SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER V
EFFECTIVE FROM SESSION 2022-23

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT205TES07	SIGNALS & SYSTEMS	3	0	0	30	70	100	3
2	IT205TPC01	DATABASE MANAGEMENT SYSTEMS	3	0	0	30	70	100	3
3	IT205TPC02	FORMAL LANGUAGE & AUTOMATA THEORY	3	0	0	30	70	100	3
4	IT205TPC03	PYTHON PROGRAMMING	3	1	0	30	70	100	4
5	IT205TPE1X	ELECTIVE – I	3	0	0	30	70	100	3
PRACTICAL									
1	IT205PPC01	DATABASE MANAGEMENT SYSTEMS LAB	0	0	4	30	20	50	2
2	IT205PPC02	PYTHON PROGRAMMING LAB	0	0	4	30	20	50	2
3	IT205PMC01	CONSTITUTION OF INDIA/ ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	-	-	2	-	-	-	0
TOTAL CREDITS									**20**
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

LIST OF ELECTIVE-I

1	IT205TPE11	SOFTWARE ENGINEERING
2	IT205TPE12	REAL TIME SYSTEM
3.	IT205TPE13	CYBER LAW & ETHICS
4.	IT205TPE14	EMBEDDED SYSTEMS

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205PMC01	-	-	2	2 HOURS	-	-	0

Essence of Indian Traditional Knowledge

Course Objectives:

1. To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
2. To make the students understand the traditional knowledge and analyze it and apply it to their day to day life.

Unit 1

Basic Structure of Indian Knowledge System

Unit2

Modern Science and Indian Knowledge System

Unit 3

Yoga

Unit 4

Holistic Health care

Unit 5

Case Studies.

Suggested Text/Reference Books

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
3. Fritzof Capra, Tao of Physics
4. Fritzof Capra, The wave of Life
5. V N Jha (Eng. Trans,), Tarkasangraha of Annam Bhatta, Inernational Chinmay Foundation, Velliarnad, Amakuam
6. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
7. GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakasham, Delhi, 2016
8. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016
9. P R Sharma (English translation), Shodashang Hridayam

Course Outcomes :

At the end of the Course, Student will be able to:

1. Identify the concept of Traditional knowledge and its importance.
2. Explain the need and importance of protecting traditional knowledge.
3. Illustrate the various enactments related to the protection of traditional knowledge.
4. Interpret the concepts of Intellectual property to protect the traditional knowledge.
5. Explain the importance of Traditional knowledge in Agriculture and Medicine.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205TPC02	3	0	0	3 HOURS	30	70	3

Formal Language & Automata Theory

Course Objectives:

1. Understand basic properties of formal languages and formal grammars.
2. Design and Understand basic properties of deterministic and nondeterministic finite automata
3. Design and Understand basic properties of pushdown automata.
4. Understand the relation between types of languages and types of finite automata
5. Design and Understanding the Context free languages and grammars, and also Normalising CFG.
6. Understanding the minimization of deterministic and nondeterministic finite automata.
7. Design and Understand basic properties of Turing machines and computing with Turing machines.
8. Design and Understand the concept of Mealy and Moore automata and its application.
9. Know the concepts of tractability and decidability, the concepts of NP-completeness and NP-hard problem.
10. Understand the challenges for Theoretical Computer Science.

Unit-I Automata: Basic machine, FSM , Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata. Regular Sets and Regular Grammars: Alphabet, words, Operations, Regular sets, Finite automata and regular expression, MyhillNerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

Unit-II Context –Free Grammars: Introduction to CFG, Regular Grammars, Derivation trees and Ambiguity, Simplification of Context free grammars, Normal Forms (Chomsky Normal Form and Greibach Normal forms).

Unit-III Pushdown Automata: Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA. Context Free Languages: The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.

Unit-IV Turing Machines: Introduction, TM model, representation and languages acceptability of TM Design of TM,Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing machine as enumerators.Properties of recursive & recursively enumerable languages,Universal Turing machine

Unit V Tractable and Untractable Problems: P, NP, NP complete and NP hard problems, examples of these problems like satisfy ability problems, vertex cover problem, Hamiltonian path problem, traveling sales man problem, Partition problem etc.

Suggested books

1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.

Suggested reference books:

1. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
2. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
3. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
4. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

Course Outcomes :

1. Comprehend Knowledge to acquire a full understanding of Automata Theory as the basis of all computer science languages - Model building and have a clear understanding of the Automata theory concepts.
2. Cognitive skills - Be able to design FAs, NFAs, Grammars, languages modeling, small compilers basics - Be able to design sample automata - Be able to minimize FA's and Grammars of Context Free Languages.
3. Professional Skill - Perceive the power and limitation of a computer as a computing machine.
4. Attitude - Develop a perception on the importance of computational theory as model building.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205PPC02	0	0	4	4 HOURS	30	20	2

Python Programming Lab

Course Objectives:

This course is designed to enable the students to:

1. To be able to introduce core programming basics and program design with functions using Python programming language.
2. To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
3. To understand the high-performance programs designed to strengthen the practical expertise.

S.No.	Experiments
1	Write a program to demonstrate different number data types in Python.
2	Write a program to perform different Arithmetic Operations on numbers in Python.
3	Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4	Write a python script to print the current date in the following format “Sun May 29 02:26:23 IST 2017”.
5	Write a program to create, append, and remove lists in python.
6	Write a program to demonstrate working with tuples in python.
7	Write a program to demonstrate working with dictionaries in python.
8	Write a python program to find largest of three numbers.
9	Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula : c/5 = f-32/9]
10	Write a Python script that prints prime numbers less than 20.
11	Write a python program to find factorial of a number using Recursion.
12	Write a program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is a right triangle (Recall from the Pythagorean Theorem that in a right triangle, the square of one side equals the sum of the squares of the other two sides).
13	Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
14	Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
15	Write a python program to define a module and import a specific function in that module to another program.
16	Write a Python class to convert an integer to a roman numeral.
17	Write a Python class to implement pow(x, n).
18	Write a Python class to reverse a string word by word.

TEXT BOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCES BOOKS:

1. Think Python, Allen Downey, Green Tea Press.
2. Introduction to Python, Kenneth A. Lambert, Cengage.

3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
4. Learning Python, Mark Lutz, O'Really.

Course Outcomes:

At the end of this course the student can answer how to:

1. Student should be able to understand the basic concepts scripting and the contributions of scripting language.
2. Ability to explore python especially the object-oriented concepts, and the built in objects of Python.
3. Ability to create practical and contemporary applications such as TCP/IP network programming, Web applications, discrete event simulations.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205TPC03	3	1	0	4 HOURS	30	70	4

Python Programming

Course Objectives:

1. Learn Syntax and Semantics and create Functions in Python.
2. Handle Strings and Files in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Implement Object Oriented Programming concepts in Python.
5. Build Web Services and introduction to Network and Database Programming in Python.

UNIT - I Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types.

UNIT - II FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, *Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules.

UNIT - III Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

UNIT - IV GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers.

UNIT - V Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules.

TEXT BOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCES BOOKS:

1. Think Python, Allen Downey, Green Tea Press.
2. Introduction to Python, Kenneth A. Lambert, Cengage.

3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
4. Learning Python, Mark Lutz, O'Really.

Course Outcomes:

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

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205TES07	3	0	0	3 HOURS	30	70	3

Signal & System

Course Objectives:

The objectives of the course are to make the students:

1. Familiar with the fundamental types and properties of signals and systems.
2. To develop an understanding the concept of representation of various time and frequency domains systems.
3. To introduce different transformation methods used in time and frequency domains.
4. To Familiar with state variable analysis for MIMO system.
5. To explore the concept of continuous to discrete conversion technique needed in communication.

UNIT – I Signals & Systems: Classification of Signals, Energy and Power Signals, Classification of systems, Properties of systems – Linearity: additivity and homogeneity, Shift-invariance, Causality, Stability. Time domain Analysis of Discrete time and Continuous time System – Impulse Response, Step Response and Convolution, Properties of Convolution, system representation of differential and difference equation.

UNIT – II Analysis of Continuous & Discrete time Signals: Fourier series Representation, Continuous Time Fourier Transform (CTFT), Magnitude & Phase response, Properties of CTFT. System Analysis with Fourier Transform.
Discrete-Time Fourier Transform (DTFT), Properties of DTFT, Frequency response of discrete time LTI systems. Discrete Fourier Transform (DFT)

UNIT – III Review of Laplace transform: Laplace transforms, Laplace transforms of common signals, Properties of Laplace transforms, Inverse Laplace transforms, Region of Convergence, Poles and Zeros of the system, Laplace domain analysis of continuous time systems, solution to differential equations & system behavior.

UNIT – IV Z-Transform: Z-transforms of common sequences, Properties of Z-transforms, Region of Convergence, Inverse Z-transforms, Analysis of discrete time systems using Z-transforms.

UNIT – V State space Analysis: State Space analysis and multi-input multi-output representation, State Transition Matrix (STM) and its role. The Sampling theorem and its implications- Spectra of sampled signals, Reconstruction: Ideal interpolator, zero order hold, first order hold, Aliasing & its effect.

SUGGESTED BOOKS & REFERENCE:-

1. Signal & System, A V Oppenheim, PHI
2. Signal & System, P Ramesh Babu, Scitech Publication
3. Signal & System, F Hussain, Umesh Publication
4. Discrete Time Signal Processing, A V Oppenheim, Pearson Education
5. Signals and Systems, by Simon Haykin and Barry Van Veen. Wiley, 1999.

6. Schaum's Outline of Signals and Systems – H Hsu, TMH.
7. Signal & System, Samarjit Ghosh, TMH.

Course Outcomes :

At the end of this course students will able to:

1. Analyze and identify different types of continuous and discrete signals and systems.
2. Analyse the spectral characteristics of continuous-time periodic and a periodic signals using Fourier analysis
3. Perform different continuous and discrete time domain transformation technique.
4. Analyze multiple input multiple output system [MIMO].
5. Obtain the conversion using sampling and reconstruction of signals.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205PMC01	-	-	2	2 HOURS	-	-	0

Constitution of India

Course Objectives:

1. To realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.
2. To identify the importance of fundamental rights aswell as fundamental duties.
3. To understand the functioning of Union, State and Local Governments in Indian federal system.
4. To learn procedure and effects of emergency, composition and activities of election commission and amendment procedure.

Unit I Introduction Constitution' meaning of the term,, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

Unit II Union Government and its Administration Structure of the Indian Union: Federalism, Centre-State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha

Unit III State Government and its Administration Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Unit IV Local Administration District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit V Election Commission Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women

Books Recommended:

1. 'Indian Polity' by Laxmikanth
2. 'Indian Administration' by Subhash Kashyap
3. 'Indian Constitution' by D.D. Basu
4. 'Indian Administration' by Avasti and Avasti

Course Outcomes :

At the end of the course the student should be able to:

1. Understand and explain the significance of Indian Constitution as the fundamental law of the land.
2. Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.
3. Analyse the Indian political system, the powers and functions of the Union, State and Local Governments in detail
4. Understand Electoral Process, Emergency provisions and Amendment procedure.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205PPC01	0	0	4	4 HOURS	30	20	2

Database Management Systems Lab

Course Objectives:

This course is designed to enable the students to:

1. Introduce ER data model, database design and normalization.
2. Learn SQL basics for data definition and data manipulation.

S.No.	Experiments
1	Concept design with E-R Model.
2	Relational Model.
3	Normalization.
4	Practicing DDL commands.
5	Practicing DML commands.
6	Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.).
7	Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8	Triggers (Creation of insert trigger, delete trigger, update trigger).
9	Procedures.
10	Usage of Cursors.

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition.

REFERENCES BOOKS:

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education.
3. Introduction to Database Systems, C.J. Date, Pearson Education.
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

Course Outcomes:

At the end of this course the student can answer how to:

1. Design database schema for a given application and apply normalization.
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205TPC01	3	0	0	3 HOURS	30	70	3

Database Management Systems

Course Objectives:

1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Unit 1: Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit 2: Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Unit 3: Storage strategies: Indices, B-trees, hashing. Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

Unit 4: Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

Unit 5: Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

Suggested books:

1. “Database System Concepts”, 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

Suggested reference books

1. “Principles of Database and Knowledge – Base Systems”, Vol 1 by J. D. Ullman, Computer Science Press.
2. “Fundamentals of Database Systems”, 5th Edition by R. Elmasri and S. Navathe, Pearson Education.
3. “Foundations of Databases”, Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley.

Course Outcomes:

1. Gain knowledge of fundamentals of DBMS, database design and normal forms.
2. Master the basics of SQL for retrieval and management of data.
3. Be acquainted with the basics of transaction processing and concurrency control.
4. Familiarity with database storage structures and access techniques.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205TPE12	3	0	0	3 HOURS	30	70	3

Real Time System

Course Objectives:

The objective of this course is to

1. Develop an understanding of various Real Time systems Application
2. Obtain a broad understanding of the technologies and applications for the emerging and exciting domain of real-time systems
3. Get in-depth hands-on experience in designing and developing a real operational system.

UNIT I - INTRODUCTION TO TASK SCHEDULING

Introduction - Issues in Real Time Computing, Structure of a Real Time System, Task classes, Performance Measures for Real time Systems, Task Assignment and Scheduling – Classical uni processor scheduling algorithms, RM algorithm with different cases-Priority ceiling precedence constraints- using of primary and alternative tasks.

UNIT II - UNI AND MULTI PROCESSOR SCHEDULING

Uniprocessor scheduling of IRIS tasks, Task assignment, Utilization balancing – Next fit- Bin packing- Myopic off-line - Focused addressing and bidding- Buddy strategy- Fault Tolerant Scheduling.-Aperiodic scheduling - Spring algorithm, Horn algorithm- Bratley. - Sporadic scheduling.

UNIT III - REAL TIME COMMUNICATION

Introduction – VTCSMA – PB CSMA- Deterministic collision resolution protocol- DCR for multi packet messages- dynamic planning based- Communication with periodic and aperiodic messages.

UNIT IV - REAL TIME DATABASES

Basic Definition, Real time Vs General purpose databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency control issues, Disk Scheduling Algorithms, Two-phase Approach to improve Predictability, Maintaining Serialization Consistency, Databases for Hard Real Time System.

UNIT V - REAL-TIME MODELING AND CASE STUDIES

Petrinets and applications in real-time modeling, Air traffic controller system – Distributed air defense system.

References

1. C.M. Krishna, Kang G. Shin, *"Real Time Systems",* Tata McGraw - Hil, 2010.
2. Giorgio C. Buttazzo , *"Hard real-time computing systems: predictable scheduling algorithms and applications"* **,** Springer, 2008.
3. C. Siva Ram Murthy, G. Manimaran, *"Resource management in real-time systems and networks",* PHI, 2009.

Course Outcomes :

On completion of this course, the students will be able to

1. Understand concepts of Real-Time systems and modeling.
2. Recognize the characteristics of a real-time system.
3. Understand and develop document on an architectural design of a real-time system.
4. Develop and document Task scheduling, resource management, real-time operating systems and fault tolerant applications of Real-Time Systems.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205TPE11	3	0	0	3 HOURS	30	70	3

Software Engineering

Course Objectives:

1. Knowledge of basic SW engineering methods and practices, and their appropriate application.
2. To provide the idea of decomposing the given problem into Analysis, Designing, Implementation, Testing and Maintenance phases.
3. To provide an idea of using various process models in the software industry according to given circumstances.
4. Understanding of implementation issues such as modularity and coding standards.
5. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

UNIT I Software Engineering – What is software, Characteristics of software, Application of software, Software Development Life Cycle, Software Process Models - Linear Sequential model, Prototype model, RAD model, Incremental model, Component Based Development Model, Fourth Generation Techniques.

UNIT II . Software Requirement Specification-Problem Analysis, Requirement Specification, Validation, metrics, monitoring and control.

UNIT III System Design - Problem portioning, abstraction, top-down and bottom-up design, Structured approach, Coupling and Cohesion,Functional versus Object oriented approach, design specification and verification, metrics.

UNIT IV Coding: Top–down and bottom-up structured programming, information hiding, programming style, internal documentation,verification. Metrics, Monitoring and Control

UNIT V Software testing – Software Testing fundamentals, Black Box Testing, White box testing, Basics path testing, A strategic Issues, Types of Testing-Unit testing, Integration testing, validation testing, System Testingsoftware metrics, software evaluation, software maintenance & reliability.

List of Books:

1. Software Engg, Pressmen
2. Software Engg, Pankaj Jalote
3. Software Engg, Shaum's Outline Series
4. Fundamentals of Software Engineering, Rajib Mal.

Course Outcomes :

1. Knowledge of basic SW engineering methods and practices, and their appropriate application.
2. To provide the idea of decomposing the given problem into Analysis, Designing, Implementation, Testing and Maintenance phases.
3. To provide an idea of using various process models in the software industry according to given circumstances.
4. Understanding of implementation issues such as modularity and coding standards.
5. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205TPE13	3	0	0	3 HOURS	30	70	3

Cyber Law & Ethics

Course Objectives:
Basic understanding of current cyber security laws and the ethical principles involved. Includes describing and evaluating the impact of various laws and regulations in an industry or business. Also includes the importance of policies, procedures, guidelines, and information classification; risk identification; evaluation and mitigation and the role of compliance.

Unit I

Fundamentals of Cyber Space, Understanding Cyber Space, Interface of Technology and Law Defining Cyber Laws

Unit II

Jurisdiction in Cyber Space, Concept of Jurisdiction, Internet Jurisdiction, Indian Context of Jurisdiction, International position of Internet Jurisdiction Cases in Cyber Jurisdiction

Unit III

E-commerce- Legal issues, Legal Issues in Cyber Contracts, Cyber Contract and IT Act 2000, The UNCITRAL Model law on Electronic Commerce

Unit IV

Intellectual Property Issues and Cyberspace – The Indian Perspective, Overview of Intellectual Property related Legislation in India. Copyright law & Cyberspace, Trademark law & Cyberspace, Law relating to Semiconductor Layout & Design

Unit- V

Cyberspace law and law enforcement, information warfare and the military, and intelligence in the information age. Information warfare policy and ethical Issues.

References

1.Hon C Graff, Cryptography and E-Commerce - A Wiley Tech Brief, Wiley Computer Publisher, 2001.
2.Michael Cross, Norris L Johnson, Tony Piltzecker, Security, Shroff Publishers and Distributors Ltd.

Course Outcomes :
1. Explain the ethical and legal ramifications of accessing, using, and manipulating data in today's society.

2. Implement examples of modern compliance in relation to NIST and other applicable standards, laws, and regulations.

3. Apply ethical and moral behaviors when implementing and using information technology.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT205TPE14	3	0	0	3 HOURS	30	70	3

Embedded Systems

Course Objectives:
The students will learn and understand
1. The basic concepts of Embedded Systems
2. The applications of embedded systems involving real-time programming of microcontrollers.

UNIT 1: Introduction of Embedded systems
An Embedded system, processor in system, Hardware units, Software embedded in systems, Exemplary Embedded systems, Embedded Systems-On-Chip(SOC) and VLSI circuit.

UNIT 2: Processor and memory Organization
Structural units in a Processor, Processor selection for an embedded system, memory devices, memory selection for an embedded system, allocation of memory to programme segments and blocks and memory map of a system, direct memory access, Interfacing Processor, memories and I/O devices.

UNIT 3: Devices and Buses for Device Network
I/O devices, Timer and counting devices, Serial communication using 'I^2-C', 'CAN' and advanced I/O buses, between the networked multiple devices, Host system or computer parallel communication between the networked I/O multiple devices using the ISA,PCI, PCI-X and advanced buses.

UNIT 4: Devices Derivers and Interrupts Service Mechanism
Device drivers, parallel port device drivers in a system, serial port device drivers in a system, Device drivers for Internal programmable timing devices, Interrupt Servicing (Handling) Mechanism, context and periods for context-switching, deadline and interrupt latency.

UNIT 5: Hardware-Software Co-design in an Embedded System
Embedded System project management, Embedded System design and co-design issues in system development process, design cycle in the development phase for an embedded system, uses of target systems or its emulator and in-circuit emulator (ICE), use of software tools for development for an embedded system, use of scopes and logic analysers for system hardware tests, Issues in embedded system design.

REFERENCES

1. Embedded Systems (Architecture, programming and design) by Raj Kamal ,Tata McGraw-Hill Publishing Company Limited.
2. Embedded systems design by Rajeshwar Singh, Dhanpat Rai publications.

Course Outcomes :
On completion of this course, the students will be able to
1. To learn the basic concepts of Embedded Systems
2. To gain an understanding of applications of embedded systems involving real-time programming of microcontrollers.

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
THIRD YEAR, INFORMATION TECHNOLOGY
SEMESTER VI
EFFECTIVE FROM SESSION 2022-23

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/ WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IT206TPC01	COMPILER DESIGN	3	0	0	30	70	100	3
2	IT206TPC02	COMPUTER NETWORKS	3	0	0	30	70	100	3
3	IT206TPE2X	ELECTIVE – II	3	0	0	30	70	100	3
4	IT206TPE3X	ELECTIVE – III	3	0	0	30	70	100	3
5		OPEN ELECTIVE - I	3	0	0	30	70	100	3
PRACTICAL									
1	IT206PPC01	COMPUTER NETWORKS LAB	0	0	4	30	20	50	2
2	IT206PPE2X	ELECTIVE – II LAB	0	0	4	30	20	50	2
3	IT206PPR11	PROJECT - I	0	0	6	30	20	50	3
TOTAL CREDITS									**22**
IA- INTERNAL ASSESSMENT, ESE-END SEMESTER EXAMINATION, L-LECTURE, T-TUTORIAL, P-PRACTICAL									

LIST OF ELECTIVE – II

1.	IT206TPE21	MICROPROCESSOR & MICROCONTROLLER
2.	IT206TPE22	WEB TECHNOLOGY & E-COMMERCE
3.	IT206TPE23	QUEUING THEORY & MODELING
4.	IT206TPE24	IMAGE PROCESSING

LIST OF ELECTIVE – II (LAB)

1.	IT206PPE21	MICROPROCESSOR & MICROCONTROLLER LAB
2.	IT206PPE22	WEB TECHNOLOGY & E-COMMERCE LAB
3.	IT206PPE23	QUEUING THEORY & MODELING LAB
4.	IT206PPE24	IMAGE PROCESSING LAB

LIST OF ELECTIVE-III

1.	IT206TPE31	GRID & CLOUD COMPUTING
2.	IT206TPE32	MULTIMEDIA SYSTEM DESIGN
3.	IT206TPE33	SPEECH & NATURAL LANGUAGE PROCESSING
4.	IT206TPE34	GRAPH THEORY

LIST OF OPEN ELECTIVE-I

S.No.	COURSE CODE	COURSE NAME	OFFERED BY	ELIGIBLE DEPARTMENT
1.	CH206TOE01	INDUSTRIAL UTILITIES AND SAFETY	CHEMICAL	CIVIL, CSE, ECE, IPE, IT & MECH
2.	CE206TOE01	METRO SYSTEMS AND ENGINEERING	CIVIL	CHEM, CSE, ECE, IPE, IT & MECH
3.	CS206TOE01	OBJECT ORIENTED PROGRAMMING WITH C++	CSE	CHEM, CIVIL, ECE, IPE, IT & MECH
4.	EC206TOE01	INTRODUCTION TO ELECTRONIC DEVICES AND CIRCUITS	ECE	CHEM, CIVIL, CSE, IPE, IT & MECH
5.	IP206TOE01	OPERATION RESEARCH	IPE	CHEM, CIVIL, CSE, ECE, IT & MECH
6.	IT206TOE01	COMPUTER GRAPHICS	IT	CHEM, CIVIL, CSE, ECE, IPE & MECH
7.	ME206TOE01	AUTOMOBILE ENGINEERING	MECHANICAL	CHEM, CIVIL, CSE, ECE, IPE & IT

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPC02	3	0	0	3 HOURS	30	70	3

Computer Networks

Course Objectives:

- To understand the working principle of various communication protocols.
- To analyze the various routing algorithms.
- To know the concept of data transfer between nodes.

UNIT I - Introduction: OSI and TCP/IP Reference models, Function of layers, Network Topologies, Categories of Network - LAN, WAN, MAN, Line Configuration, Transmission Modes, Networking Devices.

UNIT II - Data link layer: Design issues, framing, error detection and correction, CRC, Hamming Code Method, Elementary Protocol- stop and wait, Sliding Window, HDLC, Ethernet, CSMA/CD.

UNIT III - Network Layer: Design Issues, Forwarding and Routing, Virtual Circuit and Datagram Networks, shortest path routing – Dijkstra's algorithms, Link State Routing, Distance Vector Routing, Internet Protocol (IP), Hierarchical Routing – RIP – OSPF – BGP.

UNIT IV - Transport Layer: Transport Layer Services, Transmission Control Protocol, TCP header, 3 way Handshake, UDP, UDP header, Difference between TCP and UDP, Reliable Data Transfer – Go Back N and Selective Repeat.

UNIT V - Application Layer: Principles of Network Applications, Encryption, Compression, Cryptography: Substitution and Transposition Ciphers, Data functions: translation, Encryption standards (DES), RSA, Email, World Wide Web, file transfer protocol, VoIP, TFTP.

TEXT BOOKS

1. Data Communications and Networking – Behrouz A. Forouzan. TMH.
2. Computer Networks — Andrew S Tanenbaum, Pearson Education/PHI.
3. Data and Computer Communication by William Stalling (Pearson Education).

REFERENCE BOOKS

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.
3. Computer Networking by Ed Tittel (Schaum's series) (TMH).
4. Comer, "Computer Networks and Internets with Internet Applications", Pearson Education.

Course Outcomes :

1. Understand fundamental underlying principles of computer networking
2. Understand details and functionality of layered network architecture.
3. Apply mathematical foundations to solve computational problems in computer networking.
4. Analyze performance of various communication protocols.
5. Compare routing algorithms.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPC01	3	0	0	3 HOURS	30	70	3

Complier Design

Course Objectives:

1. To learn the process of translating a modern high-level language to executable code.
2. To provide a student with an understanding of the fundamental principles in compiler design and to provide the skills needed for building compilers for various situations that one may encounter in a career in Computer Science.
3. To develop an awareness of the function and complexity of modern compilers.
4. To apply the code generation algorithms to get the machine code for the optimized code.
5. To represent the target code in any one of the code formats.
6. To understand the machine dependent code.
7. To draw the flow graph for the intermediate codes.
8. To apply the optimization techniques to have a better code for code generation.

UNIT 1: Introduction: Phases of compilation and overview. Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, from regular expressions to finite automata, scanner generator (lex, flex).

UNIT 2: Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) gram-mars and top-down parsing, operator grammars, LR(O), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator (yacc, bison)Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.

UNIT 3: Symbol Table: Its structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, and scope.

UNIT 4: Intermediate Code Generation: Translation of different language features, different types of intermediate forms. Code Improvement (optimization): Analysis: control-flow, data-flow dependence etc.; Code improvement local optimization, global optimization, loop optimization, peep-hole optimization etc.

UNIT 5: Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation Advanced topics: Type systems, data abstraction, compilation of Object Oriented features and non-imperative programming languages.

List of Books:

1. A.V.Aho, Ravi Sethi, J.D.Ullman, Compilers tools and Techniques, Addison Wesley.
2. D.M.Dhamdhere, Compiler Construction-Principles and practice Macmillan, India.

3. Tremblay J.P. and Sorenson, P.G. the theory and practice of compiler writing, Mc Graw Hil.
4. Waite W.N. and Goos G., Compiler construction' springer verlag.

Course Outcomes :

By the end of the course, the successful student will be able to do:

1. To realize basics of compiler design and apply for real time applications.
2. To introduce different translation languages.
3. To understand the importance of code optimization.
4. To know about compiler generation tools and techniques.
5. To learn working of compiler and non compiler applications.
6. Design a compiler for a simple programming language.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206PPC01	0	0	4	4 HOURS	30	20	2

Computer Networks Lab

Course Objectives:

This course is designed to enable the students to:

1. Understand basic network models and Different transmission media used for data communication.
2. Understand the data link design issues and various data link protocols used for data transmission.
3. Comprehend different routing algorithms used for data transmission from source to destination in a network layer.
4. Know how internet addresses are configured and how internet protocols are used in connecting internet.

S.No.	Experiments
1	To configure the IP address for a computer connected to LAN and to configure network parameters of a web browser for the same computer.
2	a. Installing of internal modem and connecting to Internet. b. To configure WiFi for your PC.
3	Study of Stop and Wait Protocol.
4	Study of Go Back N Protocol.
5	Study of Selective Repeat Protocol.
6	Study of Networking Devices.
7	Study of LAN, MAN and WAN.
8	To practice the color code for different cables.
9	To construct Peer to Peer Topology.
10	To Construct Star Topology.

TEXT BOOKS

1. Data Communications and Networking – Behrouz A. Forouzan. TMH.
2. Computer Networks — Andrew S Tanenbaum, Pearson Education/PHI.
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3. Computer Networking by Ed Tittel (Schaum's series) (TMH).
4. Comer, "Computer Networks and Internets with Internet Applications", Pearson Education.

Course Outcomes:

At the end of this course the student can answer how to:

1. By learning models students suggest appropriate network model for data communication.
2. Know how reliable data communication is achieved through data link layer.
3. Suggest appropriate routing algorithm for the network.
4. Provide internet connection to the system and its installation.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPE21	3	0	0	3 HOURS	30	70	3

Microprocessor &Microcontroller

Course Objectives:

Students will be able to.

1. Outline the history of computing devices.
2. Describe the architecture of 8086 Microprocessors.
3. Understand 8051 microcontroller concepts, architecture and programming.
4. Compare microprocessors and microcontrollers.
5. Develop programs for microprocessor and microcontrollers.

UNIT 1: Architecture of Microprocessors

Architecture of 8085Microprocessor.Architecture of 8086 Microprocessor. Signals and pins of 8086 microprocessor.

UNIT 2: Assembly Language of 8086

Description of Instructions, Assembly Directives Assembly, Software Programs with Algorithms

UNIT 3: Interfacing with 8086

Interfacing with RAMs, ROMs along with the explanation of timing diagrams.Interfacing with Peripheral ICs like 8255, 8254, 8279, 8259 etc.Architecture of 8087, Interfacing with 8086.

UNIT 4: Architecture of Micro controllers

Architecture of Microcontroller, Family members, Microcontroller Resources, Architecture of 8051 Microcontroller, Internal External memories, Counters &Timers, Synchronous Serial-Cum-Asynchronous Serial Communication USART Interface in Intel 8051, interrupts.

UNIT 5: Assembly language of 8051

Basic Assembly Language Programming in 8051, 8051 family Microcontrollers Instruction set.

REFERENCES

1. Advanced Microprocessor and peripherals by K M Bhurchandi and A K Ray, McGraw Hill Education (India).
2. Architecture programming, interfacing and system design by Raj Kamal,pearson education.

Course Outcomes :

At the end of the course, students will develop ability to

1. Define the history of microprocessors.
2. Describe the architectures of 8085 and 8086 microprocessors.
3. Write programs for 8086 and 8051.
4. Distinguish between the different modules of operation of microprocessors.
5. Interface peripherals to 8086 and 8051.
6. Evaluate the appropriateness of a memory expansion interface based on the address reference with particular application.
7. Apply the above concepts to real world automation and other electronics problems and applications.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPE23	3	0	0	3 HOURS	30	70	3

Queuing Theory & Modeling

Course Objectives:

1. To make students familiar with stochastic process theory and its applications.
2. To develop mathematical and modeling skills required for evaluating queueing systems performance.
3. To give a theoretical background needed to understand academic literature on the subject.

UNIT 1 RandomeVariables

Discrete and continuous random variables – Moments – Moment generating functions –Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions.

UNIT 2 Two-Dimentional Random Variables

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and & Linear regression – Transformation of random variables.

UNIT 3 Random Processes

Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions.

UNIT 4 Queueing Model

MarKovian queues – Birth and Death processes – Single and multiple server queueing models –Little's formula -Queues with finite waiting rooms – Queues with impatient customers : Balkingand reneging.

UNIT 5 Advanced Queueing Models

Finite source models – M/G/1 queue – Pollaczekkhinchin formula – M/D/1 and $M/E_k/1$ asspecial cases – Series queues – Open Jackson networks.

TEXT BOOKS:

1. Ibe. O.C., "Fundamentals of applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007
2. Gross. D. and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student edition,2004.

REFERENCES:

1. Robertazzi, "Computer Networks and Systems: Queueing Theory and performance evaluation", Springer, 3RdEdition, 2006.
2. Taha. H.A., "Operations Research", Pearson Education, Asia, 8th Edition, 2007.

3. Trivedi.K.S.,"Probability and Statistics with Reliability, Queueing and Computer Science applications", John Wiley and Sons, 2nd Edition, 2002.

Course Outcomes :

At the end of the course learners will be able to:

1. Understand the fundamental concepts of probability and acquire knowledge of standard distributions which can describe real life phenomena.
2. Identify various distribution functions and acquire skills in handling situations involving more than one variable.
3. Analyze the various classifications of Random Processes and characterize phenomena which evolve with respect to time in a probabilistic manner.
4. Understand the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.
5. Analyze a network of queues with Poisson external arrivals, exponential service requirements and independent routing.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPE22	3	0	0	3 HOURS	30	70	3

Web Technology & E-Commerce

Course Objectives:

The course content enables students to:

1. Understand best technologies for solving web client/server problems.
2. Analyze and design real time web applications.
3. Use Java script for dynamic effects and to validate form input entry.
4. Analyze to Use appropriate client-side or Server-side applications

UNIT I

Fundamentals of Web, History of the Web, Growth of the Web in post decade, Web function. Security aspects on the web, Computational features encompassing the Web. Working Web Browsers, concepts of search Engines, Searching the Web, Web Servers.

UNIT II

HTML: - Introduction, , content positioning HTML content, Layer object, Handling events using localized scripts, Animating images, HTML List, HTML Table & DHTML. Cascading style sheets.

UNIT III

Active Server Page(ASP) Introduction , Internet Information System , Basic authentication , active server page, asp objects , server objects , file system objects , session ,accessing database with an ASP page, create an ODBC ADO connection object, common methods & Properties events , ADO record set object.

UNIT IV

XML: Introduction, difference between XML & HTML, building application with XML, XML schemas. DTD & XSLT.

UNIT V

Security of E-Commerce transactions, E-Commerce models- B2B, B2C, review of cryptographic tools, authentication, signatures, observers, anonymity, privacy, tractability, key certification, managementetc.EDI, Payment protocols and standards, smart card, e-card, e-wallet technologies, electronic money and electronic payment systems.

List of Books:

1. Minoli and Minoli, Web technology and Commerce, TMH.
2. Web Technology, Achyut Godbole, Atul Kahate, TMH.
3. Principles of Web Design, Sklar, Cengage.
4. Electronic Commerce, Schneider, cengage Learn.
5. The E-Business revolution, Daniel Amor, PHI.
6. E-Government, Satyanarayana, PHI.
7. E-Commerce, Greenstein, TMH.
8. Koisur David : Electronic Commerce, Microsoft.
9. Ravi Kalakota : Frontiers of Electronic commerce.

Course Outcomes :

At the end of the course students are able to:

1. Choose, understand, and analyze any suitable real time web application.
2. Integrate java and server side scripting languages to develop web applications.
3. Extend this knowledge to .Net platforms.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPE24	3	0	0	3 HOURS	30	70	3

Image processing

Course Objectives:

1. To study the image fundamentals and mathematical transforms necessary for image processing.
2. To study the image enhancement techniques.
3. To study image restoration procedures.
4. To study the image compression procedures.

Unit 1 Digital Image Fundamentals-Elements of visual perception, image sensing and acquisition, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures.

Unit 2 Image Enhancements and Filtering-Gray level transformations, histogram equalization and specifications, pixel-domain smoothing filters – linear and order-statistics, pixel-domain sharpening filters – first and second derivative, two-dimensional DFT and its inverse, frequency domain filters – low-pass and high-pass.

Unit 3 Color Image Processing-Color models–RGB, YUV, HSI; Color transformations– formulation, color complements, color slicing, tone and color corrections; Color image smoothing and sharpening; Color Segmentation.

Unit 4 Image Segmentation- Detection of discontinuities, edge linking and boundary detection, thresholding – global and adaptive, region-based segmentation.

Unit 5 Image Compression-Redundancy–inter-pixel and psycho-visual; Lossless compression – predictive, entropy; Lossy compression- predictive and transform coding; Discrete Cosine Transform; Still image compression standards – JPEG and JPEG-2000.

Text/Reference Books:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition 2008.
2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2nd edition 2004.
3. Murat Tekalp , Digital Video Processing" Prentice Hall, 2nd edition 2015.

Course Outcomes :

1. Review the fundamental concepts of a digital image processing system.
2. Analyze images in the frequency domain using various transforms.
3. Evaluate the techniques for image enhancement and image restoration.
4. Categorize various compression techniques.
5. Interpret Image compression standards.
6. Interpret image segmentation and representation techniques.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPE31	3	0	0	3 HOURS	30	70	3

Grid and Cloud Computing

Course Objectives:

1. Identify the technical foundations of cloud systems architectures.
2. Analyze the problems and solutions to cloud application problems.
3. Apply principles of best practice in cloud application design and management.
4. Identify and define technical challenges for cloud applications and assess their importance.

UNIT I

Cloud Computing, Cloud Architecture, Cloud Storage, Advantages and Disadvantages of Cloud Computing, Companies inthe Cloud Today, Cloud Services, Web-Based Application.Ubiquitous computing, On-Demand Computing,Cloud Computing for theCommunity, Collaborating on Group Projects and Events, Cloud Computing for the Corporation.

UNIT II

Infrastructure as a Service: Introduction, Virtualization, Client and Server, Storage, RAID, IBM SAN, Infrastructure creation, Elastic Computing: Amazon Ec2, Computation Services, Case Study.

UNIT III

Platformas a Service: Microsoft AZURE, Google App Engine, Amazon Web Services, IBM Clouds, Software as a Service, IBM Websphere Cast Iron, Case studies.

UNIT IV

MapReduce, GFS, Hadoop, HDFS,Bigdata, business perspectives, IBM InfosphereBiginsight, Analytics of BigData, Infosphere Streams,

UNIT V

Grid Computing: History, Definition, Types, Architecture and GoalsApplications and Challenges of Grid Computing, Providers of Grid Computing. IBM Globus Toolkit, Grid Security Infrastructure, Open Grid Service Architecture.

TEXT BOOKS / REFERENCE BOOKS

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work andCollaborate Online, Que Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing.
3. Viktors Berstis , Grid Computing : IBM Red Book.
4. Understanding Bigdata, by Paul C. Zikopoulos et al. McGraw Hill.

5. "Introduction to Grid Computing with Globus", Luis Ferreira et al. IBM Red Books.

Course Outcomes :

1. Understand the fundamental principles of distributed computing.
2. Understand how the distributed computing environments known as Grids can be built from lower level services.
3. Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.
4. Analyze the performance of Cloud Computing.
5. Understand the concept of Cloud Security.
6. Learn the Concept of Cloud Infrastructure Model.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPE32	3	0	0	3 HOURS	30	70	3

Multimedia System Design

Course Objectives:

The major goals of this course are:

1. Learn how learning theories influence the development of multimedia product.
2. Develop competencies in designing and creating interactive multimedia applications by explaining how elements of these applications reflect a theory of how learning will occur.
3. Work with all aspects of text, audio, images and video;
4. Learn the phases involved in multimedia planning, design and production.
5. Be able to use various multimedia authoring tools.
6. Be able to design and create interactive multimedia products.

UNIT 1: Introduction to Multimedia System: An overview of multimedia system and media streams architecture and components, synchronization & quality of service (QOS).

UNIT 2: Audio and Speech: Data acquisition, sampling and quantization, human speech, digital model of speech production, analysis and synthesis, psychoacoustics, low bit rate speech compression, MPEG audio compression.

UNIT 3: Images and Video: Image acquisition and representation, bi-level image compression standards: ITU (formerly CCITT) Group III and IV standards, JPEG image compression standards, MPEG, H.264/AVC video compression standards, Transcoding.

UNIT 4: Multimedia Communication: Fundamentals of data communication and networking, Bandwidth requirements of different media, Real time constraints: latency, video data rate, multimedia over LAN and WAN, Multimedia conferencing, video-on-demand broadcasting issues.

UNIT 5: Hypermedia Presentation: Authoring and publishing, Linear and non-linear presentation, Structuring Information, Different approaches of authoring hypermedia documents, Hyper-media data models and standards.

Text Book:

1. Jerry D. Gibson, Toby Berger, Tom Lookabaugh, Dave Lindergh and Richard L. Baker Digital Compression for Multimedia: Principles and Standards Elsevier, 2006.

2. Ralf Steinmetz and Klara Nahrstedt, Multimedia: Computing, Communications, and Application, Prentice Hall, 1995.
3. Khalid Sayood Introduction to Data Compression 3rd Edition, Elsevier, 2006.
4. Asit Dan and Dinkar Sitaram Multimedia Servers Elsevier, 2006.

Course Outcomes :

Upon successful completion of the course, students should be able to: Knowledge and understanding:

1. Understand the concepts and processes which underpin the design and development of multimedia products.
2. Understand the techniques and technologies used in the development of multimedia solutions. Intellectual / cognitive skills.
3. Plan the development of an idea into the realization of a product.
4. Design and implement multimedia solutions. Practical, research and independent learning skills.
5. Use appropriate tools for the design, development and creation of digital media arte facts.
6. Learn how to be proactive and reflective Transferable / key skills.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPE33	3	0	0	3 HOURS	30	70	3

Speech and Natural Language Processing

Course Objectives:

1. To understand the basics of speech and language processing.
2. Apply conventional techniques in NLP.

UNIT 1 Sound : Biology of Speech Processing; Place and Manner of Articulation; Word Boundary Detection; Argmax based computations; HMM and Speech Recognition.

UNIT 2 Words and Word Forms : Morphology fundamentals; Morphological Diversity of Indian Languages; Morphology Paradigms; Finite State Machine Based Morphology; Automatic Morphology Learning; Shallow Parsing; Named Entities; Maximum Entropy Models; Random Fields.

UNIT 3 Structures : Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on Noisy Text as in Web documents; Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.

UNIT 4 Meaning : Lexical Knowledge Networks, Wordnet Theory; Indian Language Wordnets and Multilingual Dictionaries; Semantic Roles; Word Sense Disambiguation; WSD and Multilinguality; Metaphors; Coreferences.

UNIT 5 Applications : Sentiment Analysis; Text Entailment; Robust and Scalable Machine Translation; Question Answering in Multilingual Setting; Cross Lingual Information Retrieval (CLIR).

REFERENCES

1. Allen, James, Natural Language Understanding, Second Edition, Benjamin/Cumming, 1995.
2. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
3. Jurafsky, Dan and Martin, James, Speech and Language Processing, Second Edition, Prentice Hall, 2008.
4. Manning, Christopher and Heinrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

Course Outcomes :

At the end of the course, students will be able to –

1. Describe the fundamental concepts and techniques of natural language processing.
2. Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each.
3. Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions.
4. Analyze large volume text data generated from a range of real-world applications.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206TPE34	3	0	0	3 HOURS	30	70	3

Graph Theory

Course Objectives:

1. To understand and apply the fundamental concepts in graph theory.
2. To apply graph theory based tools in solving practical problems.
3. To improve the proof writing skills.

Unit-I Preliminaries: Graphs, isomorphism, subgraphs, matrix representations,degree, operations on graphs, degree sequences. Connected graphs and shortest paths: Walks, trails, paths, connected graphs, distance, cut-vertices, cut-edges, blocks, weighted graphs, connectivity, Dijkstra's shortest path algorithm, Floyd-Warshall shortest path algorithm

Unit-II Trees: Characterizations, number of trees, minimum spanning trees. Special classes of graphs: Bipartite graphs, line graphs, chordal graphs

Unit-III Eulerian graphs: Characterization, Fleury's algorithm, chinese-postman problem. Hamilton graphs: Necessary conditions and sufficient conditions

Unit-IV Independent sets, coverings and mathcings: Basic equations, matchings in bipartite graphs, perfect matching's, greedy and approximation algorithms. Vertex colorings: Chromatic number and cliques, greedy coloring algorithm, coloring of chordal graphs, Brook's theorem. Edge colorings: Gupta-Vizing theorem, Class-1 graphs and class-2 graphs, equitable edge-coloring.

Unit-V Planar graphs :Basic concepts, Eulers formula, polyhedrons and planar graphs, charactrizations, planarity testing, 5-color-theorem. Directed graphs: Directed graph, underlying graph, outdegree, in-degree, connectivity, orientation, Eulerian directed graphs, Hamilton directed graphs, tournaments

Text Books:

1. J.A. Bondy and U.S.R.Murty: Graph Theory and Applications (Freely downloadable from Bondy's website; Google-Bondy)
2. D.B.West: Introduction to Graph Theory, Prentice-Hall of India/Pearson, 2009 (latest impression).

Reference Books:

1. J.A.Bondy and U.S.R.Murty: Graph Theory, Springer, 2008.
2. R.Diestel: Graph Theory, Springer(low price edition) 2000.

Course Outcomes:

The students will be able to apply principles and concepts of graph theory in practical situations

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206PPE24	0	0	4	4 HOURS	30	20	2

Image Processing Lab

Course Objectives:

This course is designed to enable the students to:

1. To study the image fundamentals and mathematical transforms necessary for image processing.
2. To study the image enhancement techniques.
3. To study image restoration procedures.
4. To study the image compression procedures.

S.No.	Experiments
1	Display of Gray scale Images
2	Histogram Equalization.
3	Design of Non-linear Filtering.
4	Determination of Edge detection using Operators.
5	Filtering in frequency domain.
6	Display of color images.
7	2-D DFT and DCT.
8	Conversion between color spaces.
9	DWT of images.
10	Segmentation using watershed transform.

Text/Reference Books:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education 3rd edition 2008.
2. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India.2nd edition 2004.
3. Murat Tekalp , Digital Video Processing" Prentice Hall, 2nd edition 2015.

Course Outcomes:

At the end of this course the student can answer how to:

1. Study the image fundamentals, mathematical transforms necessary for image processing.
2. About the various techniques of image enhancement, reconstruction, compression and segmentation.
3. Know sampling and reconstruction procedures.
4. Design image processing systems.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206PPE21	0	0	4	4 HOURS	30	20	2

Microprocessor & Microcontroller Lab

Course Objectives:

Students will be able to.

1. To expose students to the operation of typical microprocessor (8086) trainer kit.
2. To prepare the students to be able to solve different problems by developing different programs in assembly language.
3. To develop the quality of assessing and analyzing the obtained data.
4. To understand and hands on training of Interfacing of devices.

S.No.	Experiments with 8086 Microprocessor
1	To perform addition & subtraction of two 8 – bit hexadecimal numbers.
2	To perform addition & subtraction 16 – bit hexadecimal numbers.
3	To perform addition & subtraction 32 – bit hexadecimal numbers.
4	To perform addition & subtraction of two 8 – bit decimal numbers and store the result in DX register.
5	To perform addition & subtraction of two decimal digits n and m using ASCII code store the result in ASCII format. Where n and m are decimal number with single decimal digits.
6	To perform addition & subtraction of two decimal digits n and m using ASCII code store the result in ASCII format in CX-BX register. Where n and m are decimal number with two decimal digits.
7	To perform multiplication of n and m. Where n and m are hexadecimal numbers.
8	To perform division of 16 – bit number with 8-bit number.
9	To perform multiplication of two 8-bit numbers using ASCII code store the result in ASCII form in DX. Register.
10	To perform division of two 8-bit numbers using ASCII code store the result in ASCII form in DX register.
11	To solve Arithmetic equation 3AX+5DX+BP and store the result in CX register.
12	To solve Arithmetic equation (P*Q)+(R*S).
13	To add only positive number from 100 data bytes.
14	To write a program to add series of 20 bytes.
15	To find positive & negative byte from 100 data bytes.
16	To find largest & smallest byte from block of data.

S.No.	Experiments with 8051 Microcontroller
1	Data transfer/exchange between specified memory locations.
2	Largest/smallest from a series.
3	Sorting (Ascending/Descending) of data
4	Addition / subtraction / multiplication / division of 8/16 bit data.
5	Sum of a series of 8 bit data.
6	Multiplication by shift and add method.
7	Square / cube / square root of 8 bit data.
8	Matrix addition.

9	LCM and HCF of two 8 bit numbers.
10	Code conversion – Hex to Decimal/ASCII to Decimal and vice versa.
Interfacing experiments using 8051 Trainer kit and interfacing modules (At least two Experiments are mandatory)	
11	Time delay generation and relay interface.
12	Display (LED/Seven segments/LCD) and keyboard interface
13	ADC interface..
14	DAC interface with wave form generation.
15	Stepper motor and DC motor interface.
16	Realization of Boolean expression through port.

Reference Books:

1. IBM PC Assembly Language and Programming, P. Abel, 5th Edition, PHI/Pearson Education.
2. Introduction To Assembly Language Programming, SivaramaP.Dandamudi, Springer Int. Edition,2003.
3. The 8088 and 8086 Microprocessors: Programming , Interfacing,Software,Hardware and Application,4th edition,W.A.Triebel,A.Singh,N.K.Srinath,Pearson Education.

Course Outcomes:

On completion of this lab course the students will be able to:

1. Understand and apply the fundamentals of assembly level programming of microprocessors and microcontroller.
2. Work with standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.
3. Troubleshoot interactions between software and hardware.
4. Analyze abstract problems and apply a combination of hardware and software to address the problem.
5. Design &Develop the solutions of problems using 8051 microcontroller.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206PPE23	0	0	4	4 HOURS	30	20	2

Queuing Theory & Modeling Lab

Course Objectives:

This course is designed to enable the students to:

1. To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
2. To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
3. To understand the basic concepts of random processes which are widely used in IT fields.
4. To understand the concept of queueing models and apply in engineering.
5. To understand the significance of advanced queueing models.
6. To provide the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of science and engineering.

S.No.	Experiments
1	Infinite Capacity Markovian Models.
2	Finite Capacity Markovian Models.
3	Retrial Markovian Models for Bulk Arrival/Service.
4	Infinite Capacity Non Markovian Models.
5	Finite Capacity Non Markovian Models.
6	Non Markovian Models for Bulk Arrival/Service.
7	Discrete time Experiments.
8	Open Tandem Queue.
9	Tandem Queue with feedback.
10	Open Queueing Network Experiment.

TEXT BOOKS:

1. Ibe. O.C., "Fundamentals of applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007
2. Gross. D. and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student edition,2004.

REFERENCES:

3. Robertazzi, "Computer Networks and Systems: Queueing Theory and performance evaluation", Springer, 3RdEdition, 2006.
4. Taha. H.A., "Operations Research", Pearson Education, Asia, 8th Edition, 2007.
5. Trivedi.K.S.,"Probability and Statistics with Reliability, Queueing and Computer Science applications", John Wiley and Sons, 2nd Edition, 2002.

Course Outcomes:

At the end of this course the student can answer how to:

1. Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
2. Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
3. Apply the concept of random processes in engineering disciplines.
4. Acquire skills in analyzing queueing models.
5. Understand and characterize phenomenon which evolve with respect to time in a probabilistic manner.

SUB CODE	L	T	P	DURATION	IA	ESE	CREDITS
IT206PPE22	0	0	4	4 HOURS	30	20	2

Web Technology & E-Commerce Lab

Course Objectives:

This course is designed to enable the students to:

1. Understand the web technologies to create adaptive web pages for web application.
2. Use CSS to implement a variety of presentation effects to the web application.
3. Know the concept and implementation of cookies as well as related privacy concerns.
4. Develop a sophisticated web application that employs the MVC architecture.

S.No.	Experiments
1	Design the following static web pages required for a Training and placement cell web site. 1) Home Page 2) Login Page 3) Registration page
2	Design the following static web pages required for a Training and placement cell web site. 4) Company Details Page 5) Alumni Details Page 6) Placement Staff Details Page
3	Design the following static web pages required for a Training and placement cell web site. 7) Student personal Info Page 8) Student Academic Info page 9) Semester Wise Percentage & their Aggregate page
4	Validate login page and registration page using regular expressions.
5	Apply different font styles, font families, font colors and other formatting styles to the above static web pages.
6	Install wamp server and tomcat server, access above developed static web pages using these servers.
7	Write a servlet/PHP to connect to the database, Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration.
8	Write a JSP/PHP to connect to the database, Insert the details of the student academic information with student academic info page.
9	Write a JSP which does the following job: Authenticate the user when he submits the login form using the user name and password from the database.
10	Write a JSP to insert the student's semester wise percentages and calculate aggregate and insert into database.
11	Write a JSP to search the students according to their aggregate and produce sorted list or according to their Enroll number.

List of Books:

1. Minoli and Minoli, Web technology and Commerce, TMH.
2. Web Technology, Achyut Godbole, Atul Kahate, TMH.
3. Principles of Web Design, Sklar, Cengage.
4. Electronic Commerce, Schneider, cengage Learn.
5. The E-Business revolution, Daniel Amor, PHI.
6. E-Government, Satyanarayana, PHI.
7. E-Commerce, Greenstein, TMH.
8. Koisur David : Electronic Commerce, Microsoft.
9. Ravi Kalakota : Frontiers of Electronic commerce.

Course Outcomes:

At the end of this course the student can answer how to:

1. Integrate frontend and backend web technologies in distributed systems.
2. Facilitate interface between frontend and backend of a web application.
3. Debug, test and deploy web applications in different web servers.
4. Migrate the web applications to the other platforms like .Net.