SHRI SHANKARACHARYA TECHNICAL CAMPUS, BHILAI
(An Autonomous Institute affiliated to CSVTU, Bhilai)
Scheme of Teaching and Examination (Effective from 2020-2021Batch)

B.Tech. Information Technology (Fifth Semester)

Sl. No.	Board of Studies (BOS)	Courses	Course Code	Period per Week			Scheme of Examination			Total Marks	Credit
							Theory/Lab				
				L	T	P	ESE	CT	TA		
1	Information Technology	Artificial Intelligence and Machine Learning	IT106501	2	1	-	100	20	30	150	3
2	Information Technology	Theory of Computation	IT106502	2	1	-	100	20	30	150	3
3	Information Technology	Software Engineering & Project Management	IT106503	2	1	-	100	20	30	150	3
4	Information Technology	Operating System	IT106504	2	1	-	100	20	30	150	3
5	Information Technology	Professional Elective -1	(Refer Table - 1)	2	1	-	100	20	30	150	3
6	Information Technology	Artificial Intelligence and Machine Learning Lab (Python)	IT106591	-	-	2	25	-	25	50	1
7	Information Technology	Operating System Lab	IT106592	-	-	2	25	-	25	50	1
8	Information Technology	Software Engineering & Project Management LAB	IT106593	-	-	2	25	-	25	50	1
9	Information Technology	Minor Project (Emerging Technology)	IT106594	-	-	2	25	-	25	50	1
10	Information Technology	Practical Training /Internship assessment (Report & Seminar)	IT106595	-	-	2	-	-	25	25	1
11	Information Technology	Constitution of India	IT100596	-	-	-	-	-	25	25	
Total				**10**	**5**	**10**	**600**	**100**	**300**	**1000**	**20**

L- Lecture T- Tutorial P- Practical

CT- Class Test TA- Teachers Assessment ESE- End Semester Exam

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B.Tech. Information Technology (Fifth Semester)

Table :1 [Professional Elective -1]			
Sl. No.	**Board of Studies (BOS)**	**Courses (Subject)**	**Course Code**
1	Information Technology	Principles of Communication Systems	IT106521
2	Information Technology	Web Development Technology	IT106522
3	Information Technology	Graph Theory	IT106523
4	Information Technology	Information Retrieval	IT106524
5	Information Technology	Internet of Things	IT106525

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B.Tech. Information Technology (Sixth Semester)

Sl. No.	Board of Studies (BOS)	Courses	Course Code	Period per Week			Scheme of Examination			Total Marks	Credit
							Theory/Lab				
				L	T	P	ESE	CT	TA		
1	Information Technology	**Computer Graphics**	IT106601	3	1	-	100	20	30	150	4
2	Information Technology	Cryptography & Network Security	IT106602	2	1	-	100	20	30	150	3
3	Information Technology	**Compiler Design**	**IT106603**	2	1	-	100	20	30	150	3
4	Information Technology	Professional Elective -2	(Refer Table-1)	2	1	-	100	20	30	150	3
5	Information Technology	Open Elective -1	(Refer Table-2)	2	1	-	100	20	30	150	3
6	Information Technology	**Computer Graphics Lab**	IT106691	-	-	2	25	-	25	50	1
7	Information Technology	Cryptography & Network Security Lab	IT106692	-	-	2	25	-	25	50	1
8	Information Technology	**Virtual Lab (Android Lab)**	IT106693	-	-	2	25	-	25	50	1
9	Information Technology	Minor Project - II [Angular, Node JS]	IT106694	-	-	2	50	-	25	75	1
10	Information Technology	Essence of Indian knowledge Tradition	IT100695	-	-	-	-	-	25	25	-
Total				**11**	**5**	**8**	**625**	**100**	**275**	**1000**	**20**

L- Lecture T- Tutorial P- Practical
CT- Class Test TA- Teachers Assessment ESE- End Semester Exam

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Table : 1 [Professional Elective - 2]			
Sl. No.	**Board of Studies (BOS)**	**Courses (Subject)**	**Course Code**
1	Information Technology	Big Data Analytics	IT106821
2	Information Technology	Information Security	IT106822
3	Information Technology	Machine Learning using Deep Learning	IT106823
4	Information Technology	Wireles Adhoc & Sensor Networks	IT106824
5	Information Technology	Cluster & Grid Computing	IT106825
6	Information Technology	Bioinformatics	IT106826

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B.Tech. Information Technology (Sixth Semester)

Table 2 : Open Elective - I

Sl. No.	Board of Studies (BOS)	Course(Subject)	Course Code	Link
1.	Civil Engineering	Project Construction		https://archive.nptel.ac.in/courses/105/106/105106149/
2.	Civil Engineering	Remote Sensing Principle &		https://nptel.ac.in/courses/105101206
3.	Computer Science & Engineering	Robotics		https://onlinecourses.nptel.ac.in/noc22_me109/preview
4.	Computer Science & Engineering	Data Visualization		https://onlinecourses.nptel.ac.in/noc22_cs72/preview
5.	Computer Science & Engineering	Pattern Recognition and Visual		https://onlinecourses.nptel.ac.in/noc22_ee119/preview
6.	Computer Science & Engineering	Predictive Analysis		
7.	Electrical & Electronics	Hybrid Electric Vehicle		
8.	Electrical & Electronics Engineering	Grid Integration of Renewable Energy Sources		
9.	Electrical Engineering	Renewable Energy Systems		nptel.ac.in/courses/1031032061
10..	Electrical Engineering	Industrial Automation and PLC		nptel.ac.in/courses/108105062
11.	Electronics & Telecommunication Engineering	Introduction to Wireless and Cellular Communications		https://nptel.ac.in/courses/106106167
12.	Electronics & Telecommunication	Cryptography & Network Security		https://nptel.ac.in/courses/106105162
13.	Information Technology	Human Computer Interaction		https://nptel.ac.in/courses/106106177
14.	Information Technology	Virtual reality		https://nptel.ac.in/uacourses/106106138
15.	MBA	Management for Technocrats		https://nptel.ac.in/courses/110105146 https://onlinecourses.nptel.ac.in/noc22_mg104/preview
				https://onlinecourses.swayam2.ac.in/nou22_mg07/
16.	MBA	Industrial Management		https://onlinecourses.swayam2.ac.in/nou22_mg06/preview
				https://onlinecourses.nptel.ac.in/noc22_mg81/preview https://nptel.ac.in/courses/110106141
17.	Mechanical Engineering	Operation Research		https://nptel.ac.in/courses/110106062
18.	Mechanical Engineering	Engineering Economics		https://nptel.ac.in/courses/112107209

SYLLABUS

B.TECH. (INFORMATION TECHNOLOGY)

FIFTH SEMESTER

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Subject Code IT106501	**Artificial Intelligence and Machine Learning**	**L=2**	**T=1**	**P= 0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3Hours**

Course Objectives	**Course Outcomes**
1. To understand basic concepts of AI and Fundamental of heuristic search techniques. 2. To understandArtificial Neural Networks. 3. To understand Logistic Regression and Support Vector Machine. 4. To understanding of Machine learning and its algorithms. 5. To understand Advanced Learning methods and Clustering.	**CO:1** Apply the knowledge and skills of heuristic search and game playing for solving real time problems **CO:2**Apply Artificial Neural Networks and implement the various layers. **CO:3**Ability to work with Logistic Regression and Support Vector Machine **CO:4** Apply suitable Machine learning and its algorithms. **CO:5** Develop learning models and Advanced Learning methods and Clustering.

Unit-I: Introduction - : CO1
Introduction to AI, Problem Solving. Production systems. State space search, Blind search: Depth first search, Breadth first search, Informed search: Heuristic function, Hill climbing search, Branch and Bound technique, A* Search,Constraint Satisfaction problems Game Playing Minimax search procedure; Alpha-Beta cutoffs; Additional Refinements. [7Hrs]

Unit-II: Artificial Neural Networks: **CO2**
Introduction to Artificial Neural Networks: Biological Neurons and Biological Neural Networks, Artificial Neural Networks, Activation Functions, Perceptron NN, Multilayer Perceptron NN, Back-propagation Neural Networks, Training Methods, Basic definition of supervised and unsupervised Learning. [8Hrs]

Unit-III Introduction to Machine Learning: CO3
Introduction (Different Types of Learning) Hypothesis Space, Inductive Bias, Evaluation and Cross Validation.
Main Algorithms used in Machine Learning
Linear Regression, Decision Trees, Learning Decision Trees, K-nearest Neighbour, Collaborative Filtering, Over fitting, Dimensionality Reduction Technique :Feature Selection, Feature Extraction. [7Hrs]

Unit-IV: Logistic Regression and Support Vector Machine: CO4
Logistic Regression, Introduction to Support Vector Machine, The Dual Formation, Maximum Margin with Noise, Nonlinear SVM and Kernel Function, SVM: Solution to the Dual Problem. [7Hrs]

Unit-V: Advanced Learning methods and Clustering: CO5
Introduction to Clustering, Kmeans Clustering, Agglomerative Hierarchical Clustering, Basics of Semi Supervised and Reinforcement Learning, Introduction to Deep Learning. [7Hrs]

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Subject Code IT106501	**Artificial Intelligence and Machine Learning**	**L=2**	**T=1**	**P= 0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESEDuration**
	100	**20**	**30**	**150**	**3Hours**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Artificial Intelligence	Elaine Rich, Kevin Knight	Mc-GrawHill
2)	Introduction to Machine Learning	EthemAlpaydi	MIT Press,2015

Reference Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Introduction to AI & Expert System	Dan W.Patterson	PHI
2)	Machine Learning with Python for Everyone	Mark Fenner	Pearson
3)	Machine Learning	AnuradhanSrinivasaraghavan	Wiley
4)	Machine Learning with Python	U Dinesh Kumar ManaranjanPradhan	Wiley

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Subject Code IT106502	Theory of Computation	L=2	T=1	P= 0	Credits=3
EvaluationScheme	ESE	CT	TA	Total	ESEDuration
	100	20	30	150	3Hours

CourseObjectives	CourseOutcomes
1. To understand the language hierarchy 2. To construct automata for any given pattern and find its equivalent regular expressions. 3. To design a context free grammar for any given language. 4. To understand Turing machines and their capability. 5. To understand undecidable problems and NP class problems.	**On successful completion of the course, the student will be able to:** **CO1:** Construct finite state machines and minimize them. **CO2:** Design regular expressions and to prove the equivalence of languages described by finite state machines and regular expressions **CO3:** Design grammars and simplify context free grammars **CO4:** Construct pushdown automata and to prove the equivalence of languages described by pushdown automata and context free grammars **CO5:** Solve various problems of applying Turing Machines

UNIT I: The Theory of Automata: **CO1**
Introduction to automata theory, Examples of automata machine, Finite automata as a language acceptor and translator. Deterministic finite automata. Non deterministic finite automata, finite automata with output (Mealy Machine. Moore machine). Finite automata with null moves, Conversion of NFA to DFA, Minimization of DFA. MyhillNerode theorem, Properties and limitation of FSM. Two way finite automata. Applications of finite automata. **[8Hrs]**

UNIT II: Regular Expressions: **CO2**
Regular expression, Properties of Regular Expression. Finite automata and Regular expressions. Arden's theorem, Regular Expression to DFA conversion & vice versa. Pumping lemma for regular sets. Application of pumping lemma, Regular sets and Regular grammar. Closure properties of regular sets. Decision algorithm for regular sets and regular grammar. **[7Hrs]**

UNIT III: Grammars: **CO3**
Definition and types of grammar. Chomsky hierarchy of grammar. Relation between types of grammars. Role and application areas of grammars. Context free grammar. Left most derivation,right most derivation, Derivation trees. Ambiguity in grammar. Simplification of context free grammar. Chomsky normal from. Greibach normal form, properties of context free language. Pumping lemma from context free language. Decision algorithm for context tree language. **[7Hrs]**

UNIT IV: Push Down Automata: **CO4**
Basic definitions. Deterministic push down automata and non-deterministic push down automata. Acceptance of push down automata. Push down automata and context free language. **[7Hrs]**

UNIT V: Turing Machine Model and Computability: **CO5**
Representation of Turing Machine Construction of Turing Machine for simple problems. Universal Turing machine and other modifications. Church's Hypothesis. Halting problem of Turing Machine, Undecidable Problem with RE – Undecidable Problems about TM-Post's correspondence problem, Rice'stheorem. Introduction and Basic concepts. Recursive function, Partial recursive function, Undecidability. Recursive languare,Recursive Enumerable language, The Class P and NP. **[7 Hrs]**

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Subject Code IT106502	**Theory of Computation**	**L=2**	**T=1**	**P= 0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESEDuration**
	100	**20**	**30**	**150**	**3Hours**

TextBooks:

S. No.	**Title**	**Authors**	**Publisher**
1)	Introduction to Automata theory. Language and Computation	J. E. Hopcroft, J. D. Ullman	Pearson Prentice Hall India.
2)	Theory of Computer Science (Automata Language & Computation)	K.L.P. Mishra and N. Chandrasekran	Pearson Prentice Hall India.

ReferenceBooks:

S. No.	**Title**	**Authors**	**Publisher**
1)	Finite Automata and Formal Languag A Simple Approach	A.M. Padma Reddy	Pearson New International Edition
2)	Formal Languages and Automata Theory	K V N Sunitha , N Kalyani	McGraw Hill Education
3)	Theory of Computation	AM Natrajan. Tamilarasi, Bilasubramani	New Age International Publishers

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Subject ode IT106503	Software Engineering & Project Management	L=2	T=1	P=0	Credits=3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3Hours

Course Objectives	Course Outcomes
1.To introduce the fundamental concepts of software engineering. 2. To build an understanding on various phases of software development. 3. To introduce various software process models. 4. To understand different Quality Management Schemes. 5. To understand about different Project Management Schemes/ Techniques .	**CO1.** Identify suitable life cycle models to be used. **CO2.** Analyze a problem and identify and define the computing requirements to the problem. **CO3.** Translate a requirement specification to a design using an appropriate software engineering methodology. **CO4.** Formulate appropriate testing strategy for the given software system. **CO5.** Develop software projects based on current technology, by managing resources economically and keeping ethical values.

Unit-I: Introduction - : **CO1**
Software Characteristics, Software Engineering- A Layered Technology, Software Process Framework, Software Process Models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process Model, Agile Process Models. [8Hrs]

Unit-II: Software engineering Principles and Practice: **CO2**
Communication Practices, Planning Practices, Modeling Practices, Construction Practice & Deployment, System Engineering Hierarchy, Business Process Engineering, Product Engineering, System Modeling, Requirements Engineering.
System Analysis: Structured Analysis, Data modeling, Object- Oriented Analysis, Scenario- Based Modeling, Flow- Oriented Modeling, Class- based Modeling, Behavioral Model, Design Concepts : Abstraction , Pattern modularity, Information hiding, Design classes, Refactoring. [7Hrs]

Unit-III Software Testing: **CO3**
Testing Fundamentals, Black- Box Testing, White- Box Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging. [7Hrs]

Unit-IV: Quality Management: **CO4**
Product Metrics, Metrics for Analysis & Design Models, Metrics for Source Code, Metrics for Testing & Maintenance. Quality concepts, Evolution of Quality Management, Quality assurance, Software reviews, Statistical quality assurance. [7Hrs]

Unit-V: Project management: **CO5**
Introduction to Software Project Management, Project Planning, Project scheduling, Risk management , Change Management, Software reengineering, Restructuring Reverse engineering, Forward Engineering, CMM level [7Hrs]

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Subject ode IT106503	**Software Engineering & Project Management**	**L=2**	**T=1**	**P=0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3Hours**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Software Engineering	A Practitioner's Approach (Sixth Edition)	Roger Pressman (TMH)
2)	Software Engineering (Ninth Edition)	Ian Summerville	(Pearson Education)
	Software Engineering: Theory and Practice (Fourth Edition)	Pfleeger	
	Software Engineering	Mishra /Mohanty	Pearson Education

Reference Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Software Engineering	Schaum's Series	TMH
2)	Software Project Management	Sanjay Mohapatra	Cengage Learning

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Subject ode IT106504	**Operating System**	**L=2**	**T=1**	**P=0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3Hours**

Course Objectives	**Course Outcomes**
1. General understanding of structure of modern computers 2. To understand purpose, structure and functions of operating systems 3. To illustration of key OS aspects by example 4. Understanding of virtual Memory concept. 5. To illustration the key concept of Unix System	By the end of the course you should be able to- **CO1.** Describe the general architecture of computers and operating system **CO2.** Understand and analyse theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and les. **CO3.** Categorize the operating system's resource management techniques, dead lock management techniques, memory management techniques.C5 **CO4.** Description of protection and security and also the Comparison of UNIX and Windows based OS **CO5.** Defining I/O systems, Device Management Policies and Secondary Storage Structure and Evaluation of various Disk Scheduling Algorithms.

Unit-I: Introduction - : CO1
Operating System objective and function. The Evolution of Operating Systems, Batch, interactive, time – sharing and real time systems. Protection. Operating System Structure: System COMPONENTS, operating system service, System structure. Distributed Computing, The Key Architecture. [8Hrs]

Unit-II: CONCURRENT PROCESSES: **CO2**
Process concept: - Introduction Definitions of "Process", Process States, Process State Transitions, The process Control Block, Operations on Processes, Suspend and Resume, Interrupt Processing, Process generation, Process Scheduling. CPU Scheduling: Scheduling concepts, Performance criteria, and scheduling algorithms. Algorithm evaluation, Multiprocessor scheduling. Asynchronous Concurrent Process: - Introduction, Parallel Processing, Mutual Exclusion, Inter process Communication, the critical section problem, semaphores Classical problems in concurrency, The Producer / consumer problem, readers Writes problem, Dining Philosophers problem. [7Hrs]

Unit-III: DEAD LOCKS: CO3
System model. Deadlock characterization. Prevention, avoidance and detection, Recovery from dead lock combined approach. [7Hrs]

Unit-IV: MEMORY MANAGEMENT: CO4
Base machine, resident Monitor, Multiprogramming with fixed partitions. Multiprogramming with variable partitions. Multiple Base Registers. Paging, segmentation paged segmentation, Virtual Memory concept, Demand Paging, Performance, Page Replacement algorithms, Allocation of frames, Thrashing, Cache memory organization impact on performance. [7Hrs]

Unit-V: I/O MANAGEMENT & DISK SCHEDULING: CO5
I/O Devices and the organization ofthe I/O function. I/O Buffering, Disk I/O, Operating System Design issues. File System: File concept- File organization and Access mechanism, File Directories, File sharing. Implementation issues. Case Studies: - Unix System, MVS, OS/2, A Virtual Machine Operating System. [7Hrs]

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Subject ode IT106504	**Operating System**	**L=2**	**T=1**	**P=0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3Hours**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Operating System Concepts	Silberschatz A. and Peterson, J. L	Wiley, 8th Ed
2)	An Introduction to Operating Systems	Dietel, H. N., Addison Wesley	2nd Ed
3)	Embedded Operating Systems A Practical Approach	: Chi Yu Huang and Alan Hol	SPRINGER

Reference Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Operating System: Concept & Design	Milenkovic M.	McGraw Hill
2)	Operating System	Stalling, William	Maxwell McMillan International Editons, 1992.
3)	Operating System Design & Implementation	Tanenbaum, A. S.	Prectice Hall NJ

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Subject Code IT106501	Artificial Intelligence and Machine Learning Lab	L=	T=	P= 2	Credits=1
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	25	00	25	50	12 hrs

Course Objectives	Course Outcomes
Theobjectiveofthiscourseistofamiliarizetheprospective.Moreprecisely,theobjectives are: 1. To understand basic concepts of AI. 2. To understand Fundamental of heuristic search techniques. 3. To knowledge representation methods and planning for AI solutions. 4. To provide understanding of Machine learning, 5. To Bayesian decision theory and Multivariate methods	**On successful completion of the course, the student will be able to:** **CO 1** :Apply the knowledge and skills of heuristic search and game playing for solving real time problems **CO 2**:Make decisions based on which knowledge representation to use **CO 3**:Ability to work with Natural Languages and implement linear and nonlinear planning **CO 4**:Apply suitable Bayesian decision theory for various types of learning problems **CO 5**: Develop learning models and required solutions for Multivariate datasets

List of Experiments: **[12 hrs]**

1. Installation of gnu-prolog, Study of Prolog (gnu-prolog), its facts, and rules. Write simple facts for the statements and querying it.
2. Write a program for Family-tree.
3. Write Program for Monkey-banana Problem.
4. Write programs for computation of recursive functions like factorial Fibonacci numbers, etc.
5. Write a Program for water jug problem.

Python Programming Lab

6. Installation of Python, and learning interactively at command prompt and writing simple programs.
7. Learning the conditions and iterations in Python by writing and running simple programs.
8. Random number generations, and problems based on random numbers.
9. Handling tuples and exercises based on tuples.
10. Functions and files
11. Linear and binary search
12. Handeling tokens
13. Finding unique and duplicate items of a list.
14. Matrix addition, multiplications, and unity matrix.
15. Naïve Bayes using python
16. Programs related to python libraries like Numpy, Pandas, Scipy etc.
17. Machine learning codes with python

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Subject Code IT106501	**Artificial Intelligence and Machine Learning Lab**	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	**12 hrs**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Artificial Intelligence	Elaine Rich, Kevin Knight	Mc-Graw Hill
2)	Introduction to Machine Learning	Ethem Alpaydi	MIT Press,2015

Reference Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Introduction to AI & Expert System	Dan W.Patterson	PHI
2)	Artificial Intelligence	Luger	Pearson Education
3)	Artificial Intelligence: A Modern Approach,	Russel & Norvig,	Pearson Education
4)	Machine Learning	Mitchell Tom	Tata McGrawhill, 2017

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Subject Code IT106592	**Operating System Lab**	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	**12 hrs**

Course Objectives	**Course Outcomes**
1. To understand the functionalities of various layers of OSI model 2. To explain the difference between hardware, software; operating systems, programs and files. 3. Identify the purpose of different software applications 4. To know application of Virtual Reality in Digital Entertainment. 5. Identify the purpose concurrent processing	**On successful completion of the course, the student will be able to:** **CO1**: Ability to implement **inter** process communication between two processes. **CO2**: Ability to design and solve synchronization problems. **CO3**: Ability to simulate and implement operating system concepts such as scheduling, **CO4**: Deadlock management, file management, and memory management. **CO5**: Ability to simulate parallel processing system.

1) Simulate the following CPU scheduling algorithms.
a) FCFS b) SJF c) Round Robin d) Priority.

2) Write a C program to simulate producer-consumer problem using Semaphores .

3) Write a C program to simulate the concept of Dining-philosophers problem.

4) Simulate MVT and MFT.

5) Write a C program to simulate the following contiguous memory allocation Techniques
a) Worst fit b) Best fit c) First fit.

6) Simulate all page replacement algorithms
a)FIFO b) LRU c) OPTIMAL

7) Simulate all File Organization Techniques
a) Single level directory b) Two level directory

8): Simulate all file allocation strategies
a) Sequential b) Indexed c) Linked.

9) Simulate Bankers Algorithm for Dead Lock Avoidance.

10) Simulate Bankers Algorithm for Dead Lock Prevention.

11) Write a C program to simulate disk scheduling algorithms.
a) FCFS b) SCAN c) C-SCAN

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Subject Code IT106592	**Operating System Lab**	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	**12 hrs**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1	An Introduction to Operating Systems	P.C.P Bhatt	,2nd edition PHI.
2	Modern Operating Systems	Andrew S Tanenbaum	3rd Edition, PHI

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Subject Code IT106593	Software Engineering & Project Management LAB	L=	T=	P= 2	Credits=1
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	25	00	25	50	12 hrs

Course Objectives	Course Outcomes
1.To introduce the fundamental concepts of software engineering. 2. To build an understanding on various phases of software development. 3. To introduce various software process models. 4. To understand different Quality Management Schemes. 5. To understand about different Project Management Schemes/ Techniques .	**CO1.** Identify suitable life cycle models to be used. **CO2.** Analyze a problem and identify and define the computing requirements to the problem. **CO3.** Translate a requirement specification to a design using an appropriate software engineering methodology. **CO4.** Formulate appropriate testing strategy for the given software system. **CO5.** Develop software projects based on current technology, by managing resources economically and keeping ethical values.

List of Experiments:

1. Write down the problem statement for a suggested system of relevance.
2. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.
3. To perform the function oriented diagram: Data Flow Diagram (DFD) and Structured chart.
4. To perform the user's view analysis for the suggested system: Use case diagram.
5. To draw the structural view diagram for the system: Class diagram, object diagram.
6. To draw the behavioral view diagram : State-chart diagram, Activity diagram
7. To perform the behavioral view diagram for the suggested system : Sequence diagram. Collaboration diagram
8. To perform the implementation view diagram: Component diagram for the system.
9. To perform the environmental view diagram: Deployment diagram for the system.
10. To perform various testing using the testing tool unit testing, integration testing for a sample code of the suggested system.
11. 10 Perform Estimation of effort using FP Estimation for chosen system.
12. 11 To Prepare time line chart/Gantt Chart/PERT Chart for selected software project.

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Subject Code IT106593	**Software Engineering & Project Management LAB**	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	**12 hrs**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Software Engineering	K.K. Aggarwal & Yogesh Singh	New Age International, 2005
2)	An Integrated Approach to Software Engineering	Pankaj Jalote	Second Edition, Springer

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Subject Code IT106594	**Minor Project Lab**	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	**12 hrs**

Course Objectives	**Course Outcomes**
The course objective is to introduce the terminology, technology and its, applications to introduce the concept of M2M (machine to machine) with necessary protocols, to introduce the Python Scripting Language which is used in many IoT devices, to introduce the Raspberry PI platform, that is widely used in IoT applications.to introduce the implementation of web-based services on IoT devices	**On successful completion of the course, the student will be able to:** **CO1:** Describe what emerging technologies is and how it works today **CO2:** Recognize the factors that contributed to the Emergence of emerging technologies. **CO3:** Use emerging technologies for communication, Secure the elements of an IoT device. **CO4:** Design emerging technologies to work with a Cloud Computing infrastructure. **CO5:** Ability to work with these new technologies.

Students must use following Emerging Technologies for designing of their project –

1. Artificial Intelligence.
2. Machine Learning.
3. Internet of Things.
4. Cyber Security.
5. Block chain Technology.
6. Android
7. Data Science.
8. Deep Learning.

Note-: Group of Student must be of only of 2 or 3 student only.

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Subject Code IT106595	**Practical Training / Intership** (Report & Seminar)	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	--------

Course Objectives	**Course Outcomes**
Theobjectiveofthiscourseistofamiliarizetheprospective.Moreprecisely,theobjectives are: The course objective is to promote cooperation and to develop synergetic collaboration between industry and the institute in promoting a knowledgeable society. To expose students to the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions.	**On successful completion of the course, the student will be able to:** **CO1**: Apply engineering knowledge in solving real life problems. **CO2**: Attain new skills and be aware of the state of-art in engineering disciplines of their own interest. **CO3**: Describe use of advanced tools and techniques encountered during training and visit. **CO4**: Acquire practical skills, organizational skills, Communication skills, lifelong learning skills, professional awareness and experience working on projects and alongside industry experts. **CO5**: Write a technical project report that follows an established structure and give oral presentations with focus on the project results and a credible work procedure.

1. As per institution's guidelines, Industrial Training have to be done at the end of 4th Semester.
2. The student must follow the instructions given by the Teacher In-charge of Industrial Training.
3. The purpose of the Industrial Training is to develop the work process being performed and apprise them of the industry problems.
4. During the training, students will be given practical problems by the industry in which they are undergoing training. In case the industry does not give them the problems, the students will themselves formulate problems and carry out detailed study on them and recommend the optimum solution based on their theory knowledge.
5. Submission of Final Report - Each student must submit a Final Report and deliver a presentation on industrial training at the end of the industrial training period on the date and time announced by the Teacher In-charge.
6. The Internship report must include the following:
   (a)The basic history/introduction of the industry
   b)The software and hardware used.
   (c)The sequence of operations followed/ systems introduced for the project development.
   (d)The formulation of practical problems.
   (e)Data required formulating the problems.
   (f) Analysis of the data, steps required and commands used in industry.
   (g)Certificate from the industry for the period of training undergone.
7. The student would be evaluated through Report and Viva-voce

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CONSTITUTION OF NDIA					
Course Code	**IT100596**	**L = 0**	**T = 0**	**P = 0**	**Credits = -**
Examination Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	-	**-**	**25**	**25**	**-**

Course Objectives	Course Outcomes
The objective of this course is to introduce students to the Constitution of India.	**On successful completion of the course, the student will be able to:** **CO1:** Display understanding about the history and philosophy of Indian Constitution. **CO2:** Demonstrate clarity about the premises informing the twin themes of liberty and freedom from civil rights perspective. **CO3:** Display understanding about powers and functions of Indian government. **CO4:** Exhibit understanding about emergency rule. **CO5:** Demonstrate understanding about structure and functions of local administration.

UNIT – I **CO1**
Introduction: Historical Perspective of Constitution of India; Philosophy of Indian Constitution; Meaning of the constitution law and constitutionalism; Salient features and Preamble.

UNIT – II **CO2**
Contours of Constitutional Rights and Duties: Fundamental rights; Scheme of the Fundamental Duties and its legal status.

UNIT – III **CO3**
Organs of Governance: Parliamentary Form of Government in India; The constitutional powers and status of the President of India; Judiciary- Powers and Functions; Local Self Government – Constitutional Scheme in India.

UNIT – IV **CO4**
Emergency Provisions: National Emergency; President Rule; Financial Emergency.

UNIT – V **CO5**
Local Administration: Federal structure and distribution of legislative and financial powers between the Union and the States; The Directive Principles of State Policy – Its importance and implementation.

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Text Books:

S. No.	Title	Author(s)	Publisher
1.	Introduction to the Constitution of India	Basu D D	Lexis Nexis
2.	Principles of Public Administration	Dr S N Myneni	Allahabad Law Agency

Reference Books:

S. No.	Title	Author(s)	Publisher
1.	Dr. B. R. Ambedkar Framing of Indian Constitution	Busi S N	Ava Publishers
2.	Theory and Practices of Modern Government	M G Gupta	Central Book Depot

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Subject Code IT106521	Principles of Communication Systems	L = 2	T = 1	P =	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
1. To understand the need of Modulation & Modulation Techniques. 2. To understand frequency Techniques. 3. To understand the concept of Sampling, Quantization and Coding : 4. To Learn About the basics of Digital Communication Techniques. 5.To learn different Advanced Communication Techniques & its application in different industry	After the successful completion of this course, student will be able to: **CO1:** Understand the need of Modulation in any Communication System. **CO2:** Describe various modulation techniques in Analog Communication Systems. **CO3:** Evaluate the performance of digital communication system having digital Modulation Techniques. **CO4:** Describe working of light propagation in Optical fiber and explain Satellite Communication System. **CO5:** Have an understanding of design considerations for multiple access / use spectrum and multiplexing.

UNIT – I : Amplitude Modulation : **CO1**
Need for Modulation, Amplitude Modulation, Amplitude Modulation Index, Modulation Index for Sinusoidal AM, Frequency spectrum for Sinusoidal AM, Average power for Sinusoidal AM, Effective voltage and current for sinusoidal AM, Balanced Modulator, The Square law demodulator, Non-sinusoidal modulation, DSBSC Modulation, SSB modulation and generation, VSB. **[8Hrs]**

UNIT – II : Angle Modulation: : **CO2**
Phase and frequency modulation and their relationship. Frequency deviation, spectrumof FM Signal, BW of FM Signal, Effect of modulation on BW, constant BW, FM phasor diagram, Narrow-band F.M. Armstrong and Parameter variation methods of FM generation and FM demodulators. **[7Hrs]**

UNIT – III : Sampling, Quantization and Coding : **CO3**
Sampling theorem, Pulse Modulation: PAM, PPM, PWM. Quantization of Signals, Quantization error, TDM, Pulse Code Modulation (PCM), DPCM, DM, ADM & their comparative performance evaluation. **[7Hrs]**

UNIT – IV : Digital Modulation: : **CO4**
Digital Modulation: Generation and detection of BASK, BPSK and BFSK; ASK, FSK, PSK performance evaluation, Fundamentals of QPSK , generation and detection of QPSK ; Definition of MSK, M-Ary PSK and its application areas. **[7Hrs]**

UNIT – V : Advanced Communication Techniques: **CO5**
Satellite Communication: Components and Block diagram of Satellite communication system, Transponders, Up-link and Down-link budget calculations. Fiber Optic Communication: Principles of light propagation in optical fiber, Losses in fibers, Dispersion, Connectors and splices, Fiber optic communication link. **[7Hrs]**

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Subject Code IT106521	Principles of Communication Systems	L = 2	T = 1	P =	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Text Books:

S. No.	Title	Authors	Publisher
1)	Principles of Communication system	H.Taub and D.L. Shiling	TMH, 2nd edition 2008
2)	Communication Systems	R. P. Singh and S. D. Sapre	TMH, 2nd edition
3)	Modern Digital and. Digital an d. Analog Communication	B.P.Lathi & T.Srinivasa Rao	THIRD EDITION.

Reference Books:

S. No.	Title	Authors	Publisher
1)	Electronic Communication Systems	Roddy & Coolen	PHI, 4 th Ed
2)	An Introduction to the Principle of Communication Theory	J.C. Hancock	,Mc-Graw Hill, 3 rd Edition
3)	Electronic Communication System	Kenedy & Davis	TMH, 5 th Edition
4)	Principles of Communications	Rodger E. Ziemer, William H. Tranter	Willey, 7th Edition,2014

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Subject Code IT106522	Web Development Technology	L = 2	T = 1	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
1. Describe the important features of the Web and Web browser software. 2. Evaluate e-mail software and Web-based e-mail services. 3. Use FTP and other services to transfer and store data. 4. Demonstrate the use of real-time chat and briefly describe the history of the wireless Internet. 5. Create HTML documents and enhance them with browser extensions.	**On successful completion of the course, the student will be able to:** **CO 1.** Understand, analyze and apply the role of languages like HTML, DHTML, CSS, XML, Javascript, and web applications. **CO2.** Analyze a web page and identify its elements and attributes. **CO3.** Create XML documents and XML Schema. **CO4**. Learn to protect their website. **CO5**. Learn the skill of website hosting.

UNIT –I : INTRODUCTION TO INTERNET: **CO1**

Introduction, Evolution of Internet, Internet Applications, Internet Protocol -TCP/IP, UDP, HTTP, Secure Http(Shttp) Internet Addressing – Addressing Scheme – Ipv4 & IPv6, Network Byte Order, Domain Name Server and IP Addresses, Mapping . Internet Service Providers, Types Of Connectivity Such As Dial-Up Leaded Vsat Etc. Web Technologies: Three Tier Web Based Architecture; Jsp, Asp, J2ee, .Net Systems. [8 Hrs]

UNIT–II: HTML CSS AND SCRIPTING: **CO 2**

HTML - Introduction, Sgml, Dtd(Document Type Definition, Basic Html Elements, Tags and usages, HTML Standards , Issues in HTML Dhtml: Introduction Cascading Style Sheets: Syntax ,Class Selector, Id Selector Dom (Document Object Model) & Dso (Data Source Object) Approaches To Dynamic Pages: Cgi, Java Applets, Plug Ins, Active X, Java Script – Java Script Object Model, Variables-Constant – Expressions, Conditions- Relational Operators- Data Types – Flow Control – Functions & Objects-events and event handlers – Data type Conversion & Equality – Accessing HTML form elements. [7 Hrs]

UNIT –III : XML: **CO 3**

What is XML – Basic Standards, Schema Standards, Linking & Presentation Standards, Standards that build on XML, Generating XML data, Writing a simple XML File, Creating a Document type definition, Documents & Data ,Defining Attributes & Entities in the DTD ,Defining Parameter Entities & conditional Sections, Resolving a naming conflict, Using Namespaces, Designing an XML data structure, Normalizing Data, Normalizing DTDS. [7 Hrs]

UNIT –IV : I NTERNET SECURITY & FIREWALLS: **CO 4**

Security Threats From Mobile Codes, Types Of Viruses, Client Server Security Threats, Data & Message Security, Various electronic payment systems, Introduction to EDI, Challenges–Response System, Encrypted Documents And Emails , Firewalls: Hardened Firewall Hosts, Ip- Packet Screening, Proxy Application Gateways, Aaa (Authentication , Authorization And Accounting). [7 Hrs]

UNIT –V : WEBSITE PLANNING & HOSTING: **CO 5**

Introduction, Web Page Lay-Outing, Where To Host Site, Maintenance Of Site, Registration Of Site On Search Engines And Indexes, Introduction To File Transfer Protocol, Public Domain Software, Types Of Ftp Servers (Including Anonymous),Ftp Clients Common Command. Telnet Protocol, Server Domain, Telnet Client, Terminal Emulation. Usenet And Internet Relay Chat. [7 Hrs]

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Subject Code IT106522	**Web Development Technology**	**L = 2**	**T = 1**	**P = 0**	**Credits = 3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3 Hours**

Text Books:

S. No.	Title	Authors	Publisher
1)	Internet & Intranet Engineering	Daniel Minoli	TMH
2)	Internet for Every One	Alexis Leon and Mathews Leon	Tech World.
3)	Web Technologies	Uttam K Roy	Oxford University Press.

Reference Books:

S. No.	Title	Authors	Publisher
1)	Using HTML 4, XML and JAVA	Eric Ladd, Jim O'Donnel	Prentice Hall of India
2)	Beginning Java Script	Paul Wilton	SPD Publications
3)	Internet and World Wide Web	Dietel and Nieto	Pearson
4)	Java Script	D.Flanagan	O'Reilly, SPD

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Subject Code: IT106523	Graph Theory	L =2	T =1	P =0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
1. Able to formally apply graph – Theoretic terminology and notations. 2. Able to formally apply Tree – Theoretic terminology and notations 3. Able to apply theoretical knowledge acquired to solve realistic problems in real life. 4. Aware of the benefits of representing networks as probabilistic graphs vs. the traditional binary representation. 5. Able to demonstrate their knowledge of algorithms by solving concrete problems.	**On successful completion of the course, thestudent will be able to:** **CO1:** Understand the basic concepts of graph theory. **CO2:** Understand the basic concepts of Trees, and different types of Tree **CO3:** Implement the graph theory in real life problems that can be modeled into graphs. **CO4:** understand the basic concept of coloring & dominating sets. **CO5:** Apply suitable graph model and algorithm for solving applications.

UNIT –I : Introduction: **CO 1**
Definitions: Directed and undirected graphs. Hand shaking property and its problems. Real Life applications. Application - Konigsberg bridge problem, Utility problem and travelling salesman problem. Definitions: Walks, trail, paths, Circuits, Cycles, Sub graphs, Induced and Spanning sub graphs, Connected graphs and Complement of graph-Problems. Euler graphs and Hamiltonian graphs (no theorems) problems. Operations on graphs and Isomorphism of two graphs, problems. [8 Hrs]

UNIT–II : Trees: **CO 2**
Definitions: Trees, Spanning trees, Properties of trees. Rooted and binary tree. Finding all the spanning trees of a graph and Spanning trees in a weighted graph. Traversal of Binary Tree, Pre-order and Post-order Traversal. Prefix codes. [7 Hrs]

UNIT –III: Planner & Dual Graph & Matrix representation of Graphs: **CO 3**
Planar Graphs. Kuratowski's graphs. Different representation of planar graph. Detection of planar graphs. Euler's polyhedral formula (No proof). Geometrical Dual(no theorems) problems. Adjacency matrix, Incidence matrix, Sub-matrices of Incidence matrix. [7 Hrs]

UNIT –IV : Coloring and Dominating sets: **CO 4**
Definition of Chromatic number. Chromatic Partitioning. Chromatic Polynomial. Finding the Chromatic polynomial by Decomposition Theorem and by Multiplication Theorem Dominating set. Minimal Dominating set. Domination number. Independent dominating set. Finding minimal dominating sets. Some applications of domination theory. [7 Hrs]

UNIT –V : Graph Theoretic Algorithms: **CO 5**
Computer representation of a graph. Algorithm on spanning trees: Kruskal's and Prim's Algorithm. Shortest path algorithms: Shortest path from a specified vertex to another specified vertex by Dijkstra's algorithm, Shortest path between all pairs of vertices. Warshall's algorithm. [7 Hrs]

Subject Code: IT106523	**Graph Theory**	**L =2**	**T =1**	**P =0**	**Credits = 3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3 Hours**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Graph Theory with Application to Engineering and Computer Science	Narsingh Deo	Prentice Hall of India
2)	Graph Theory Applications	L.R.Foulds	Springer

Reference Books:

S.No.	**Title**	**Authors**	**Publisher**
1)	Graph Theory with Applications	Bondy, J. A. and Murty, U.S.R	North Holland Publication
2)	Introduction to Graph Theory	West, D. B	Pearson Education
3)	A First Look at Graph Theory	John Clark, Derek Allan Holton	World Scientific Publishing Company
4)	Discrete Mathematics and Its Applications	Kenneth H. Rosen	TMH

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Subject Code IT106524	Information Retrieval	L = 2	T = 1	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
1. To gain a better understanding of Information Retrieval Technology and data where house. 2. Understand design of different Clustering algorithm 3. To Understand the basic concept of retrieval systems for web search tasks. 4. To understand the concept of Information Retrieval System for web search tasks. 5. To use text based Algorithm	**On successful completion of the course, thestudent will be able to:** **CO** 1. Ability to apply IR principles to locate relevant information large collections of data **CO** 2. Ability to design different document clustering algorithms **CO** 3. Implement retrieval systems for web search tasks. **CO** 4. Design an Information Retrieval System for web search tasks. **CO5**:Able to understand text based Algorithm

Unit-1:Introduction to Information Retrieval Systems: **CO 1**
Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses.
Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities. [8 Hrs]

Unit-II: Cataloging and Indexing: **CO 2**
Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction.
Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models. [7 Hrs]

Unit-III: Automatic Indexing: **CO 3**
Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages
Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters. [7 Hrs]
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Unit-IV: User Search Techniques: **CO 4**
User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext
Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies. [7 Hrs]

Unit-V: Text Search Algorithms: **CO 5**
Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems
Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval. [7 Hrs]

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Subject Code IT106524	**Information Retrieval**	**L = 2**	**T = 1**	**P = 0**	**Credits = 3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3 Hours**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Information Storage and Retrieval Systems – Theory and Implementation	Gerald J. Kowalski, Mark T. Maybury	Springer

Reference Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Information Retrieval Data Structures and Algorithms	Frakes, W.B., Ricardo Baeza-Yates	Prentice Hall, 1992.
2)	Information Storage & Retrieval	Robert Korfhage	John Wiley & Sons.
3)	Modern Information Retrieval	Yates and Neto	Pearson Education

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Subject ode IT106525	**Internet of Things**	**L=2**	**T=1**	**P=0**	**Credits= 3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3Hours**

Course Objectives	**Course Outcomes**
1.To study the fundamentals about IoT. 2.To study about IoT Access technologies 3. To study the design methodology and different IoT hardware platforms. 4. To study the basics of IoT Data Analytics and supporting services. 5. To study about various IoT case studies and industrial applications.	On successful completion of the course, the student will be able to: **CO1:**Understand the basics of IoT **CO2**:Implement the state of the Architecture of an IoT **CO3:**Understand design methodology and hardware platform sinvolvedin IoT **CO4:**Understand how to analyze and organize the data **CO5:**Compare IOT Applications in Industrial & real world.

UNIT – I : INTRODUCTION TO IoT: **CO1**
Evolution of Internet of Things, Enabling Technologies, M2M Communication, IoT World Forum (IoTWF) standardized architecture, Simplified IoT Architecture, Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Function alblocksofan IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects. **[8hrs]**

UNIT – II : ELEMENTS OF IoT: **CO2**
IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks,6LoWPAN, Application Transport Methods: SCADA, Application Layer Protocols: CoAP and MQTT. **[7hrs]**

UNIT – III : IoT APPLICATION DESIGN & DEVELOPMENT: **CO3**
Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, Arduino Board details. **[7hrs]**

UNIT – IV : DATA ANALYTICS: **CO4**
Data Analytics: Introduction, Structured Versus Unstructured Data, Data in Motion versus Data at Rest, IoT Data Analytics Challenges, Data Acquiring, Organizing in IoT/M2M, Supporting Services: Computing Using a Cloud Platform for IoT/M2M Applications/Services, Everything as a service and Cloud Service Models. **[7hrs]**

UNIT – V : CASE STUDIES/IoT APPLICATIONS: **CO5**
IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, Agriculture, Health care, other IoT electronic equipment, Industry 4.0concepts **[7hrs]**

Subject ode IT106525	**Internet of Things**	**L=2**	**T=1**	**P=0**	**Credits= 3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3 Hours**

Text Books:

S. No.	Title	Authors	Publisher
1	Internet of Things, "A Hands on Approach	Vijay Madisetti	ArshdeepBahgaUniversity Press
2	IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry	Cisco Press, 2017
3	The Internet of Things: Enabling Technologies, Platforms, and Use Cases	Pethuru Raj and Anupama C. Raman	CRC Press

Reference Books:

S. No.	Title	Authors	Publisher
1	Internet of Things	Jeeva Jose	Khanna Publishing House, Delhi
2	Designing the Internet of Things	Adrian McEwen,HakimCassimally	Wiley publications
3	Internet of Things: Architecture and Design	Raj Kamal	Tata McGraw Hill

SYLLABUS

B.TECH. (INFORMATION TECHNOLOGY)

FIFTH SEMESTER

SHRI SHANKARACHARYA TECHNICAL CAMPUS, BHILAI
(An Autonomous Institute affiliated to CSVTU, Bhilai)
Scheme of Teaching and Examination (Effective from 2020-2021Batch)

B.Tech. Information Technology (Fifth Semester)

Sl. No.	Board of Studies (BOS)	Courses	Course Code	Period per Week			Scheme of Examination			Total Marks	Credit
							Theory/Lab				
				L	T	P	ESE	CT	TA		
1	Information Technology	Artificial Intelligence and Machine Learning	IT106501	2	1	-	100	20	30	150	3
2	Information Technology	Theory of Computation	IT106502	2	1	-	100	20	30	150	3
3	Information Technology	Software Engineering & Project Management	IT106503	2	1	-	100	20	30	150	3
4	Information Technology	Operating System	IT106504	2	1	-	100	20	30	150	3
5	Information Technology	Professional Elective -1	(Refer Table - 1)	2	1	-	100	20	30	150	3
6	Information Technology	Artificial Intelligence and Machine Learning Lab (Python)	IT106591	-	-	2	25	-	25	50	1
7	Information Technology	Operating System Lab	IT106592	-	-	2	25	-	25	50	1
8	Information Technology	Software Engineering & Project Management LAB	IT106593	-	-	2	25	-	25	50	1
9	Information Technology	Minor Project (Emerging Technology)	IT106594	-	-	2	25	-	25	50	1
10	Information Technology	Practical Training /Internship assessment (Report & Seminar)	IT106595	-	-	2	-	-	25	25	1
11	Information Technology	Constitution of India	IT100596	-	-	-	-	-	25	25	
Total				**10**	**5**	**10**	**600**	**100**	**300**	**1000**	**20**

L- Lecture T- Tutorial P- Practical

CT- Class Test TA- Teachers Assessment ESE- End Semester Exam

SHRI SHANKARACHARYA TECHNICAL CAMPUS, BHILAI
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Scheme of Teaching and Examination (Effective from 2020-2021Batch)

B.Tech. Information Technology (Fifth Semester)

Table :1 [Professional Elective -1]			
Sl. No.	**Board of Studies (BOS)**	**Courses (Subject)**	**Course Code**
1	Information Technology	Principles of Communication Systems	IT106521
2	Information Technology	Web Development Technology	IT106522
3	Information Technology	Graph Theory	IT106523
4	Information Technology	Information Retrieval	IT106524
5	Information Technology	Internet of Things	IT106525

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Subject Code IT106501	**Artificial Intelligence and Machine Learning**	**L=2**	**T=1**	**P= 0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3Hours**

Course Objectives	**Course Outcomes**
1. To understand basic concepts of AI and Fundamental of heuristic search techniques. 2. To understandArtificial Neural Networks. 3. To understand Logistic Regression and Support Vector Machine. 4. To understanding of Machine learning and its algorithms. 5. To understand Advanced Learning methods and Clustering.	**CO:1** Apply the knowledge and skills of heuristic search and game playing for solving real time problems **CO:2**Apply Artificial Neural Networks and implement the various layers. **CO:3**Ability to work with Logistic Regression and Support Vector Machine **CO:4** Apply suitable Machine learning and its algorithms. **CO:5** Develop learning models and Advanced Learning methods and Clustering.

Unit-I: Introduction - : CO1
Introduction to AI, Problem Solving. Production systems. State space search, Blind search: Depth first search, Breadth first search, Informed search: Heuristic function, Hill climbing search, Branch and Bound technique, A* Search,Constraint Satisfaction problems Game Playing Minimax search procedure; Alpha-Beta cutoffs; Additional Refinements. [7Hrs]

Unit-II: Artificial Neural Networks: **CO2**
Introduction to Artificial Neural Networks: Biological Neurons and Biological Neural Networks, Artificial Neural Networks, Activation Functions, Perceptron NN, Multilayer Perceptron NN, Back-propagation Neural Networks, Training Methods, Basic definition of supervised and unsupervised Learning. [8Hrs]

Unit-III Introduction to Machine Learning: CO3
Introduction (Different Types of Learning) Hypothesis Space, Inductive Bias, Evaluation and Cross Validation.
Main Algorithms used in Machine Learning
Linear Regression, Decision Trees, Learning Decision Trees, K-nearest Neighbour, Collaborative Filtering, Over fitting, Dimensionality Reduction Technique :Feature Selection, Feature Extraction. [7Hrs]

Unit-IV: Logistic Regression and Support Vector Machine: CO4
Logistic Regression, Introduction to Support Vector Machine, The Dual Formation, Maximum Margin with Noise, Nonlinear SVM and Kernel Function, SVM: Solution to the Dual Problem. [7Hrs]

Unit-V: Advanced Learning methods and Clustering: CO5
Introduction to Clustering, Kmeans Clustering, Agglomerative Hierarchical Clustering, Basics of Semi Supervised and Reinforcement Learning, Introduction to Deep Learning. [7Hrs]

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Subject Code IT106501	**Artificial Intelligence and Machine Learning**	**L=2**	**T=1**	**P= 0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESEDuration**
	100	**20**	**30**	**150**	**3Hours**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Artificial Intelligence	Elaine Rich, Kevin Knight	Mc-GrawHill
2)	Introduction to Machine Learning	EthemAlpaydi	MIT Press,2015

Reference Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Introduction to AI & Expert System	Dan W.Patterson	PHI
2)	Machine Learning with Python for Everyone	Mark Fenner	Pearson
3)	Machine Learning	AnuradhanSrinivasaraghavan	Wiley
4)	Machine Learning with Python	U Dinesh Kumar ManaranjanPradhan	Wiley

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Subject Code IT106502	Theory of Computation	L=2	T=1	P= 0	Credits=3
EvaluationScheme	ESE	CT	TA	Total	ESEDuration
	100	20	30	150	3Hours

CourseObjectives	CourseOutcomes
1. To understand the language hierarchy 2. To construct automata for any given pattern and find its equivalent regular expressions. 3. To design a context free grammar for any given language. 4. To understand Turing machines and their capability. 5. To understand undecidable problems and NP class problems.	**On successful completion of the course, the student will be able to:** **CO1:** Construct finite state machines and minimize them. **CO2:** Design regular expressions and to prove the equivalence of languages described by finite state machines and regular expressions **CO3:** Design grammars and simplify context free grammars **CO4:** Construct pushdown automata and to prove the equivalence of languages described by pushdown automata and context free grammars **CO5:** Solve various problems of applying Turing Machines

UNIT I: The Theory of Automata: **CO1**
Introduction to automata theory, Examples of automata machine, Finite automata as a language acceptor and translator. Deterministic finite automata. Non deterministic finite automata, finite automata with output (Mealy Machine. Moore machine). Finite automata with null moves, Conversion of NFA to DFA, Minimization of DFA. MyhillNerode theorem, Properties and limitation of FSM. Two way finite automata. Applications of finite automata. **[8Hrs]**

UNIT II: Regular Expressions: **CO2**
Regular expression, Properties of Regular Expression. Finite automata and Regular expressions. Arden's theorem, Regular Expression to DFA conversion & vice versa. Pumping lemma for regular sets. Application of pumping lemma, Regular sets and Regular grammar. Closure properties of regular sets. Decision algorithm for regular sets and regular grammar. **[7Hrs]**

UNIT III: Grammars: **CO3**
Definition and types of grammar. Chomsky hierarchy of grammar. Relation between types of grammars. Role and application areas of grammars. Context free grammar. Left most derivation,right most derivation, Derivation trees. Ambiguity in grammar. Simplification of context free grammar. Chomsky normal from. Greibach normal form, properties of context free language. Pumping lemma from context free language. Decision algorithm for context tree language. **[7Hrs]**

UNIT IV: Push Down Automata: **CO4**
Basic definitions. Deterministic push down automata and non-deterministic push down automata. Acceptance of push down automata. Push down automata and context free language. **[7Hrs]**

UNIT V: Turing Machine Model and Computability: **CO5**
Representation of Turing Machine Construction of Turing Machine for simple problems. Universal Turing machine and other modifications. Church's Hypothesis. Halting problem of Turing Machine, Undecidable Problem with RE – Undecidable Problems about TM-Post's correspondence problem, Rice'stheorem. Introduction and Basic concepts. Recursive function, Partial recursive function, Undecidability. Recursive languare,Recursive Enumerable language, The Class P and NP. **[7 Hrs]**

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Subject Code IT106502	**Theory of Computation**	**L=2**	**T=1**	**P= 0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESEDuration**
	100	**20**	**30**	**150**	**3Hours**

TextBooks:

S. No.	**Title**	**Authors**	**Publisher**
1)	Introduction to Automata theory. Language and Computation	J. E. Hopcroft, J. D. Ullman	Pearson Prentice Hall India.
2)	Theory of Computer Science (Automata Language & Computation)	K.L.P. Mishra and N. Chandrasekran	Pearson Prentice Hall India.

ReferenceBooks:

S. No.	**Title**	**Authors**	**Publisher**
1)	Finite Automata and Formal Languag A Simple Approach	A.M. Padma Reddy	Pearson New International Edition
2)	Formal Languages and Automata Theory	K V N Sunitha , N Kalyani	McGraw Hill Education
3)	Theory of Computation	AM Natrajan. Tamilarasi, Bilasubramani	New Age International Publishers

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Subject ode IT106503	Software Engineering & Project Management	L=2	T=1	P=0	Credits=3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3Hours

Course Objectives	Course Outcomes
1.To introduce the fundamental concepts of software engineering. 2. To build an understanding on various phases of software development. 3. To introduce various software process models. 4. To understand different Quality Management Schemes. 5. To understand about different Project Management Schemes/ Techniques .	**CO1.** Identify suitable life cycle models to be used. **CO2.** Analyze a problem and identify and define the computing requirements to the problem. **CO3.** Translate a requirement specification to a design using an appropriate software engineering methodology. **CO4.** Formulate appropriate testing strategy for the given software system. **CO5.** Develop software projects based on current technology, by managing resources economically and keeping ethical values.

Unit-I: Introduction - : **CO1**
Software Characteristics, Software Engineering- A Layered Technology, Software Process Framework, Software Process Models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process Model, Agile Process Models. [8Hrs]

Unit-II: Software engineering Principles and Practice: **CO2**
Communication Practices, Planning Practices, Modeling Practices, Construction Practice & Deployment, System Engineering Hierarchy, Business Process Engineering, Product Engineering, System Modeling, Requirements Engineering.
System Analysis: Structured Analysis, Data modeling, Object- Oriented Analysis, Scenario- Based Modeling, Flow- Oriented Modeling, Class- based Modeling, Behavioral Model, Design Concepts : Abstraction , Pattern modularity, Information hiding, Design classes, Refactoring. [7Hrs]

Unit-III Software Testing: **CO3**
Testing Fundamentals, Black- Box Testing, White- Box Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging. [7Hrs]

Unit-IV: Quality Management: **CO4**
Product Metrics, Metrics for Analysis & Design Models, Metrics for Source Code, Metrics for Testing & Maintenance. Quality concepts, Evolution of Quality Management, Quality assurance, Software reviews, Statistical quality assurance. [7Hrs]

Unit-V: Project management: **CO5**
Introduction to Software Project Management, Project Planning, Project scheduling, Risk management , Change Management, Software reengineering, Restructuring Reverse engineering, Forward Engineering, CMM level [7Hrs]

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Subject ode IT106503	**Software Engineering & Project Management**	**L=2**	**T=1**	**P=0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3Hours**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Software Engineering	A Practitioner's Approach (Sixth Edition)	Roger Pressman (TMH)
2)	Software Engineering (Ninth Edition)	Ian Summerville	(Pearson Education)
	Software Engineering: Theory and Practice (Fourth Edition)	Pfleeger	
	Software Engineering	Mishra /Mohanty	Pearson Education

Reference Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Software Engineering	Schaum's Series	TMH
2)	Software Project Management	Sanjay Mohapatra	Cengage Learning

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Subject ode IT106504	**Operating System**	**L=2**	**T=1**	**P=0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3Hours**

Course Objectives	**Course Outcomes**
1. General understanding of structure of modern computers 2. To understand purpose, structure and functions of operating systems 3. To illustration of key OS aspects by example 4. Understanding of virtual Memory concept. 5. To illustration the key concept of Unix System	By the end of the course you should be able to- **CO1.** Describe the general architecture of computers and operating system **CO2.** Understand and analyse theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and les. **CO3.** Categorize the operating system's resource management techniques, dead lock management techniques, memory management techniques.C5 **CO4.** Description of protection and security and also the Comparison of UNIX and Windows based OS **CO5.** Defining I/O systems, Device Management Policies and Secondary Storage Structure and Evaluation of various Disk Scheduling Algorithms.

Unit-I: Introduction - : CO1
Operating System objective and function. The Evolution of Operating Systems, Batch, interactive, time – sharing and real time systems. Protection. Operating System Structure: System COMPONENTS, operating system service, System structure. Distributed Computing, The Key Architecture. [8Hrs]

Unit-II: CONCURRENT PROCESSES: **CO2**
Process concept: - Introduction Definitions of "Process", Process States, Process State Transitions, The process Control Block, Operations on Processes, Suspend and Resume, Interrupt Processing, Process generation, Process Scheduling. CPU Scheduling: Scheduling concepts, Performance criteria, and scheduling algorithms. Algorithm evaluation, Multiprocessor scheduling. Asynchronous Concurrent Process: - Introduction, Parallel Processing, Mutual Exclusion, Inter process Communication, the critical section problem, semaphores Classical problems in concurrency, The Producer / consumer problem, readers Writes problem, Dining Philosophers problem. [7Hrs]

Unit-III: DEAD LOCKS: CO3
System model. Deadlock characterization. Prevention, avoidance and detection, Recovery from dead lock combined approach. [7Hrs]

Unit-IV: MEMORY MANAGEMENT: CO4
Base machine, resident Monitor, Multiprogramming with fixed partitions. Multiprogramming with variable partitions. Multiple Base Registers. Paging, segmentation paged segmentation, Virtual Memory concept, Demand Paging, Performance, Page Replacement algorithms, Allocation of frames, Thrashing, Cache memory organization impact on performance. [7Hrs]

Unit-V: I/O MANAGEMENT & DISK SCHEDULING: CO5
I/O Devices and the organization ofthe I/O function. I/O Buffering, Disk I/O, Operating System Design issues. File System: File concept- File organization and Access mechanism, File Directories, File sharing. Implementation issues. Case Studies: - Unix System, MVS, OS/2, A Virtual Machine Operating System. [7Hrs]

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Subject ode IT106504	**Operating System**	**L=2**	**T=1**	**P=0**	**Credits=3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3Hours**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Operating System Concepts	Silberschatz A. and Peterson, J. L	Wiley, 8th Ed
2)	An Introduction to Operating Systems	Dietel, H. N., Addison Wesley	2nd Ed
3)	Embedded Operating Systems A Practical Approach	: Chi Yu Huang and Alan Hol	SPRINGER

Reference Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Operating System: Concept & Design	Milenkovic M.	McGraw Hill
2)	Operating System	Stalling, William	Maxwell McMillan International Editons, 1992.
3)	Operating System Design & Implementation	Tanenbaum, A. S.	Prectice Hall NJ

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Subject Code IT106501	Artificial Intelligence and Machine Learning Lab	L=	T=	P= 2	Credits=1
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	25	00	25	50	12 hrs

Course Objectives	Course Outcomes
Theobjectiveofthiscourseistofamiliarizetheprospective.Moreprecisely,theobjectives are: 1. To understand basic concepts of AI. 2. To understand Fundamental of heuristic search techniques. 3. To knowledge representation methods and planning for AI solutions. 4. To provide understanding of Machine learning, 5. To Bayesian decision theory and Multivariate methods	**On successful completion of the course, the student will be able to:** **CO 1** :Apply the knowledge and skills of heuristic search and game playing for solving real time problems **CO 2**:Make decisions based on which knowledge representation to use **CO 3**:Ability to work with Natural Languages and implement linear and nonlinear planning **CO 4**:Apply suitable Bayesian decision theory for various types of learning problems **CO 5**: Develop learning models and required solutions for Multivariate datasets

List of Experiments: **[12 hrs]**

1. Installation of gnu-prolog, Study of Prolog (gnu-prolog), its facts, and rules. Write simple facts for the statements and querying it.
2. Write a program for Family-tree.
3. Write Program for Monkey-banana Problem.
4. Write programs for computation of recursive functions like factorial Fibonacci numbers, etc.
5. Write a Program for water jug problem.

Python Programming Lab

6. Installation of Python, and learning interactively at command prompt and writing simple programs.
7. Learning the conditions and iterations in Python by writing and running simple programs.
8. Random number generations, and problems based on random numbers.
9. Handling tuples and exercises based on tuples.
10. Functions and files
11. Linear and binary search
12. Handeling tokens
13. Finding unique and duplicate items of a list.
14. Matrix addition, multiplications, and unity matrix.
15. Naïve Bayes using python
16. Programs related to python libraries like Numpy, Pandas, Scipy etc.
17. Machine learning codes with python

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Subject Code IT106501	**Artificial Intelligence and Machine Learning Lab**	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	**12 hrs**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Artificial Intelligence	Elaine Rich, Kevin Knight	Mc-Graw Hill
2)	Introduction to Machine Learning	Ethem Alpaydi	MIT Press,2015

Reference Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Introduction to AI & Expert System	Dan W.Patterson	PHI
2)	Artificial Intelligence	Luger	Pearson Education
3)	Artificial Intelligence: A Modern Approach,	Russel & Norvig,	Pearson Education
4)	Machine Learning	Mitchell Tom	Tata McGrawhill, 2017

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Subject Code IT106592	**Operating System Lab**	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	**12 hrs**

Course Objectives	**Course Outcomes**
1. To understand the functionalities of various layers of OSI model 2. To explain the difference between hardware, software; operating systems, programs and files. 3. Identify the purpose of different software applications 4. To know application of Virtual Reality in Digital Entertainment. 5. Identify the purpose concurrent processing	**On successful completion of the course, the student will be able to:** **CO1**: Ability to implement **inter** process communication between two processes. **CO2**: Ability to design and solve synchronization problems. **CO3**: Ability to simulate and implement operating system concepts such as scheduling, **CO4**: Deadlock management, file management, and memory management. **CO5**: Ability to simulate parallel processing system.

1) Simulate the following CPU scheduling algorithms.
a) FCFS b) SJF c) Round Robin d) Priority.

2) Write a C program to simulate producer-consumer problem using Semaphores .

3) Write a C program to simulate the concept of Dining-philosophers problem.

4) Simulate MVT and MFT.

5) Write a C program to simulate the following contiguous memory allocation Techniques
a) Worst fit b) Best fit c) First fit.

6) Simulate all page replacement algorithms
a)FIFO b) LRU c) OPTIMAL

7) Simulate all File Organization Techniques
a) Single level directory b) Two level directory

8): Simulate all file allocation strategies
a) Sequential b) Indexed c) Linked.

9) Simulate Bankers Algorithm for Dead Lock Avoidance.

10) Simulate Bankers Algorithm for Dead Lock Prevention.

11) Write a C program to simulate disk scheduling algorithms.
a) FCFS b) SCAN c) C-SCAN

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Subject Code IT106592	**Operating System Lab**	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	**12 hrs**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1	An Introduction to Operating Systems	P.C.P Bhatt	,2nd edition PHI.
2	Modern Operating Systems	Andrew S Tanenbaum	3rd Edition, PHI

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Subject Code IT106593	Software Engineering & Project Management LAB	L=	T=	P= 2	Credits=1
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	25	00	25	50	12 hrs

Course Objectives	Course Outcomes
1.To introduce the fundamental concepts of software engineering. 2. To build an understanding on various phases of software development. 3. To introduce various software process models. 4. To understand different Quality Management Schemes. 5. To understand about different Project Management Schemes/ Techniques .	**CO1.** Identify suitable life cycle models to be used. **CO2.** Analyze a problem and identify and define the computing requirements to the problem. **CO3.** Translate a requirement specification to a design using an appropriate software engineering methodology. **CO4.** Formulate appropriate testing strategy for the given software system. **CO5.** Develop software projects based on current technology, by managing resources economically and keeping ethical values.

List of Experiments:

1. Write down the problem statement for a suggested system of relevance.
2. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.
3. To perform the function oriented diagram: Data Flow Diagram (DFD) and Structured chart.
4. To perform the user's view analysis for the suggested system: Use case diagram.
5. To draw the structural view diagram for the system: Class diagram, object diagram.
6. To draw the behavioral view diagram : State-chart diagram, Activity diagram
7. To perform the behavioral view diagram for the suggested system : Sequence diagram. Collaboration diagram
8. To perform the implementation view diagram: Component diagram for the system.
9. To perform the environmental view diagram: Deployment diagram for the system.
10. To perform various testing using the testing tool unit testing, integration testing for a sample code of the suggested system.
11. 10 Perform Estimation of effort using FP Estimation for chosen system.
12. 11 To Prepare time line chart/Gantt Chart/PERT Chart for selected software project.

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Subject Code IT106593	**Software Engineering & Project Management LAB**	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	**12 hrs**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Software Engineering	K.K. Aggarwal & Yogesh Singh	New Age International, 2005
2)	An Integrated Approach to Software Engineering	Pankaj Jalote	Second Edition, Springer

		July 2022	1.00	Applicable for AY 2022-23 Onwards
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Subject Code IT106594	**Minor Project Lab**	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	**12 hrs**

Course Objectives	**Course Outcomes**
The course objective is to introduce the terminology, technology and its, applications to introduce the concept of M2M (machine to machine) with necessary protocols, to introduce the Python Scripting Language which is used in many IoT devices, to introduce the Raspberry PI platform, that is widely used in IoT applications.to introduce the implementation of web-based services on IoT devices	**On successful completion of the course, the student will be able to:** **CO1:** Describe what emerging technologies is and how it works today **CO2:** Recognize the factors that contributed to the Emergence of emerging technologies. **CO3:** Use emerging technologies for communication, Secure the elements of an IoT device. **CO4:** Design emerging technologies to work with a Cloud Computing infrastructure. **CO5:** Ability to work with these new technologies.

Students must use following Emerging Technologies for designing of their project –

1. Artificial Intelligence.
2. Machine Learning.
3. Internet of Things.
4. Cyber Security.
5. Block chain Technology.
6. Android
7. Data Science.
8. Deep Learning.

Note-: Group of Student must be of only of 2 or 3 student only.

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Subject Code IT106595	**Practical Training / Intership** (Report & Seminar)	**L=**	**T=**	**P= 2**	**Credits=1**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	25	**00**	**25**	**50**	--------

Course Objectives	**Course Outcomes**
Theobjectiveofthiscourseistofamiliarizetheprospective.Moreprecisely,theobjectives are: The course objective is to promote cooperation and to develop synergetic collaboration between industry and the institute in promoting a knowledgeable society. To expose students to the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions.	**On successful completion of the course, the student will be able to:** **CO1**: Apply engineering knowledge in solving real life problems. **CO2**: Attain new skills and be aware of the state of-art in engineering disciplines of their own interest. **CO3**: Describe use of advanced tools and techniques encountered during training and visit. **CO4**: Acquire practical skills, organizational skills, Communication skills, lifelong learning skills, professional awareness and experience working on projects and alongside industry experts. **CO5**: Write a technical project report that follows an established structure and give oral presentations with focus on the project results and a credible work procedure.

1. As per institution's guidelines, Industrial Training have to be done at the end of 4th Semester.
2. The student must follow the instructions given by the Teacher In-charge of Industrial Training.
3. The purpose of the Industrial Training is to develop the work process being performed and apprise them of the industry problems.
4. During the training, students will be given practical problems by the industry in which they are undergoing training. In case the industry does not give them the problems, the students will themselves formulate problems and carry out detailed study on them and recommend the optimum solution based on their theory knowledge.
5. Submission of Final Report - Each student must submit a Final Report and deliver a presentation on industrial training at the end of the industrial training period on the date and time announced by the Teacher In-charge.
6. The Internship report must include the following:
   (a)The basic history/introduction of the industry
   b)The software and hardware used.
   (c)The sequence of operations followed/ systems introduced for the project development.
   (d)The formulation of practical problems.
   (e)Data required formulating the problems.
   (f) Analysis of the data, steps required and commands used in industry.
   (g)Certificate from the industry for the period of training undergone.
7. The student would be evaluated through Report and Viva-voce

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CONSTITUTION OF NDIA					
Course Code	**IT100596**	**L = 0**	**T = 0**	**P = 0**	**Credits = -**
Examination Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	-	**-**	**25**	**25**	**-**

Course Objectives	Course Outcomes
The objective of this course is to introduce students to the Constitution of India.	**On successful completion of the course, the student will be able to:** **CO1:** Display understanding about the history and philosophy of Indian Constitution. **CO2:** Demonstrate clarity about the premises informing the twin themes of liberty and freedom from civil rights perspective. **CO3:** Display understanding about powers and functions of Indian government. **CO4:** Exhibit understanding about emergency rule. **CO5:** Demonstrate understanding about structure and functions of local administration.

UNIT – I **CO1**
Introduction: Historical Perspective of Constitution of India; Philosophy of Indian Constitution; Meaning of the constitution law and constitutionalism; Salient features and Preamble.

UNIT – II **CO2**
Contours of Constitutional Rights and Duties: Fundamental rights; Scheme of the Fundamental Duties and its legal status.

UNIT – III **CO3**
Organs of Governance: Parliamentary Form of Government in India; The constitutional powers and status of the President of India; Judiciary- Powers and Functions; Local Self Government – Constitutional Scheme in India.

UNIT – IV **CO4**
Emergency Provisions: National Emergency; President Rule; Financial Emergency.

UNIT – V **CO5**
Local Administration: Federal structure and distribution of legislative and financial powers between the Union and the States; The Directive Principles of State Policy – Its importance and implementation.

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Text Books:

S. No.	Title	Author(s)	Publisher
1.	Introduction to the Constitution of India	Basu D D	Lexis Nexis
2.	Principles of Public Administration	Dr S N Myneni	Allahabad Law Agency

Reference Books:

S. No.	Title	Author(s)	Publisher
1.	Dr. B. R. Ambedkar Framing of Indian Constitution	Busi S N	Ava Publishers
2.	Theory and Practices of Modern Government	M G Gupta	Central Book Depot

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Subject Code IT106521	Principles of Communication Systems	L = 2	T = 1	P =	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
1. To understand the need of Modulation & Modulation Techniques. 2. To understand frequency Techniques. 3. To understand the concept of Sampling, Quantization and Coding : 4. To Learn About the basics of Digital Communication Techniques. 5.To learn different Advanced Communication Techniques & its application in different industry	After the successful completion of this course, student will be able to: **CO1:** Understand the need of Modulation in any Communication System. **CO2:** Describe various modulation techniques in Analog Communication Systems. **CO3:** Evaluate the performance of digital communication system having digital Modulation Techniques. **CO4:** Describe working of light propagation in Optical fiber and explain Satellite Communication System. **CO5:** Have an understanding of design considerations for multiple access / use spectrum and multiplexing.

UNIT – I : Amplitude Modulation : **CO1**
Need for Modulation, Amplitude Modulation, Amplitude Modulation Index, Modulation Index for Sinusoidal AM, Frequency spectrum for Sinusoidal AM, Average power for Sinusoidal AM, Effective voltage and current for sinusoidal AM, Balanced Modulator, The Square law demodulator, Non-sinusoidal modulation, DSBSC Modulation, SSB modulation and generation, VSB. **[8Hrs]**

UNIT – II : Angle Modulation: : **CO2**
Phase and frequency modulation and their relationship. Frequency deviation, spectrumof FM Signal, BW of FM Signal, Effect of modulation on BW, constant BW, FM phasor diagram, Narrow-band F.M. Armstrong and Parameter variation methods of FM generation and FM demodulators. **[7Hrs]**

UNIT – III : Sampling, Quantization and Coding : **CO3**
Sampling theorem, Pulse Modulation: PAM, PPM, PWM. Quantization of Signals, Quantization error, TDM, Pulse Code Modulation (PCM), DPCM, DM, ADM & their comparative performance evaluation. **[7Hrs]**

UNIT – IV : Digital Modulation: : **CO4**
Digital Modulation: Generation and detection of BASK, BPSK and BFSK; ASK, FSK, PSK performance evaluation, Fundamentals of QPSK , generation and detection of QPSK ; Definition of MSK, M-Ary PSK and its application areas. **[7Hrs]**

UNIT – V : Advanced Communication Techniques: **CO5**
Satellite Communication: Components and Block diagram of Satellite communication system, Transponders, Up-link and Down-link budget calculations. Fiber Optic Communication: Principles of light propagation in optical fiber, Losses in fibers, Dispersion, Connectors and splices, Fiber optic communication link. **[7Hrs]**

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Subject Code IT106521	Principles of Communication Systems	L = 2	T = 1	P =	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Text Books:

S. No.	Title	Authors	Publisher
1)	Principles of Communication system	H.Taub and D.L. Shiling	TMH, 2nd edition 2008
2)	Communication Systems	R. P. Singh and S. D. Sapre	TMH, 2nd edition
3)	Modern Digital and. Digital an d. Analog Communication	B.P.Lathi & T.Srinivasa Rao	THIRD EDITION.

Reference Books:

S. No.	Title	Authors	Publisher
1)	Electronic Communication Systems	Roddy & Coolen	PHI, 4 th Ed
2)	An Introduction to the Principle of Communication Theory	J.C. Hancock	,Mc-Graw Hill, 3 rd Edition
3)	Electronic Communication System	Kenedy & Davis	TMH, 5 th Edition
4)	Principles of Communications	Rodger E. Ziemer, William H. Tranter	Willey, 7th Edition,2014

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Subject Code IT106522	Web Development Technology	L = 2	T = 1	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
1. Describe the important features of the Web and Web browser software. 2. Evaluate e-mail software and Web-based e-mail services. 3. Use FTP and other services to transfer and store data. 4. Demonstrate the use of real-time chat and briefly describe the history of the wireless Internet. 5. Create HTML documents and enhance them with browser extensions.	**On successful completion of the course, the student will be able to:** **CO 1.** Understand, analyze and apply the role of languages like HTML, DHTML, CSS, XML, Javascript, and web applications. **CO2.** Analyze a web page and identify its elements and attributes. **CO3.** Create XML documents and XML Schema. **CO4**. Learn to protect their website. **CO5**. Learn the skill of website hosting.

UNIT –I : INTRODUCTION TO INTERNET: **CO1**

Introduction, Evolution of Internet, Internet Applications, Internet Protocol -TCP/IP, UDP, HTTP, Secure Http(Shttp) Internet Addressing – Addressing Scheme – Ipv4 & IPv6, Network Byte Order, Domain Name Server and IP Addresses, Mapping . Internet Service Providers, Types Of Connectivity Such As Dial-Up Leaded Vsat Etc. Web Technologies: Three Tier Web Based Architecture; Jsp, Asp, J2ee, .Net Systems. [8 Hrs]

UNIT–II: HTML CSS AND SCRIPTING: **CO 2**

HTML - Introduction, Sgml, Dtd(Document Type Definition, Basic Html Elements, Tags and usages, HTML Standards , Issues in HTML Dhtml: Introduction Cascading Style Sheets: Syntax ,Class Selector, Id Selector Dom (Document Object Model) & Dso (Data Source Object) Approaches To Dynamic Pages: Cgi, Java Applets, Plug Ins, Active X, Java Script – Java Script Object Model, Variables-Constant – Expressions, Conditions- Relational Operators- Data Types – Flow Control – Functions & Objects-events and event handlers – Data type Conversion & Equality – Accessing HTML form elements. [7 Hrs]

UNIT –III : XML: **CO 3**

What is XML – Basic Standards, Schema Standards, Linking & Presentation Standards, Standards that build on XML, Generating XML data, Writing a simple XML File, Creating a Document type definition, Documents & Data ,Defining Attributes & Entities in the DTD ,Defining Parameter Entities & conditional Sections, Resolving a naming conflict, Using Namespaces, Designing an XML data structure, Normalizing Data, Normalizing DTDS. [7 Hrs]

UNIT –IV : I NTERNET SECURITY & FIREWALLS: **CO 4**

Security Threats From Mobile Codes, Types Of Viruses, Client Server Security Threats, Data & Message Security, Various electronic payment systems, Introduction to EDI, Challenges–Response System, Encrypted Documents And Emails , Firewalls: Hardened Firewall Hosts, Ip- Packet Screening, Proxy Application Gateways, Aaa (Authentication , Authorization And Accounting). [7 Hrs]

UNIT –V : WEBSITE PLANNING & HOSTING: **CO 5**

Introduction, Web Page Lay-Outing, Where To Host Site, Maintenance Of Site, Registration Of Site On Search Engines And Indexes, Introduction To File Transfer Protocol, Public Domain Software, Types Of Ftp Servers (Including Anonymous),Ftp Clients Common Command. Telnet Protocol, Server Domain, Telnet Client, Terminal Emulation. Usenet And Internet Relay Chat. [7 Hrs]

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Subject Code IT106522	**Web Development Technology**	**L = 2**	**T = 1**	**P = 0**	**Credits = 3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3 Hours**

Text Books:

S. No.	Title	Authors	Publisher
1)	Internet & Intranet Engineering	Daniel Minoli	TMH
2)	Internet for Every One	Alexis Leon and Mathews Leon	Tech World.
3)	Web Technologies	Uttam K Roy	Oxford University Press.

Reference Books:

S. No.	Title	Authors	Publisher
1)	Using HTML 4, XML and JAVA	Eric Ladd, Jim O'Donnel	Prentice Hall of India
2)	Beginning Java Script	Paul Wilton	SPD Publications
3)	Internet and World Wide Web	Dietel and Nieto	Pearson
4)	Java Script	D.Flanagan	O'Reilly, SPD

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Subject Code: IT106523	Graph Theory	L =2	T =1	P =0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
1. Able to formally apply graph – Theoretic terminology and notations. 2. Able to formally apply Tree – Theoretic terminology and notations 3. Able to apply theoretical knowledge acquired to solve realistic problems in real life. 4. Aware of the benefits of representing networks as probabilistic graphs vs. the traditional binary representation. 5. Able to demonstrate their knowledge of algorithms by solving concrete problems.	**On successful completion of the course, thestudent will be able to:** **CO1:** Understand the basic concepts of graph theory. **CO2:** Understand the basic concepts of Trees, and different types of Tree **CO3:** Implement the graph theory in real life problems that can be modeled into graphs. **CO4:** understand the basic concept of coloring & dominating sets. **CO5:** Apply suitable graph model and algorithm for solving applications.

UNIT –I : Introduction: **CO 1**
Definitions: Directed and undirected graphs. Hand shaking property and its problems. Real Life applications. Application - Konigsberg bridge problem, Utility problem and travelling salesman problem. Definitions: Walks, trail, paths, Circuits, Cycles, Sub graphs, Induced and Spanning sub graphs, Connected graphs and Complement of graph-Problems. Euler graphs and Hamiltonian graphs (no theorems) problems. Operations on graphs and Isomorphism of two graphs, problems. [8 Hrs]

UNIT–II : Trees: **CO 2**
Definitions: Trees, Spanning trees, Properties of trees. Rooted and binary tree. Finding all the spanning trees of a graph and Spanning trees in a weighted graph. Traversal of Binary Tree, Pre-order and Post-order Traversal. Prefix codes. [7 Hrs]

UNIT –III: Planner & Dual Graph & Matrix representation of Graphs: **CO 3**
Planar Graphs. Kuratowski's graphs. Different representation of planar graph. Detection of planar graphs. Euler's polyhedral formula (No proof). Geometrical Dual(no theorems) problems. Adjacency matrix, Incidence matrix, Sub-matrices of Incidence matrix. [7 Hrs]

UNIT –IV : Coloring and Dominating sets: **CO 4**
Definition of Chromatic number. Chromatic Partitioning. Chromatic Polynomial. Finding the Chromatic polynomial by Decomposition Theorem and by Multiplication Theorem Dominating set. Minimal Dominating set. Domination number. Independent dominating set. Finding minimal dominating sets. Some applications of domination theory. [7 Hrs]

UNIT –V : Graph Theoretic Algorithms: **CO 5**
Computer representation of a graph. Algorithm on spanning trees: Kruskal's and Prim's Algorithm. Shortest path algorithms: Shortest path from a specified vertex to another specified vertex by Dijkstra's algorithm, Shortest path between all pairs of vertices. Warshall's algorithm. [7 Hrs]

Subject Code: IT106523	**Graph Theory**	**L =2**	**T =1**	**P =0**	**Credits = 3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3 Hours**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Graph Theory with Application to Engineering and Computer Science	Narsingh Deo	Prentice Hall of India
2)	Graph Theory Applications	L.R.Foulds	Springer

Reference Books:

S.No.	**Title**	**Authors**	**Publisher**
1)	Graph Theory with Applications	Bondy, J. A. and Murty, U.S.R	North Holland Publication
2)	Introduction to Graph Theory	West, D. B	Pearson Education
3)	A First Look at Graph Theory	John Clark, Derek Allan Holton	World Scientific Publishing Company
4)	Discrete Mathematics and Its Applications	Kenneth H. Rosen	TMH

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Subject Code IT106524	Information Retrieval	L = 2	T = 1	P = 0	Credits = 3
Evaluation Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours

Course Objectives	Course Outcomes
1. To gain a better understanding of Information Retrieval Technology and data where house. 2. Understand design of different Clustering algorithm 3. To Understand the basic concept of retrieval systems for web search tasks. 4. To understand the concept of Information Retrieval System for web search tasks. 5. To use text based Algorithm	**On successful completion of the course, thestudent will be able to:** **CO** 1. Ability to apply IR principles to locate relevant information large collections of data **CO** 2. Ability to design different document clustering algorithms **CO** 3. Implement retrieval systems for web search tasks. **CO** 4. Design an Information Retrieval System for web search tasks. **CO5**:Able to understand text based Algorithm

Unit-1:Introduction to Information Retrieval Systems: **CO 1**
Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses.
Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities. [8 Hrs]

Unit-II: Cataloging and Indexing: **CO 2**
Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction.
Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure, Hypertext and XML Data Structures, Hidden Markov Models. [7 Hrs]

Unit-III: Automatic Indexing: **CO 3**
Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages
Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters. [7 Hrs]
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Unit-IV: User Search Techniques: **CO 4**
User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext
Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies. [7 Hrs]

Unit-V: Text Search Algorithms: **CO 5**
Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems
Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval. [7 Hrs]

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Subject Code IT106524	**Information Retrieval**	**L = 2**	**T = 1**	**P = 0**	**Credits = 3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3 Hours**

Text Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Information Storage and Retrieval Systems – Theory and Implementation	Gerald J. Kowalski, Mark T. Maybury	Springer

Reference Books:

S. No.	**Title**	**Authors**	**Publisher**
1)	Information Retrieval Data Structures and Algorithms	Frakes, W.B., Ricardo Baeza-Yates	Prentice Hall, 1992.
2)	Information Storage & Retrieval	Robert Korfhage	John Wiley & Sons.
3)	Modern Information Retrieval	Yates and Neto	Pearson Education

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Subject ode IT106525	**Internet of Things**	**L=2**	**T=1**	**P=0**	**Credits= 3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3Hours**

Course Objectives	**Course Outcomes**
1.To study the fundamentals about IoT. 2.To study about IoT Access technologies 3. To study the design methodology and different IoT hardware platforms. 4. To study the basics of IoT Data Analytics and supporting services. 5. To study about various IoT case studies and industrial applications.	On successful completion of the course, the student will be able to: **CO1:**Understand the basics of IoT **CO2**:Implement the state of the Architecture of an IoT **CO3:**Understand design methodology and hardware platform sinvolvedin IoT **CO4:**Understand how to analyze and organize the data **CO5:**Compare IOT Applications in Industrial & real world.

UNIT – I : INTRODUCTION TO IoT: **CO1**
Evolution of Internet of Things, Enabling Technologies, M2M Communication, IoT World Forum (IoTWF) standardized architecture, Simplified IoT Architecture, Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Function alblocksofan IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects. **[8hrs]**

UNIT – II : ELEMENTS OF IoT: **CO2**
IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks,6LoWPAN, Application Transport Methods: SCADA, Application Layer Protocols: CoAP and MQTT. **[7hrs]**

UNIT – III : IoT APPLICATION DESIGN & DEVELOPMENT: **CO3**
Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, Arduino Board details. **[7hrs]**

UNIT – IV : DATA ANALYTICS: **CO4**
Data Analytics: Introduction, Structured Versus Unstructured Data, Data in Motion versus Data at Rest, IoT Data Analytics Challenges, Data Acquiring, Organizing in IoT/M2M, Supporting Services: Computing Using a Cloud Platform for IoT/M2M Applications/Services, Everything as a service and Cloud Service Models. **[7hrs]**

UNIT – V : CASE STUDIES/IoT APPLICATIONS: **CO5**
IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, Agriculture, Health care, other IoT electronic equipment, Industry 4.0concepts **[7hrs]**

Subject ode IT106525	**Internet of Things**	**L=2**	**T=1**	**P=0**	**Credits= 3**
Evaluation Scheme	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**
	100	**20**	**30**	**150**	**3 Hours**

Text Books:

S. No.	Title	Authors	Publisher
1	Internet of Things, "A Hands on Approach	Vijay Madisetti	ArshdeepBahgaUniversity Press
2	IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry	Cisco Press, 2017
3	The Internet of Things: Enabling Technologies, Platforms, and Use Cases	Pethuru Raj and Anupama C. Raman	CRC Press

Reference Books:

S. No.	Title	Authors	Publisher
1	Internet of Things	Jeeva Jose	Khanna Publishing House, Delhi
2	Designing the Internet of Things	Adrian McEwen,HakimCassimally	Wiley publications
3	Internet of Things: Architecture and Design	Raj Kamal	Tata McGraw Hill