Internet communication; Raspberry pi; ARM Cortex Processors; Interfacing with Temperature, Pressure, Humidity sensor		
	Total Hr.	**52**	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1.	The 8051 microcontroller & Embedded systems Using Assembly and C	M. A. Mazidi, J. G. Mazidi, R. D., McKinlay	Pearson	3rd	2008
2.	Embedded / real – time systems: concepts, design & programming, Black Book	Dr. K V. K. K. Prasad	Dreamtech press	Reprint	2013
3.	Introduction to embedded systems	Shibu K. V	McGraw Hill	3rd	2016
4.	Embedded systems an integrated approach	Laya B. Das	Pearson	3rd	2013
5.	ARM System on chip Architecture	Steve Furber	Pearson	2nd	2014
6.	Arduino Cookbook	Michael Margolis	O'reilly	2nd	2011
7.	Raspberry Pi Cookbok	Simon Monk	O'reilly	2nd	2016
8.	Getting Started with Arduino: The Open Source Electronics Prototyping Platform (Make)	Massimo Banzi,	O'Reilly Media	3rd	2014

Online Recourses:

S. No.	Website Name	URL	Modules covered
1.	https://www.elprocus.com	https://www.elprocus.com/basics-of-embedded-system-and-applications/	M1
2.	https://www.elprocus.com	https://www.elprocus.com/8051-microcontroller-architecture-and-applications/	M2
3.	https://www.elprocus.com	https://www.elprocus.com/peripherals-interfacing-to-the-microcontroller-8051-in-electronics/	M3
4.	http://infocenter.arm.com	http://infocenter.arm.com/help/index.jsp?topic=/com.arm.doc.set.arm7/index.html	M4
5.	https://freertos.org	https://freertos.org/FAQWhat.html	M5
6.	https://www.elprocus.com	https://www.elprocus.com/different-types-of-microcontroller-boards/	M6

T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E.(Information Technology)							**T.E.(SEM :** V)		
Course Name : Internet Programming							**Course Code : ITC502**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	
4	-	2	6	5	20	80	25	25	**150**
IA: In-Semester Assessment- Paper Duration – **1 Hours** **ESE : End Semester Examination-** Paper Duration - **3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).									
Prerequisite: Basic Java Programming, Python Programming									

Course Objective: The course intend to deliver the fundamentals of the Internet Programming and apply to create web site, develop responsive web applications, web extensions, web services standards, and characteristics of RIA –Web Mashup Eco System by using Python web framework-Django.

Course Outcomes: Upon completion of the course student will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Implement interactive web page(s) using HTML, CSS and JavaScript.	L1, L2
2	Design a responsive web site using HTML5 and CSS3.	L1, L2
3	Demonstrate Rich Internet Application.	L1, L2, L3
4	Build Dynamic web site using server side PHP Programming and Database connectivity.	L1, L2, L3
5	Describe and differentiate different Web Extensions and Web Services.	L1, L2, L3
6	Demonstrate web application using Python web Framework-Django.	L1, L2, L3, L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Client Side Programming :HTML, CSS and JavaScript** **Basic of HTML:** Web System architecture-1,2,3 and n tier Architecture, URL, domain name system, overview of HTTP and FTP, Cross browser compatibility issues, W3C Validators. Formatting and Fonts, Anchors, images, lists, tables, frames and Forms. **Introduction to CSS**: Evolution of CSS, Syntax of CSS, Exploring CSS Selectors, Inserting CSS in an HTML Document, Defining Inheritance in CSS. **Introduction to JavaScript:** JavaScript language constructs, Objects in JavaScript- Built in, Browser objects and DOM objects, event handling, form validation and cookies.	**09**	L1, L2

2	**HTML5 and Responsive Web Design with CSS3** **HTML 5 :** Fundamental Syntax and Semantics, Native Audio and Video, Micro data and Custom data, Accessibility, Geo-location, Canvas **CSS3 and Responsive Web Design** Media Queries: Supporting Differing Viewports, Embracing Fluid Layout. **CSS3:** Selectors, Typography and color Modes, Stunning Aesthetics with CSS3, CSS3 Transitions, Transformations and Animations, Conquer Forms HTML5 and CSS3	**10**	L1, L2, L3
3	**Web Extensions and Web Services** **Web Extensions**: Introduction to XML, Introducing XSL. Web services: Evolution and differences with Distributed computing, WSDL, SOAP, UDDI. REST-ful web services, Resource Oriented Architecture	**07**	L1, L2
4	**Server Side Programming: PHP** Introduction to PHP- Data types, control structures, built in functions, Building web applications using PHP- tracking users, PHP and Mysql database connectivity with example. Introduction to PHP Framework.	**10**	L1, L2, L3
5	**Rich Internet Application(RIA)** Characteristics of RIA, **Introduction to AJAX** :AJAX design basics, AJAX vs Traditional Approach, , Rich User Interface using Ajax. **Working with JavaScript Object Notation(JSON)**: Create data in JSON format, JSON Parser. Web Mashup Eco Systems –Mashup Techniques: Mashing on the Web Server, Mashing with JSON	**10**	L1, L2, L3
6	**Python Web Framework: Django** Introduction, Web Frameworks, Introduction to Django, Projects and Apps, "Hello World" Application.	**05**	L1, L2, L3
	Total Hrs.	**51**	

Practical List:

Practical No.	Type of Experiment	Practical/Experiment topic	Cognitive levels of attainment as per Bloom's Taxonomy
1	Mini Project	HTML, CSS, Java Script, AJAX, JSON, PHP, Web services	L1, L2, L3, L4
Total Hrs.			30

Books and References

Sr. No	Title	Authors	Publisher	Edition/Year
1	Web Technologies: Black Book	Dreamtech series	Dreamtech Press	First Edition /2018
2	Learning PHP 5	David Sklar	O'Reilly Publication	First Edition /2004
3	Rich Internet Application AJAX and Beyond	Dana Moore, Raymond Budd, Edward Benson	WROX press	First Edition /2007
4	Responsive Web Design with HTML5 and CSS3	Ben Frain	PACKT Publication	First Edition/2012

Online References:

S. No.	Website Name	URL	Modules Covered
1.	https://www.programiz.com https://www.javatpoint.com	https://www.w3schools.com/html/default.asp https://www.w3schools.com/html/html_css.asp https://www.w3schools.com/html/html_scripts.asp	M1
2.	https://www.javatpoint.com	https://www.w3schools.com/html/html5_intro.asp https://developer.mozilla.org/en-US/docs/Web/CSS/CSS3	M2
3.	https://www.javatpoint.com	https://www.w3schools.com/xml/default.asp https://www.w3schools.com/xml/xml_dtd.asp	M3
4.	https://www.javatpoint.com	https://www.w3schools.com/xml/ajax_intro.asp	M4
5.	https://www.javatpoint.com	https://www.w3schools.com/php/default.asp	M5
6.	https://www.javatpoint.com	https://www.djangoproject.com/start https://realpython.com/tutorials/django	M6

T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E.(Information Technology)							T.E.(SEM : V)		
Course Name : Advance Data Management Technology							Course Code : ITC503		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR	TW	
4	-	2	6	5	20	80	25	25	150

IA: In-Semester Assessment- Paper Duration – **1Hours**
ESE : End Semester Examination- Paper Duration - **3 Hours**
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).

Prerequisite: Database Management System

Course Objective: Course should be able to deliver the fundamental knowledge of advanced transaction management, recovery techniques, query processing and query optimizer, advanced access control techniques, database models and apply to analyze emerging data models like temporal, mobile and spatial databases, Create awareness of Data Warehouse.

Course Outcomes: Upon completion of the course students will be able to:

SN	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Explain and understand the concept of a transaction and how ACID properties are maintained when concurrent transaction occur in a database	L1,L2
2	Measure query costs and design alternate efficient paths for query execution.	L1,L2,L3,L4
3	Apply sophisticated access protocols to control access to the database.	L1, L2
4	Implement alternate models like Distributed databases and Design applications using advanced models like mobile, spatial databases.	L1,L2,L3
5	Organize strategic data in an enterprise and build a data Warehouse.	L1,L2
6	Analyze data using OLAP operations so as to take strategic decisions.	L1,L2,L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Query Processing and Optimization** Overview, Measures of Query Cost Selection Operation, Sorting, Join Operation, Other Operations Evaluation of Expressions. Query Optimization Overview, Transformation of Relational Expressions Estimating Statistics of Expression Results Choice of Evaluation Plans	05	L1,L2
2	**Transactions Management and Concurrency** Transaction concept, Transaction states, ACID properties, Implementation of atomicity and durability, Concurrent Executions, Serializability, Recoverability, Implementation of isolation, Concurrency Control: Lock-based, Time-stamp based Deadlock handling, Recovery System: Failure Classification, Storage structure, Recovery & atomicity, Log based recovery, Checkpoints, Shadow Paging, ARIES Algorithm.	10	L1,L2,L3
3	**Advanced Data Management techniques** Advanced Database Access protocols: Discretionary Access Control Based on Granting and Revoking Privileges; Mandatory Access Control and Role-Based Access Control. Overview of Advanced Database models like Mobile databases, Temporal databases, Spatial databases.	09	L1, L2

4	**Distributed Databases**	9	L1,L2,L3
	Introduction: Distributed Data Processing, What is a Distributed Database System? Design Issues .Distributed DBMS Architecture. Distributed Database Design: Top-Down Design Process, Distribution Design Issues, Fragmentation, and Allocation. Overview of Query Processing : Query Processing Problem, Objectives of Query Processing, Complexity of Relational Algebra Operations, Characterization of Query Processors, Layers of Query Processing, Query Optimization in Distributed Databases, Overview of Transaction Management in DDB; Overview of Concurrency Control in DDB; Overview of Recovery in DDB		
5	**Data Warehousing, Dimensional Modeling and OLAP**	11	L1, L2
	The Need for Data Warehousing; Data Warehouse Defined; Benefits of Data Warehousing; Features of a Data Warehouse; Data Warehouse Architecture; Data Warehouse and Data Marts; Data Warehousing Design Strategies. Dimensional Model Vs ER Model; The Star Schema; How Does a Query Execute? The Snowflake Schema; Fact Tables and Dimension Tables; Fact less Fact Table; Updates To Dimension Tables, Primary Keys, Surrogate Keys & Foreign Keys; Aggregate Tables; Fact Constellation Schema or Families of Star Need for Online Analytical Processing; OLTP vs OLAP; OLAP Operations in a cube: Roll-up, Drill- down, Slice, Dice, Pivot ; OLAP Models: MOLAP, ROLAP, HOLAP.		
6	**ETL Process**		L1,L2,L3,L4
	Challenges in ETL Functions; Data Extraction; Identification of Data Sources; Immediate Data Extraction, Deferred Data Extraction; Data Transformation: Tasks Involved in Data Transformation, Techniques of Data Loading, Loading the Fact Tables and Dimension Tables	6	
	Total Hrs.	**50**	

List of Practical/ Experiment:

Practical No.	Type of Experiment	Practical/Experiment topic	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Basic experiment**	To Study SQL: a) To Study DDL, DML, DCL commands. b) To Study Order By, Group By, nested and recursive queries. c) To Study SQL Joins.	6	**L1,L2,L3,L4**
2		Implementation of any Query optimizer using (Java/Python)	2	**L1,L2,L3,L4**
3		Assignments for query evaluation path expressions	2	**L1,L2,L3,L4**
4	**Design Experiment**	Simulation of Concurrency Control Algorithm (Java/Python)	2	**L1,L2**
5		Simulation of Recovery Method Algorithm (Java/Python)	2	**L1,L2,L3**
6		To Study Distributed Database: a) Implement Horizontal, Vertical and Hybrid fragmentation on Database b) To study Query Processing and Optimization in Distributed Databases.	4	**L1,L2,L3**
7		Advanced Database Models Case study based assignments for Temporal, Mobile or Spatial databases	2	**L1,L2,L3**
8		Data Warehouse Construction a) Real life Problem to be defined for Warehouse Design. b) Construction of star schema	2	**L1,L2,L3**
9		a) To Study ETL process. b) To Perform Data Loading, Cleansing and retrieval using Python and MySQL.	2	**L1,L2,L3**
10		Design of a DW and running OLAP operations on them (Roll up, Drill down, Slice, Dice, pivot)	2	**L1,L2,L3,L4**
11	**Group Activity/ Case study**	a) To Study Open Source Databases. b) To Study NoSQL.	4	**L1,L2,L3,L4**
		Total Hrs.	**30**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Database System Concepts	Korth, Slberchatz, Sudarshan	McGraw – Hill	6th Edition	2009
2	Fundamentals of Database Systems	Elmasri and Navathe	PEARSON Education.	7th Edition	2016
3	Database Management Systems	Raghu Ramakrishnan and Johannes Gehrke,	McGraw Hill	3rd Edition	2002
4	Data Warehousing	Theraja Reema	Oxford University Press	1st Edition	2009
5	Data Warehousing: Fundamentals for IT Professionals	Paulraj Ponniah	Wiley India.	2nd Edition	2007
6	Database Systems : A Practical Approach to Design implementation and Management	Thomas M. Connolly Carolyn Begg	Pearson	4th Edition	2008
7	The Data Warehouse Toolkit: The Definitive Guide To Dimensional Modeling	Ralph Kimball, Margy Ross	Wiley India	3rd Edition.	2019
8	Data Mining Concepts and Techniques	Han, Kamber	Morgan Kaufmann	3nd Edition.	2008

Online References:

Sr. No.	Website Name	URL	Modules Covered
1.	https://www.geeksforgeeks.org/	https://www.geeksforgeeks.org/query-optimization/	M1
2.	https://www.w3schools.in	https://www.w3schools.in/dbms/transaction-and-concurrency-control/	M2
3.	https://www.geeksforgeeks.org/	https://www.geeksforgeeks.org/dbms-concurrency-control-protocols-lock-based-protocol/	M3
4.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/distributed_dbms/	M4
5.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/dwh/dwh_multidimensional_olap	M5
6.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/sap_bods/etl_introduction	M6

T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E.(Information Technology)							**T.E.(SEM : V)**		
Course Name : Cryptography & Network Security							**Course Code : ITC504**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	
4	-	2	6	5	20	80	25	25	**150**
IA: In-Semester Assessment- Paper Duration – **1 Hour** **ESE : End Semester Examination-** Paper Duration - **3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning attitude (20%).									
Prerequisite: Computer Networks , Basic concepts of OSI Layer									

Course Objective: The course intend to deliver the fundamentals of encryption techniques, finite fields, number theory, cryptographic algorithms including secret key cryptography, hashes and message digests, public key algorithms, authentication protocols, PKI standards and apply them to techniques as Kerberos, IPsec, and SSL/TLS and email, analyze cryptographic utilities, authentication mechanisms to design secure applications.

Course Outcomes: Upon completion of the course student will be able to:

S. N	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory.	L1, L2, L3
2	Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication	L1, L2, L3
3	Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes	L1, L2, L3, L4
4	Apply different digital signature algorithms to achieve authentication and create secure applications	L1, L2, L3
5	Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP.	L1, L2, L3, L4
6	Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure application	L1, L2, L3

Detailed Syllabus:

Module No.	Topics	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction** Principle of security, Service Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, mono-alphabetic and poly-alphabetic substitution techniques: Vignere cipher, playfair cipher, Hill cipher, transposition techniques: keyed and keyless transposition ciphers, steganography).	7	L1, L2, L3
2	**Block Ciphers & Public Key Cryptography** Data Encryption Standard-Block cipher principles-block cipher modes of operation, Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm, The knapsack algorithm, El-Gamal Algorithm. Key management – Diffie Hellman Key exchange	8	L1, L2, L3

3	**Cryptographic Hashes, Message Digests and Digital Certificates** Authentication requirement – Authentication function , Types of Authentication, MAC – Hash function – Security of hash function and MAC –MD5 – SHA – HMAC – CMAC, Digital Certificate: X.509, PKI	7	L1, L2, L3, L4
4	**Digital signature schemes and authentication n Protocol** Digital signature and authentication protocols: Needham Schroeder Authentication protocol, Digital Signature Schemes – RSA, EI Gamal and Schnorr, DSS.	10	L1, L2, L3, L4
5	**Network Security** Network security basics: TCP/IP vulnerabilities (Layer wise), Packet Sniffing, ARP spoofing, port scanning, IP spoofing, TCP syn flood, DNS Spoofing. Denial of Service: Classic DOS attacks, Source Address spoofing, ICMP flood, SYN flood, UDP flood, Distributed Denial of Service, Defenses against Denial of Service Attacks. Firewalls, Intrusion Detection Systems: Host Based and Network Based IDS, Honey pots.	10	L1, L2, L3, L4
6	**Network Security Applications** Authentication Applications, Kerberos, Internet Security Protocols: SSL, TLS, IPSEC: AH, ESP, Secure Email: PGP and S/MIME, Key Management.	**8**	L1, L2, L3, L4
	Total Hrs	**50**	

Suggested Topics for Practical's:

Practical No.	Type of Experiment	Practical/Experiment topic	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Basic experiment**	To implement conventional cryptographic techniques Ceaser Cipher,Vernam cipher.(Substitution cipher)	2	L1, L2, L3
2		Study the use of network reconnaissance tools like WHOIS, dig,traceroute nslookup to gather information about networks and domain registrars	2	L1, L2, L3, L4
3		Implementation of Diffie Hellman Key exchange algorithm	2	L1, L2, L3, L4
4	**Design Experiment**	Demonstrate and test integrity of message using MD-5, SHA-1, For varying message sizes, and analyze the performance of the two protocols. Use crypt APIs.	2	L1, L2, L3, L4
5		Implementation and analysis of RSA cryptosystem and Digital signature scheme using RSA/El Gamal	2	L1, L2, L3, L4
6		Study of packet sniffer tools wireshark, :- 1. Observer performance in promiscuous as well as non-promiscuous mode. 2. Show the packets can be traced based on different filters	2	L1, L2, L3, L4
7		Demonstrate the use of nmap with different options to scan open ports, perform OS finger printing , ping scan , tcp port scan , udp port scan etc.	2	L1, L2, L3, L4
8		Study and Simulation of DOS attack using Hping and other tools	2	L1, L2, L3, L4
9		Study andUse the NESSUS/ISO Kaali Linux tool to scan the network for vulnerabilities.	2	L1, L2, L3, L4
10		Set up IPSEC under LINUX and explore GPG tool of linux to implement email security	2	L1, L2, L3, L4
11		Setup Snort and study the logs	2	L1, L2, L3, L4
12	**Group Activity/ Case study**	Case study	2	L1, L2, L3, L4
13		Mini project	6	L1, L2, L3, L4
		Total Hrs	**30**	

Books & References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1	Information Security Principles and Practice	Mark Stamp, Deven Shah	Cengage Learning	2nd Edition	2011
2	Cryptography and Network Security, Principles and Practice	William Stallings	Pearson Education	6th Edition	2013
3	Cryptography & Network Security	Behrouz A. Ferouzan	Tata Mc Graw Hill	2nd Edition	2008
4	Cryptography & Network Security	Bernard Menezes	Cengage Learning	1st Edition	2010
5	Cryptography and Network Security	Atul Kahate	Mc Graw Hill education.	2nd Edition	2008

Online References

Sr No	Web Link
1	https://nptel.ac.in/courses/106105031/
2	https://www.coursebuffet.com/course/814/nptel/cryptography-and-network-security-iit-kharagpur

T.E. Semester –V
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E.(Information Technology)							T.E.(SEM : V)		
Course Name : Advanced Data Structures and Analysis of algorithms							Course Code : ITDLO5011		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral/ (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR	TW	
4	-	-	4	4	20	80	--	--	100
IA: In-Semester Assessment- Paper Duration – **1Hours** **ESE : End Semester Examination-** Paper Duration - **3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).									
Prerequisite: knowledge of programming languages, Data structure and analysis									

Course Objective: The course intend to deliver the fundamentals of mathematical background required for analysis of algorithm, advanced data structures, concept of designing an algorithm, dynamic programming, greedy method and apply it to pattern matching to analyze advanced tree and graph applications.

Course Outcomes: Upon completion of the course student will be able to:

SN	Course Outcome	Cognitive levels of attainment as per Bloom's Taxonomy
1	Choose appropriate advanced data structure for given problem.	L1, L2
2	Calculate complexity.	L1, L2
3	Select appropriate design techniques to solve real world problems.	L1, L2
4	Apply the dynamic programming technique to solve the problems.	L1, L2, L3
5	Apply the greedy programming technique to solve the problems.	L1, L2, L3, L4
6	Select a proper pattern matching algorithm for given problem.	L1, L2, L3

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction** Introduction •Introduction to advanced data structures: • Introduction/Fundamentals of the analysis of algorithms o Recurrences: The substitution method Masters method o Mathematical aspects and analysis of algorithms	**11**	L1, L2
2	**Advanced Data** • Introduction • AVL tree • Huffman algorithm • B/B+ tree • 2-3 tree operations • Analysis of All problems	**11**	L1, L2, L3, L4

3	**Divide and Conquer** • Introduction • Binary search • Finding the minimum and maximum • Merge sort • Quick sort • Strassen's matrix multiplication Analysis of All problems	**6**	L1, L2, L3, L4
4	**Greedy algorithms** Introduction • Knapsack problem • Job sequencing with deadlines Minimum cost spanning trees o Kruskal's algorithm o Prim's algorithm • Optimal storage on tapes • Analysis of All problems	**8**	L1, L2, L3, L4
5	**Dynamic algorithms And NP-Hard and NP- Complete** Introduction Dynamic algorithms • All pair shortest path • 0/1 knapsack • Travelling salesman problem • Matrix Chain Multiplication • Analysis of All problems • Introduction to NP-Hard And NP-Complete Problems	**8**	L1, L2, L3
6	**String Matching** Introduction • The naïve string matching algorithm • Rabin Karp algorithm • Knuth-Morris-Pratt algorithm (KMP) • Longest common subsequence(LCS) • Analysis of All problems • Genetic algorithms	**6**	L1, L2, L3, L4
	Total Hrs.	**50**	

Books and References

Sr. No	Title	Authors	Publisher	Edition	Year
1	Introduction to ALGORITHMS	Cormen, Leiserson, Rivest, Stein	PHI	3rd edition	2009
2	Algorithms: Design and Analysis	Harsh Bhasin	OXFORD	1st edition	2015
3	Fundamentals of Computer Algorithms	Horowitz, Sahani, Rajsekaran	Universities Press	2nd edition	1998
4	C and Data structures	Deshpande, Kakde	Dreamtech Press	2nd edition	2004

Online Recourses:

S. No.	Website Name	URL	Modules Covered
1.	NPTEL	https://nptel.ac.in/courses/106102064/	M1
2.	NPTEL	https://nptel.ac.in/courses/106102064/6	M2
3.	NPTEL	https://nptel.ac.in/courses/106102064/14	M3
4.	NPTEL	https://nptel.ac.in/courses/106102064/33	M4
5.	Tutorials point.com	https://www.tutorialspoint.com/analysis_of_algorithm/dynamic_programming_travelling_salesman_problem.asp	M5
6.	Technopedia.com	https://www.techopedia.com/definition/17137/genetic-algorithm	M6

T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**T.E.(SEM : V)**		
Course Name : Image Processing							**Course Code : ITDLO5012**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	
4	-	-	4	--	20	80	--	--	**100**

IA: In-Semester Assessment- Paper Duration – **1Hours**
ESE : End Semester Examination- Paper Duration - **3 Hours**
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).

Prerequisite: Mathematics and statistics

Course Objective: The course intend to deliver the fundamentals of digital image processing system, image enhancement techniques, Image Transforms, Compression techniques, Morphological concepts to apply & analyze various segmentation techniques and object descriptors.

Course Outcomes: Upon completion of the course student will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Remember the fundamental concepts of image processing.	L1, L2
2	Explain different Image enhancement techniques	L1, L2
3	Understand and review image transforms	L1, L2, L3
4	Analyze the basic algorithms used for image processing &image compression with morphological image processing	L1, L2, L3, L4
5	Contrast Image Segmentation and Representation	L1, L2, L3, L4
6	Design & Synthesize Color image processing and its real world applications.	L1, L2, L3, L4

Detailed Syllabus:

Module No.	**Topics**	**Hrs.**	**Cognitive levels of attainment as per Bloom's Taxonomy**
1	**Introduction to digital image processing system**	7	L1, L2
	Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Image Sensing and Acquisition, Image Sampling and Quantization, Basic Relationships between Pixels.		
2	**Image enhancement**	8	L1, L2
	Intensity Transformations and Spatial Filtering, Histogram processing, Filtering in Frequency Domain		
3	**Image transforms**	7	L1, L2, L3
	Discrete Fourier transform - Properties of two dimensional DFT, DCT, DST, Walsh, Hadamard, Haar Transform and their properties.		
4	**Image compression and morphological image processing**	10	L1, L2, L3, L4
	Fundamentals of compression, Basic compression Methods, Huffman Coding, Arithmetic Coding , LZW Coding , Run- Length Coding , Symbol-Based Coding, Bit-Plane Coding, Block Transform Coding , Predictive Coding. Image morphology, Opening & Closing, Hit or Miss Transform, Basic Morphological Algorithms		

5	**Image segmentation and representation** The detection of discontinuities - Point, Line and Edge detections, Hough Transform, Thresholding Region based segmentation Chain codes, Polygon approximation, Shape numbers, Fourier descriptors, statistical Moments.	8	L1, L2, L3, L4
6	**Color Image Processing and Applications** Color Fundamentals and Models, Pseudo color Image Processing, Smoothing and Sharpening, Image Segmentation Based on Color. Biometric Authentication, Digital watermarking, Content Base Image Retrieval. Vector quantization Case Study/Tool/Application	**10**	**L1, L2, L3, L4**
	Total Hr.	**50**	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	Digital Image Processing	Rafael C. Gonzalez and Richard E.woods	Addition - Wesley Publishing Company,	Third Edition	2007
2	Digital Image Processing	William K. Pratt	John Wiley, NJ,	Fourth Edition	2007
3	Image Processing Theory, Algorithm and Architectures	Sid Ahmed M.A	McGraw-Hill	Third Edition	1995
4	Digital Image Processing	Kenneth R Castleman	Prentice Hall, New Delhi	Second Edition	1996
5	Fundamentals of Digital Image Processing	Anil.K.Jain	Prentice Hall of India Pvt Ltd., New Delhi	Third Edition	1995
6	Digital Image Processing	S. Sridhar	Oxford university press	Second Edition	2016.
7	Digital Image Processing	S. Jayaraman, S. Esakkirajan, T. Veerakumar	McGraw-Hill,	Third Edition	2016

Online References

S. No.	Website Name	URL	Modules Covered
1	https://www.tutorialspoint.com	https://www.tutorialspoint.com/imageprocessing/ web.ipac.caltech.edu	M1
2	http://www.imageprocessingplace.com/root_files_V3/tutorials.htm	http://www.imageprocessingplace.com/root_files_V3/tutorials.htm	M2
3	http://www.imageprocessingplace.com/root_files_V3/tutorials.htm	http://www.imageprocessingplace.com/downloads_V3/root_downloads/tutorials/Image%20Processing	M3
4	http://www.imageprocessingplace.com/root_files_V3/tutorials.htm	http://www.imageprocessingplace.com/downloads_V3/root_downloads/tutorials/Image%20Processing/fingureprint recognition	M4, M5, M6

T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**T.E.(SEM : V)**		
Course Name : E-commerce & E- Business							**Course Code : ITDLO5013**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	
4	-	-	4	4	20	80	--	--	**100**
IA: In-Semester Assessment- Paper Duration – **1Hours** **ESE : End Semester Examination-** Paper Duration - **3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).									
Prerequisite: Internet Technologies, Internet Security, Middleware technologies, web services									

Course Objective: The course intends to deliver the fundamentals knowledge of E-commerce, Online Payment systems, selling and marketing on web, apply and analyze various E-business Models and E-business Strategies.

Course Outcomes: Upon completion of the course student will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Define and differentiate various types of E-commerce.	L1, L2
2	Describe Hardware and Software Technologies for E-commerce.	L1, L2, L3
3	Explain payment systems for E -commerce.	L1, L2
4	Describe the process of Selling and Marketing on web	L1, L2, L3
5	Define and Describe E-business and its Models	L1, L2, L3, L4
6	Discuss various E-business Strategies	L1, L2, L3, L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to E –commerce** E–commerce: Definition of e commerce, different types of E-commerce ,Examples of E- commerce, E-commerce trade cycle, advantages and disadvantages of E- commerce, Traditional commerce Vs E - commerce	4	L1, L2
2	**Overview of Hardware and Software Technologies for Ecommerce** Overview of Client side programming (Dream weaver , Front page) Hardware and , Server side Programming (PHP) , Database Software connectivity , session tracking, middleware technologies for ecommerce perspective and security aspects with respect to e commerce, integration of web services	9	L1, L2, L3
3	**Payment System for Ecommerce** Traditional payment model , Characteristics of payment, Online Payment Basics, Payment Cards, Electronic Cash, Electronic Wallets, Stored-Value Cards, SET Protocol for credit card payment, Internet Technologies and the Banking Industry	10	L1, L2

4	**Selling and Marketing on Web** Selling on the Web: Revenue Models and Building a Web Presence: Revenue Models, Revenue Models in Transition, Revenue Strategy Issues, Creating an Effective Web Presence, Web Site Usability, Connecting with Customers Marketing on the Web: Web Marketing Strategies, Communicating with Different Market Segments, Beyond Market Segmentation: Customer Behavior and Relationship Intensity, Advertising on the Web, E-Mail Marketing, Technology- Enabled Customer Relationship Management, Creating and Maintaining Brands on the Web Online Auctions, Virtual Communities, and Web Portals	10	L1, L2, L3
5	**E business :- Introduction to e business and Developing E-business models** Definition of e- business , Characteristics , elements of e business , e business roles , Impact of e business , challenges of e business , difference between e business and e commerce , E-business structure, Evolution of E –business and stages , E – business models , Characteristics of Internet based software and e business solutions	9	L1, L2, L3, L4
6	**E business strategies** Strategic planning process, SCM, CRM, ERP, Procurement, Case Study/Tool/Application	8	L1, L2, L3, L4
	Total Hrs.	**50**	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1.	E -Commerce Fundamentals and application	Henry Chan	Wiley publication	1st edition	2008
2.	Electronics Commerce	Gary Schneider	Thomson Course technology	8th edition	2009
3.	E –Business	Parag Kulkarni , Sunita Jahirabadkar Pradip Chande	Oxford Higher Education , Oxford University Press	2nd edition	2013
4.	E –business and E – commerce Management	Dave Chaffey	Pearson	3rd edition	2009
5.	E commerce	Laudon	Pearson	1st edition	2002
6.	E-Commerce Strategies, Technology and applications	David Whitley	Tata McGraw Hill	1st edition	2000

Online References

S. No.	Website Name	URL	Modules Covered
1	https://www.tutorialspoint.com	https://www.tutorialspoint.com/e_commerce/e_commerce_pdf_version	M1
2	https://www.geeksforgeeks.org https://www.tutorialspoint.com	https://www.geeksforgeeks.org/server-side-client-side-programming/ https://www.tutorialspoint.com/internet_technologies/web_pages	M2
3	https://www.tutorialspoint.com/e_commerce/e_commerce_payment_systems	https://www.tutorialspoint.com/e_commerce/e_commerce_payment_systems	M3
4	https://www.tutorialspoint.com	https://www.tutorialspoint.com/listtutorial/INTRODUCTION-TO-E-BUSINESS/6549	M4, M5, M6

T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E.(Information Technology)							**T.E.(SEM : V)**		
Course Name : IT Enabled Services							**Course Code : ITDLO5014**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**Oral**	**TW**	
4	-	-	4	4	20	80	--	--	**100**

IA: In-Semester Assessment- Paper Duration – **1 Hours**
ESE : End Semester Examination- Paper Duration - **3 Hours**
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).

Prerequisite: Internet Programming.

Course Objectives The course intend to deliver the fundamentals of IT enabled services, challenges and apply strategic IT planning for industries, enterprise IT architecture, to integrate various resources to optimize IT enabled services, functions and analyze competence in global sourcing towards strategy and management.

Course Outcomes: Upon completion of the course student will be able to:

S. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Describe the importance of IT enabled services and challenges.	L1, L2, L3
2	Identify strategic IT planning for software development.	L1, L2, L3, L4
3	Recognize enterprise IT architecture for Information technology.	L1, L2, L3, L4
4	Make use of Information Technology so as to enable them for job in sunrise industries.	L1, L2, L3
5	Illustrate various IT web services for betterment of knowledge.	L1, L2, L3, L4
6	Use their skills to find out various current IT trends in ITES.	L1, L2, L3

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Business strategy : Challenges and opportunities for IT** Business Strategy: Challenges and Opportunities in the globalized, Interconnected, Convergent World ,Establish Principles before Practice, IT Strategy, Application Strategy, Technology Strategy for IT, IT Management Strategy, Developing IT Strategy for Competitive Advantage, Stages of IT Strategy Development and Implementation, Challenges of IT and Business Strategy Alignment, Inhibitors of Business and IT Strategy Alignment, Three-D Framework for Business And IT Strategy Alignment.	09	L1, L2, L3
2	**Strategic IT planning** Business Implications for IT strategic and Planning, Strategic IT Planning Motivations, SITP Process: Prevalent Planning Approaches, Difficulties in Developing and Executing SITP, Best Practices for Achieving Good SITP, SITP Approaches-Prevalent Researches.	09	L1, L2, L3, L4

3	**Enterprise IT architecture**	08	L1, L2, L3, L4
	Defining EITA, Contents of a Typical Enterprise IT Architecture, Standard for Enterprise IT Architecture, Technology Management strategy Framework, Prevalent Technology Reference Architectures Framework and Standards, Program Management, Benefits of PMO, Desired Qualities of a Program Office Manager, Maturity of PMO, Implementation of PMO Strategy, Measuring PMO Performance, Success Factors for PMO, Project Scope Management, MO Dashboard and Reporting.		
4	**IT service management strategy**	08	L1, L2, L3
	Information Technology Infrastructure Library (ITIL), ITIL Overview, ITIL Service Support Processes, Incident Management, Problem Management, Service Delivery, Service Level Management, Financial Management, Capacity Management, IT Service Continuity Management (ITSCM), Availability Management ,Imperatives for Outsourcing, IT Management Layers, Variants of outsourcing ,Business Process Outsourcing, In sourcing.		
5	**IT enabled web services**	08	L1, L2, L3
	Overview of basic features of PHP: arrays, functions and state management, working with PHP forms, More advanced PHP, OOP's concept in PHP, Portable database supported with different, exception Handling, concepts of UDDI, WSDL, SOAP.		
6	**Current trends in ITES**	08	L1, L2, L3, L4
	Current Employment in the IT and ITES industry: Newly emerging area and requirement of IT enabled service sector. Industry Oriented Human Resource Requirement: Outlook of the IT and ITES Industry. Barriers to Trade in ITES Role of International Bodies (WTO & UNCTAD) in facilitating Trade in ITEST/ITES, experiences and Case studies of ITES-call centers, ERP, google.		
	Total Hr.	**50**	

Books and References:

S. No	Title	Authors	Publisher	Edition	Year
1	IT strategy and Management	Sanjiva Shankar Dubey,	PHI.	2nd	2010
2	Marketing of Information Technology	K. Venkatesh	TMH	1st	2009
3	PHP 6 and MySQL Bible	Steve Suehring, Timconverse, Joyoe Park	Wiley	1st	2009
4	IT Enabled Services	Shiro Uesugi	Springer	1st	2013
5.	IT Services Business Management: Concepts, Processes and Practices	Sanjiva Shankar Dubey	PHI,	1st	2012
6	Promoting IT Enabled Services	Nikhil Treebhoohu	Addison-Wesley	3rd	2013.

Online References

S. No.	Website Name	URL	Modules Covered
1	https://www.tutorialspoint.com	https://www.tutorialspoint.com/e_commerce/e_commerce_pdf_version	M1
2	https://www.geeksforgeeks.org https://www.tutorialspoint.com	https://www.geeksforgeeks.org/server-side-client-side-programming/ https://www.tutorialspoint.com/internet_technologies/web_pages	M2
3	https://www.tutorialspoint.com/e_commerce/e_commerce_payment_systems	https://www.tutorialspoint.com/e_commerce/e_commerce_payment_systems	M3
4	https://www.tutorialspoint.com	https://www.tutorialspoint.com/listtutorial/INTRODUCTION-TO-E-BUSINESS/6549	M4, M5, M6

T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E.(Information Technology)							**T.E.(SEM : V)**		
Course Name : Computer Graphics & Virtual Reality							**Course Code : ITDLO5015**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	
4	-	-	4	4	20	80	--	--	**100**

IA: In-Semester Assessment- Paper Duration – **1Hour**
ESE : End Semester Examination- Paper Duration - **3 Hours**
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).

Prerequisite: Data structures and mathematics

Course Objectives: The course intend to deliver the fundamentals of components of graphics system and apply 3-dimensional computer graphics to convert geometrical primitives, transform shapes, develop computer games, information visualization business applications and analyze the fundamentals of animation, virtual reality.

Course Outcomes: Upon completion of the course student will be able to:

S.No.	**Course Outcomes**	**Cognitive levels of attainment as per Bloom's Taxonomy**
1	List the basic concepts used in computer graphics.	L1, L2
2	Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.	L1, L2, L3
3	Describe the importance of viewing and projections.	L1, L2, L3
4	Define the fundamentals of animation, virtual reality and its related technologies.	L1, L2
5	Understand a typical graphics pipeline.	L1, L2
6	Design an application with the principles of virtual reality.	L1, L2, L3, L4

Detailed Syllabus:

Module No.	**Topics**	**Hrs.**	**Cognitive levels of attainment as per Bloom's Taxonomy**
1	**Introduction to Computer graphics and Output primitives** Display Devices, Bitmap and Vector based graphics, Overview of Coordinate System. **Scan Conversion of:** point, line using Digital differential analyzer & Bresenham's algorithm, circle using midpoint approach, **Curve Generation:** Bezier and B-Spline curves. Introduction to fractals: generation procedure, classification, dimension and Koch Curve.	**08**	L1, L2, L3
2	**Area Filling, Transformations (2D & 3D)** Area filling: Inside/Outside Test, Scan line Polygon Fill Algorithm, Boundary Fill and Flood Fill algorithm. Basic Geometrical 2D Transformations: Translation, Rotation, Scaling, Reflection, Shear, their homogeneous Matrix representation and Composite transformation. Three Dimensional transformations: Translation, Scaling, Rotations, Composite	**08**	L1, L2, L3

3	**Viewing (2D and 3D) Projection and Clipping** Viewing: Introduction, Viewing Pipeline, View Coordinate reference frame, Window to viewport transformation. Three-Dimensional Viewing: 3D Pipeline, Viewing transformation, Projections: Parallel (Oblique and orthographic), Perspective (one point) , Clipping: Point clipping, Line clipping: Cohen Sutherland Algorithm, Liang Barsky algorithms, Polygon clipping: Sutherland Hodgeman polygon clipping and Weiler Atherton. Text Clipping.	**08**	L1, L2, L3
4	**Introduction to Animation** **Animation:** Key Frame Animation, Animation Sequence, Motion Control Methods, **Morphing, Warping**- Mesh Warping.	**06**	L1, L2, L3
5	**Introduction to Virtual Reality** **Virtual Reality:** Basic Concepts, Overview and perspective on virtual reality, Human sensation and perception. Classical Components of VR System, Types of VR Systems, Three-Dimensional Position Trackers, Navigation and Manipulation Interfaces, Gesture Interfaces, Input Devices, Graphical Display, Sound displays, and Haptic Feedback. Graphical Rendering Pipeline, Haptic Rendering Pipeline, Open GL rendering pipeline. **Applications of Virtual Reality**.	**10**	L1, L2, L3, L4
6	**VR Modeling and Programming** **Geometric Modeling:** Virtual Object Shape, Object Visual Appearance. **Kinematics Modeling:** Object Position, Transformation Invariants, Object Hierarchies, **Physical Modeling:** Collision Detection, Surface Deformation, Force Computation. **Behavior Modeling:** Programming through VRML/X3D: Defining and Using Nodes and Shapes, VRML Browsers, Java 3D, OpenCV for augmented reality	**10**	L1, L2, L3, L4
	Total Hrs.	**50**	

Books and References

S.No.	Title	Authors	Publisher	Edition	Year
1	Computer Graphics	Donald Hearn and M. Pauline Baker	Pearson Education.	Second	2008
2	Computer Graphics with Virtual Reality	R. K Maurya	Wiley India	First	2009
3	Virtual Reality Technology	Grigore Burdea, Philippe Coiffet	Wiley	Second	2005
4	Computer Graphics	Steven Harrington	McGraw Hill	First	2007
5	Procedural Elements of Computer Graphics	Rogers	Tata McGraw Hill	First	2001
6	Virtual Reality Systems	Vince	Pearson Education	First	2007
7	Computer Graphics using Open GL	F.S. Hill, Stephen M. Kelley	Prentice Hall	First	2007
8	Learning OpenCV 3 Application Development	Samyak Datta	Packt	First	2016

Online References:

S. No.	Website Name	URL	Modules Covered
1	https://www.tutorialspoint.com/computer_graphics/	http://ecomputernotes.com/computer-graphics/basic-of-computer-graphics/introduction-to-computer-graphics, https://www.tutorialspoint.com/computer_graphics/computer_graphics_basics.htm, https://www.tutorialspoint.com/computer_graphics/line_generation_algorithm.htm, https://www.tutorialspoint.com/computer_graphics/circle_generation_algorithm.htm, https://www.tutorialspoint.com/computer_graphics/computer_graphics_curves.htm	M1
2	https://www.tutorialspoint.com/computer_graphics/	https://www.tutorialspoint.com/computer_graphics/2d_transformation.htm, https://www.tutorialspoint.com/computer_graphics/3d_transformation.htm	M2
3	https://www.tutorialspoint.com/computer_graphics/	https://www.tutorialspoint.com/computer_graphics/viewing_and_clipping.htm	M3
4	https://www.tutorialspoint.com/computer_graphics/	https://www.tutorialspoint.com/computer_graphics/computer_animation.htm	M4
5	https://www.marxentlabs.com/what-is-virtual-reality/, https://www.vrs.org.uk/virtual-reality-applications/	https://www.marxentlabs.com/what-is-virtual-reality/, https://www.vrs.org.uk/virtual-reality-applications/, http://www.iamwire.com/2017/10/19-ways-on-how-to-get-the-most-from-virtual-reality/167724, https://www.realitytechnologies.com/virtual-reality/	M5
6	https://www.explainthatstuff.com/virtualreality.html	https://www.explainthatstuff.com/virtualreality.html http://what-when-how.com/Tutorial/topic-8032kh/Interactive-Web-Based-Virtual-Reality-with-Java-3D-22.html, https://www.whoishostingthis.com/resources/vrml/	M6

T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E.(Information Technology)							**T.E.(SEM :** V)		
Course Name : IOT (Mini Project Lab)							**Course Code : ITL501**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**OR**	**TW**	
-	-	2	2	1	--	--	25	25	**50**

IA: In-Semester Assessment- Paper Duration – **1Hour**
ESE : End Semester Examination- Paper Duration - **3 Hours**
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).

Prerequisite: Concepts of Digital circuits, Integrated Circuits, Operating System

Lab Objective: The course intend to deliver the fundamentals of real world problems , apply and analyze to design problem solutions with basic concepts of programming/ hardware/ emulator for Raspberry pi/Arduino/ ARM Cortex/ Intel Galileo etc.

Lab Outcomes: Upon completion of the course student will be able to:

S.No.	Lab Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Identify the requirements for the real world problems.	L1, L2
2	Conduct a survey of several available literatures in the preferred field of study.	L1, L2
3	Study and enhance software/ hardware skills.	L1, L2, L3, L4
4	Demonstrate and build the project successfully by hardware requirements, coding, emulating and testing.	L1, L2, L3, L4
5	To report and present the findings of the study conducted in the preferred domain	L1, L2, L3, L4
6	Demonstrate an ability to work in teams and manage the conduct of the research study.	L1, L2, L3, L4

Guidelines:

1. The mini project work is to be conducted by a group of three students.
2. Each group will be associated with a subject Incharge/ mini project mentor. The group should meet with the concerned faculty during Laboratory hours and the progress of work discussed must be documented.
3. The students may do survey for different application using Raspberry pi/Arduino/ ARM Cortex/ etc topics for the mini project.
4. Each group will identify the Hardware and software requirement for their mini project problem statement.
5. Prototype/Design your own circuit board using Raspberry pi/Arduino/ ARM Cortex etc.
6. Installation, configure and manage your Raspberry pi/Arduino/ ARM Cortex etc board/kit.
7. Work with operating system and do coding to for input devices on board.
8. The project assessment for term work will be done at least two times at department level by giving presentation to panel members which consist of at least two to three members as Internal examiners (including the project guide/mentor) .
9. Create and interface using Web to publish or remotely access the data on Internet.
10. Each group along with the concerned faculty shall identify a potential problem statement, on which the study and implementation is to be conducted.
11. Each group may present their work in various project competitions and paper presentations.
12. A detailed report is to be prepared as per guidelines given by the concerned faculty.

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	Getting Started with Arduino	Massimo Banzi	O'reilly,	2nd	2010
2	Raspberry Pi Cookbok	Simon Monk	O'reilly	1st	2013
3	Internet of Things (A Hands-on-Approach) ,	Vijay Madisetti , Arshdeep Bahga	Universities Press	1st	2014
4	Raspberry Pi User Guide	https://www.raspberrypi.org/blog/tag/raspberry-pi-user-guide/			

Online References:

S. No.	Website Name	URL	Modules Covered
1.	https://www.edx.org/	https://www.edx.org/course/getting started with the internet-of-things-iot-3/	Mini Project
2.	https://www.edx.org/	https://www.edx.org/course/iot-sensors-and-devices/	
3	https://www.nptel.iit.ac	https://www.nptel.iit.ac/course/iot-sensors-and-devices/	

T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**T.E.(SEM : V)**		
Course Name : Business Communication and Ethics							**Course Code : ITL502**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	
2	-	2	4	3	--	--	--	50	**50**
IA: In-Semester Assessment- Paper Duration – **1Hours** **ESE : End Semester Examination-** Paper Duration - **3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).									
Prerequisite: Communications Skills									

Course Objectives: The course intend to deliver the fundamentals of professional and ethical attitude at workplace and apply effective communication and interpersonal skills, build multidisciplinary approach to hone analytical and logical skills for problem-solving.

Course Outcomes: Upon completion of the course student will be able to:

SN	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Design a technical document using precise language, suitable vocabulary and apt style.	L1, L2, L3
2	Develop the life skills/ interpersonal skills to progress professionally by building stronger relationships	L1, L2, L3
3	Demonstrate awareness of contemporary issues knowledge of professional and ethical responsibilities	L1, L2, L3
4	Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume/SOP	L1, L2, L3
5	Deliver formal presentations effectively implementing the verbal and non-verbal skills.	L1, L2, L3

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Report Writing** Objectives of Report Writing Language and Style in a report Types : Informative and Interpretative (Analytical, Survey and Feasibility)and Formats of reports (Memo, Letter, Short and Long Report)	**05**	L1, L2, L3
2	**Technical Writing** Technical Paper Writing (IEEE Format) Proposal Writing	**03**	L1, L2, L3
3	**Introduction to Interpersonal Skills** Emotional Intelligence Leadership and Motivation Team Building Assertiveness Conflict Resolution and Negotiation Skills Time Management Decision Making	**08**	L1, L2, L3

4	**Meetings and Documentation** Strategies for conducting effective meetings Notice, Agenda and Minutes of a meeting Business meeting etiquettes	**04**	L1, L2, L3
5	**Introduction to Corporate Ethics** Professional and work ethics (responsible use of social media - Facebook, WA, Twitter etc.) Introduction to Intellectual Property Rights Ethical codes of conduct in business and corporate activities (Personal ethics, conflicting values, choosing a moral response and making ethical decisions)	**04**	L1, L2, L3
6	**Employment Skills** Group Discussion Resume Writing Interview Skills Presentation Skills Statement of Purpose	**06**	L1, L2, L3
	Total Hrs.	**30**	

Guidelines:

1. Report Writing (Theory)
2. Technical proposal
3. Technical paper writing (Paraphrasing a published IEEE technical paper)
4. Interpersonal skills (Group activity and Role play)
5. Interpersonal skills (Documentation in the form of softcopy and hardcopy)
6. Meeting and documentation (notice, agenda, minutes of mock meeting)
7. Corporate ethics (Case study, Role play)
8. Writing resume and statement of purpose

Books and References

Sr. No	Title	Authors	Publisher	Edition	Year
1.	Organizational Behavior	Fred Luthans	McGraw Hill	2nd Edition	1978
2.	Report Writing for Business	Lesiker and Petit	McGraw Hill	10th Edition	1998
3.	Technical Writing and Professional Communication	Huckin and Olsen	McGraw Hill	2nd Edition	1991
4.	Personal Development for Life and Work	Wallace and Masters	Thomson Learning	10th edition	2010
5.	Effective Business Communication	Heta Murphy	McGraw Hill	7th edition	1997
6.	Business Correspondence and Report Writing	Sharma R.C. and Krishna Mohan	Tata McGraw-Hill Education	5th edition	2002
7.	Managing Soft Skills for Personality Development	Ghosh, B. N	Tata McGraw Hill	3rd edition	2012
8.	BCOM	Dufrene, Sinha	Cengage Learning	2nd edition	2016
9.	Management Communication	Bell, Smith	Wiley India Edition	3rd edition	2010
10.	Soft Skills	Dr. Alex, K	S Chand and Company	1st edition	2009
11.	Professional Ethics	Subramaniam, R	Oxford University Press	2nd edition	2013
12.	Organizational Behavior	Robbins Stephens P.,	Pearson Education	11th edition	2012
13.	https://grad.ucla.edu/asis/agep/advsopstem.pdf				

T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

<table>
<tr><td colspan="5">BE (Information Technology)</td><td colspan="4">T.E. (SEM : V)</td></tr>
<tr><td colspan="5">Course Name :Professional Skills V- ASP.NET</td><td colspan="4">Course Code : ITPS-501</td></tr>
<tr><td colspan="5">Teaching Scheme (Holistic Student Development–HSD)</td><td colspan="4">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="4">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5" rowspan="2">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Presentation (25)</td><td>Report (25)</td><td>Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>AC</td><td>AC</td><td rowspan="2">Audit</td></tr>
<tr><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td><td colspan="4">Non-Scholastic Evaluation by teacher Guardian and Institute will issue certificate</td></tr>
<tr><td colspan="9">The weightage of marks for continuous evaluation of Term work/Report: Formative(40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude(20%)</td></tr>
<tr><td colspan="9">Prerequisite: SQL & Object Oriented Programming</td></tr>
</table>

Course Objective: The course intends to deliver the fundamentals of the architecture of .NET frame work, concept of C# language and ASP.NET basics, apply web controls of ASP.NET, web application configuration, front end, back end connectivity using various ADO component and web services.

Course Outcomes: Upon completion of the course student will be able to:

S.No.	Course Outcome	Cognitive levels of attainment as per Bloom's Taxonomy
1	Identify the components of .NET Framework such as CLS, CTS, Class base library, ADO, ASP	L1, L2
2	Develop web page using C# as code behind	L1, L2
3	Implement various web controls and ASP. net component for website development	L1, L2, L3
4	Configure website as per the requirement	L1, L2, L3
5	Use various ADO classes for connectivity of front end with back end	L1, L2, L3
6	Implement webservices	L1, L2, L3

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
01	**Introduction to .NET Framework** Introduction, Advantages & Components, CLR,CTS,CLS,MSIL,JIT,GC, BCL(Base Class Library), Compilation of .NET Applications,Features of .NET Framework, C#	2	L1, L2
02	**Conceptual Overview of ASP.NET Framework** Client And Server Architecture, Page LifeCycle, All Standard Controls, Validation Controls, Navigation Controls	2	L1, L2, L3
03	**ASP.NET Web Controls** Rich Web Controls.,Creating and Implementing User and Custom Controls, Design website with Master Pages.	3	L1, L2, L3
04	**ASP.NET Configuration:** Session and Application Management, Caching, Security-Authentication and Authorization, Localization and Globalization	2	L1, L2

05	**Working with Data Controls** Basics of ADO.NET, OLEDB and SQL Managed DataProviders- Data adapters, Dataset, DataReader, ExecuteReader, ExecuteScalar,ExecuteNonQuery, DataTable, DataRow, DataColumn, Crystal Reports	3	L1, L2, L3
06	**Introduction to Web Services** Need of Web Services, role of XML, UDDI, WSDL, HTTPand SOAP Protocol,	3	L1, L2, L3
	Total Hrs .	**15**	

List of Practical/Experiment:

S.No.	Type of Experiment	Practical/ Experiment Topic	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Basic Experiments**	Implementaion of basic logical statement , looping statement using C#.NET	4	L1, L2, L3
2	**Design Experiments**	Develpe simple webpage with various controls and ASP componemt (e.g text box , drop down ,list , button , radio button etc.)	4	L1, L2, L3
3		Develop web page with data controls and form connectivity with database	4	L1, L2, L3
4		Create Registartion page , login page and account page. After registration user can able to login into account with his/her name display on top. Implement using session variable. Also demonstrate the use of cockies and session variable	4	L1, L2, L3
5	**Advanced Experiments**	Create a web a web application to demonstrate the use of AJAX in a web page	4	L1, L2, L3
6		Impementaion of web Mash-up in using ASP.NET	2	L1, L2, L3
7		Impelemention of web serices for a web site	2	L1, L2, L3
8	**Mini/Minor Projects/ Seminar/ Case Studies**	Mini Project Design a Mini Project	6	L1, L2, L3,L4,L5
		Total Hrs .	**30**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Applied Microsoft .Net framework programming	Jeffery Ritcher	MS Press	Second Edition	2002
2	Beginning ASP. NET 4: in C# and VB	ImarSpaanjaars	Wrox Publication	Second Edition	2010
3	.Net framework essentials	Thuan L. Thai, Hoang Q. Lam	O'Reilly	Third Edition	2003

T.E. Semester –V

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

<table>
<tr><td colspan="6">B.E (Information Technology)</td><td colspan="3">T.E(SEM : V)</td></tr>
<tr><td colspan="6">Course Name : Project Based Learning-III</td><td colspan="3">Course Code : HSD-ITPBL501</td></tr>
<tr><td colspan="5">Teaching Scheme (Holistic Student Development-HSD)</td><td colspan="4">Examination Scheme (Formative/ Summative)</td></tr>
<tr><td colspan="5">Modes of Teaching / Learning / Weightage</td><td colspan="4">Modes of Continuous Assessment / Evaluation</td></tr>
<tr><td colspan="5" rowspan="2">Hours Per Week</td><td colspan="2">Theory (100)</td><td>Presentation (25)</td><td>Report (25)</td><td rowspan="2">Total</td></tr>
<tr><td>Theory</td><td>Tutorial</td><td>Practical</td><td>Contact Hours</td><td>Credits</td><td>IA</td><td>ESE</td><td>AC</td><td>AC</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td colspan="3">Non-Scholastic Evaluation by teacher Guardian and Institute will issue certificate</td><td>Audit</td></tr>
<tr><td colspan="9">The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance/Learning Attitude (20%)</td></tr>
<tr><td colspan="9">Prerequisite: Computer Fundamentals & knowledge of Programming Languages</td></tr>
</table>

Course Objectives: The course intends to deliver the fundamental knowlwdge of basic real time problems, study existing solutions, prepare literature survey, and apply basic computing & mathematics fundamentals and fundamental concepts of Programming such as C/C++ and Java to solve Basic real time problems.

Course Outcomes: Upon completion of the course students will be able to:

S. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	To identify & analyze the basic real time problems and prepare literature survey.	L1, L2, L3,L4
2	Identify & apply appropriate technologies & programming constructs to solve problems.	L1, L2, L3
3	Presenting & Documenting results obtained.	L1, L2, L3,L4

Project Listing:

S. No.	Project Title
1.	Separate banking software for persons with intellectual disabilities including the better access to avail the benefits of ATM services
2.	IOT in agriculture
3.	Games on Road Safety
4.	Google Ad Grants online marketing challenge
5.	IoT in healthcare
6.	Google Ad Grants online marketing challenge
7.	Design an intelligent algorithm leveraging big data/AI/machine learning techniques that can learn from user viewing behavior
8.	End to end mapping of network to arrive at the expected time of delivery
9.	Image analysis and compression
10.	Knowledge Enhancement Platform
11.	App development using IOT
12.	Game Development
13.	Sentiment Analysis using Social Media responses
14.	To design dynamic website using advanced web technologies
15.	Identifying accident prone area for roads

T.E. Semester –V
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E (Information Technology)							**T.E.(SEM : V)**		
Course Name: Research Based Learning 1							**Course Code:** HSD-CSRBL501		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Assessment/Evaluation Scheme**				
Hours Per Week					**Presentation**		**Report**		**Term Work**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**IA**	**ESE**	**TW**
Audit course evaluated by Teacher Guardian									
Mid Semester Assessment for Term work will be on continuous basis									
Prerequisite: Subject knowledge, Domain knowledge									

Course Objectives: This course is focused to engage the learner in research using critical thinking, problem solving, coding and technical writing related to upcoming latest technologies.

Course Outcomes: Upon completion of the course students will be able to:

S.N.	Course Outcome	Cognitive level attainment as per revised Bloom Taxonomy
1	Student will be aware of latest technologies developments in their discipline in a competitive environment.	L1, L2
2	Student will be able to create new idea for problem solving related to industry or societal issues.	L1, L2, L3,L4
3	Students will be to develop the code for given problem definition in a competitive environment.	L1, L2, L3,L4,l5,L6
4	Students will be write a research paper and understand technical writing.	L1, L2, L3,L4,l5

Detailed Syllabus:

Module No.	Topics	Cognitive level attainment as per revised Bloom Taxonomy
1	**Technical Quiz (Latest Technologies under various Domains in the dept.)**	L1, L2, L3
	I. Introduction to Quiz: Quiz competition on Technical topics including all the domains in the dept. with 50 MCQ. (Questions will be different branch wise) **II. Quiz competition on Latest Technologies** with 50 MCQ. **Evaluation by faculty as per format.**	
2	**Idea Generation**	L1, L2, L3,L4
	I. **Introduction to idea Generation**: Introduction to invention and innovation, managing creativity, Techniques for generating ideas, Steps for Idea generation to implementation. Transforming Idea into project with implementation II. Brainstorming session with peers for idea generation and assessment, Experience sharing by entrepreneurs or Hackathon Winners. (Idea must be such that it should be converted into project and further into Product if possible, it can be multidisciplinary projects also) **Idea competition and evaluation**	
3	**Competitive Programming**	L1, L2, L3,L4
	I. Introduction to competitive programming, benefits, Tips for good programming performance, logic development (Problem Solving strategies, loops)	

	II. Mock Evaluation/Experience sharing by good coders **Coding competition and evaluation**	
4	**Introduction to Research and Development**	L1, L2, L3,L4,L5
	I. **Introduction to Research** Motivation and objectives of Research, Characteristics of research, Basic methods of research, types of research, review of literature, research process formulating research hypothesis, evaluation of research results, writing reports. II **Research Paper Writing** Formation of groups as per the domain interest, formulation of topic for research, Allocation of faculty for two topics, Identification of appropriate journal or conference for submission and Preparation of a review paper. **Evaluation of research review paper.**	

References:

Sr. No.	Title	Authors	Publisher	Edition	Year
1.	Guide to Competitive Programming: Learning and Improving Algorithms Through Contests	Antti Laaksonen	Springer	Kindle	2018
2.	Writing Research Papers: A Complete Guide	James D. Lester	Longman	10th	2001
3.	Creativity in Product Innovation	Jacob Goldenberg	Cambridge University Press	Kindle	2002

Online References:

Sr. No.	Website Name	URL	Modules Covered
	https://www.geeksforgeeks.org	https://www.geeksforgeeks.org/tag/c-quiz-references/	M1
	https://www.researchgate.net	https://www.researchgate.net/publication/224372998_Idea_Generation_Techniques_among_Creative_Professionals	M2
	https://discuss.codechef.com	https://discuss.codechef.com/t/programming-contest-detailed-syllabus-along-with-example-problems/17791	M3
	https://www.statpac.com	https://www.statpac.com/online-software-manual/Basic-Research-Concepts.htm	M4
	https://www.slideshare.net	https://www.slideshare.net/AsirJohnSamuel/1introduction-to-research-methodology?next_slideshow=1	M4

T.E. Semester –V
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

B.E (Information Technology)							T.E (SEM : V)		
Course Name : Seminar/Workshop							Course Code :SI 501		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	--	TW	
--	--	2	2	-	--	--	--	-	-
IA: In-Semester Assessment ESE: End Semester Examination									
Prerequisite: Mathematical foundation, Computing Methods									

Course Objective: To familiarize students with emerging trends and practices in industry and research in the domains of Information Technology. Also, to expose the students to developments in various Program Specific Research (PSR) domain offered by the department.

Course Outcomes: Upon completion of the course students will be able to:

S. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	To comprehend the different trends and practices in the industry and research	L1,L2
2	To apply different trends and practices of Industry and Research for problem solving in Domains.	L1,L2,L3
3	To analyze different trends and practices of industry and research.	L1,L2,L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Software Programming & Development**	6	L4,L5,L6
	• Seminar and workshop on Industry Practices and Research Trends in the area of Software Programming & Development		
2	**Information & Communication Technology**	6	L4,L5
	• Seminar and workshop on Industry Practices and Research Trends in the area of Information & Communication Technology		
3	**Machine Learning & Artificial Intelligence**	6	L4,L5,L6
	• Seminar and workshop on Industry Practices and Research Trends in the area of Machine Learning & Artificial Intelligence		
4	**Web Technology & E Commerce**	6	L4,L5,L6
	• Seminar and workshop on Industry Practices and Research Trends in the area of Web Technology & E Commerce.		
5	**Database Technology**	6	L4,L5,L6
	• Seminar and workshop on Industry Practices and Research Trends in the area of Database Technology.		
	Total Hrs.	**30**	

Books and References:

S. No	Title	Authors	Publisher	Edition	Year
1.	Cryptography and network security	William Stallings	Prentice Hall	5th	2011
2.	Machine Learning	Anuradha Srinisaragahven Vincy Joseph	Wiely	1st	2017
3.	The Complete Reference HTML & CSS	Thomas A Powel	McGraw Hill Professional	5th	2010

Online References:

S. No.	Website Name	URL	Modules Covered
1.	https://nptel.ac.in	https://nptel.ac.in/courses/106105031/	M2
2.	Coursera.org	Coursera.org/learn/machine learning	M3
3.	W3schools.com	W3schools.com/html	M4