D Y PATIL
COLLEGE of
ENGINEERING & TECHNOLOGY
(AN AUTONOMOUS INSTITUTE)
KASABA BAWADA, KOLHAPUR

D. Y. Patil College of Engineering and Technology

Kasaba Bawada, Kolhapur

(An Autonomous Institute)

Accredited by NAAC with 'A' Grade

Structure and Syllabus
of
T. Y. B.Tech in Computer Science and Engineering

Department of
Computer Science and Engineering
2022-23

HEAD OF DEPARTMENT
Computer Science & Engineering
D. Y. Patil College of Engg. & Tech.
Kasaba Bavada, Kolhapur 416 006

D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY, KOLHAPUR
Teaching and Evaluation Scheme from Year 2020-21
Third Year B. Tech. Computer Science & Engineering
SEMESTER-V

Sr. No.	Course Code	CourseType	Name of the Course	Lecture	Tutorial	Practical	Credits	Total Marks	Type	Max. Marks	Min. Marks for Passing	
1	201CSL301	ESC	Design and Analysis of Algorithms	3	1		4	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
2	201CSL302	PCC	Cloud Computing	3			3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
3	201CSL303	PCC	Database Engineering	3			3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
4	201CSL304	PEC	Professional Elective-I	3	1		4	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
5	201CSP305	PCC	Advance Programming Laboratory	2		2	3	100	ISE	50	10	30
									ESE-POE	50	20	
6	201CSP306	PCC	Cloud Computing Laboratory			2	1	25	ISE	25	10	10
7	201CSP307	PCC	Database Engineering Laboratory			2	1	75	ISE	25	10	30
									ESE-POE	50	20	
8	201CSP308	PROJ	Project-II			2	1	75	ISE	25	10	30
									ESE-OE	50	20	
9	201CSMC309	MC	Intellectual Property Rights (Mandatory Course-III)	2				50	ESE	50	20	20
		Total		16	2	8	20	725				280

ISE: In Semester Evaluation MSE: Mid Semester Examination ESE: End Semester Examination

Note 1: Tutorials and practical shall be conducted in batches with batch strength not exceeding 15 students.

Note 2: ESE will be conducted for 100 marks and converted to 50 marks

Professional Elective-I	1. Wireless Sensor Networks
	2. Software Defined Networks

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Teaching and Evaluation Scheme from Year 2020-21
Third Year B. Tech. Computer Science & Engineering
SEMESTER-VI

Sr. No.	Course Code	CourseType	Name of the Course	Teaching Scheme per Week				Total Marks	Evaluation Scheme			
				Lecture	Tutorial	Practical	Credits		Type	Max. Marks	Min. Marks forPassing	
1	201CSL310	PCC	Information Security	3			3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
2	201CSL311	PCC	Compiler Design	3			3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
3	201CSL312	PEC	Professional Elective-II	3			3	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
4	201CSL313	OEC	Open Elective I	3	1		4	100	ISE	20	20	40
									MSE	30		
									ESE	50	20	
5	201CSP314	PCC	Web Technology Laboratory	2		4	4	75	ISE	25	10	30
									ESE-POE	50	20	
6	201CSP315	HSMC	Technical Communication			2	1	50	ISE	25	10	20
									ESE-OE	25	10	
7	201CSP316	PCC	Information Security Laboratory			2	1	25	ISE	25	10	10
8	201CSP317	PCC	System Programming & Compilers Laboratory			2	1	25	ISE	25	10	10
9	201CSP318	PROJ	Project III			2	1	75	ISE	25	10	30
									ESE-POE	50	20	
		Total		14	1	12	21	650				260

ISE: In Semester Evaluation MSE: Mid Semester Examination ESE: End Semester Examination

Note 1: Tutorials and practical shall be conducted in batches with batch strength not exceeding 15students.

Note 2: ESE will be conducted for 100 marks and converted to 50 marks

Professional Elective-II	Open Elective-I
1. Internet of Things	1. E-Commerce and Digital Marketing
2. Foundation of Artificial Intelligence	2. Python Programming

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Course Plan

Course Title : Design and Analysis of Algorithms	
Course Code : 201CSL301	Semester : V
Teaching Scheme : L-T-P : 3-1-0	Credits : 4
Evaluation Scheme : ISE+MSE Marks: 20+30	ESE Marks : 50

Course Description:

This course introduces basic methods for the design and analysis of efficient algorithms. Different algorithms for a given computational task are presented and their relative merits evaluated based on performance measures. It introduces the fundamental techniques for designing and analyzing algorithms, including asymptotic analysis, divide-and-conquer algorithms, greedy algorithms, dynamic programming, traversal methods and even backtracking approach. It also provides introduction to NP-completeness.

Course Objectives:

1. To introduce algorithm design methods / techniques with analysis.
2. To devise algorithm for given problem statement and compute its complexity.
3. To introduce complex computational problems.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COS	BTL
C301.1	Understand and demonstrate algorithm design methods namely divide and conquer, greedy and backtracking with complexity analysis.	Apply
C301.2	Devise an algorithm for given problem statement and anlayze its space and time complexity.	Create
C301.3	Apply and analyze graph traversal and Dynamic programming algorithmic approach.	Analyze
C301.4	Understand the terms P, NP, NP Hard, NP Complete problems.	Understand

Prerequisite:	Data Structures, Discrete Mathematics, Engineering Mathematics, Programming Concepts.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	
C301.1	3	3	-	-	-	-	-	-	-	-	-	-	2	-	3
C301.2	3	3	-	-	-	-	-	-	-	-	-	-	2	-	6
C301.3	3	3	-	-	-	-	-	-	-	-	-	-	2	-	4
C301.4	3	3	-	-	-	-	-	-	-	-	-	-	1	-	2

Content	Hours
Unit 1: Divide and Conquer: What is algorithm, Algorithm Specification, Recurrence relations, Performance Analysis, Randomized Algorithms, Divide and Conquer: The general method, Binary search, Finding the maximum and minimum, Merge sort, Quick sort, DC Selection Algorithm, analysis of Divide and Conquer algorithms.	8
Unit 2: The Greedy Method: The general method, Knapsack problem, Job sequencing with deadlines, minimum-cost spanning trees – Prim's and Kruskal's Algorithms, Optimal storage on tapes, Optimal merge Patterns, Single source shortest paths	6
Unit 3: Backtracking: The general method, 8-queen problem, sum of subsets, Knapsack Problem, Hamiltonian Cycle, and Graph Coloring	7
Unit 4: Basic Traversal and Search Techniques: Techniques for Binary Trees, Game Tree; Techniques for Graphs – Breadth First Search & Traversal, Depth First Search & Traversal, AND/OR graphs; Connected components and Spanning Trees; Bi-connected components and depth first search.	6
Unit 5: Dynamic Programming: The general method, Multistage graphs, All pair shortest paths, 0/1 knapsack, Reliability design, Traveling Sales person problem	5
Unit 6: NP Hard, NP Complete Problems: Basic Concepts, Introduction to NP Hard Graph Problems**.**	4

List of Assignments

Ass. No.	Name of Tutorial Assignments	S/O	Hours
1	Introduction to Computer Algorithm : Understand Characteristics, Asymptotic Notations, Performance Analysis and basics of devising an Algorithms	S	1
2	Divide and Conquer Approach: Understand Analysis of Algorithm using Recurrence relation	S	1
3	Apply Greedy method to Optimization problems (Knapsack Problem, Job Sequencing with deadline, Single source shortest path)	S	1
4	Apply Greedy method to Optimization problems (Minimum cost spanning tree , Optimal storage on tapes , Optimal merge pattern)	S	1
5	Understand and Apply Backtracking approach to 4 Queen's Problem, Graph Colouring, Sum of Subset, Hamiltonian Cycle, Knapsack Problem	S	1
6	Demonstrate Traversal Techniques for Graphs: BFS, DFS, Articulation Point and Application of DFS and BFS by solving various examples	S	1
7	Apply Dynamic Programming approach to Multistage Graph, Reliability Design, All Pairs Shortest Path	S	1
8	Apply Dynamic Programming approach to OBST, Travelling Sales Person Problem	S	
9	Understand P, NP and NP hard Problems and NP Hard Graph Problems	S	1
10	Develop a program for one of the applications learnt with appropriate Algorithm devising approach along with priori analysis and posterior measurement for the same.	S	1

❖ **S-STUDY, O-OPERATIONAL**

Text Books:
   1. Ellis Horowitz, Satraj Sahani, Saguthevar Rajasejaran, Fundamentals of Computer Algorithms Universities Press, Second Edition (All Units)

Reference Books:

1. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein , MIT Press
2. Gilles Brassard, Paul Bratley, Fundamentals of Algorithmics, Pearson Education
3. Kyle Loudon, Mastering Algorithms with C, SPD O'Reilly
4. Allen Van Gelder , Sara Baase, Computer Algorithms- Introduction to Design and Analysis, Pearson Education

Online Resources:

1. YouTube channel by Abdul Bari
   https://www.youtube.com/channel/UCZCFT11CWBi3MHNlGf019nw
2. NPTEL course on https://onlinecourses.nptel.ac.in/noc20_cs10/preview
3. Virtual Lab Links for practicing various problems :
   https://ds2-iiith.vlabs.ac.in/exp/min-spanning-trees/index.html

Course Plan

Course Title : Cloud Computing	
Course Code : 201CSL302	Semester : V
Teaching Scheme : L-T-P : 3-0-0	Credits : 3
Evaluation Scheme : ISE+MSE Marks : 20+30	ESE Marks : 50

Course Description:

This course is intended to analyze the basics of cloud computing and overview of computing paradigm, make aware students with diversified technologies working for cloud architecture, Virtualization. Course will be focusing on architecture, IaaS, PaaS & SaaS.

Course Objectives:

1. To become familiar with Cloud Computing and its ecosystem.
2. To learn basics of virtualization and its importance.
3. To evaluate in-depth analysis of Cloud Computing capabilities.
4. To give technical overview of Cloud Programming and Services.
5. To understand security issues in cloud computing.

Course Outcomes:

Upon successful completion of this course, the students will be able to:

	COs	BTL
C302.1	Describe the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.	Remember
C302.2	Explain the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.	Understand
C302.3	Collaboratively research on the state of the art (and open problems) in cloud computing.	Understand
C302.4	Identify problems, and explain, analyse, and evaluate various cloud computing solutions.	Apply
C302.5	Choose the appropriate technologies, algorithms, and approaches for the related issues.	Apply

Pre-requisites:	Operating Systems, Fundamentals of Computer Networks.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

Cos	POs												PSOs		BTL
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	
C302.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1
C302.2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2
C302.3	-	-	2	1	2	-	-	-	-	-	-	-	-	-	2
C302.4	-	-	2	-	-	-	-	-	-	-	-	-	1	-	3
C302.5	-	-	-	-	2	-	-	-	-	-	-	-	-	-	3

Content	Hours
Unit 1: Overview of computing paradigm: Recent trends in Computing - Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing. Evolution of cloud computing - Business driver for adopting cloud computing. Definition, Goals, Types of distributed systems: Distributed computing system, Information System, Architecture: Architectural, Styles, System Architecture.	7
Unit 2: Process and Communication: Remote Procedure call, Message Oriented Transient Communication, Physical Clock, Synchronization, Logical Clock, Mutual Exclusion, Election Algorithms. **Introduction to Cloud Computing:** Cloud Computing - Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers. Properties, Characteristics & Disadvantages - Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing. Role of Open Standards.	7
Unit 3: Cloud Computing Architecture: Cloud computing stack - Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services. Service Models (XaaS) - Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS). Deployment Models, Public cloud, Private cloud, Hybrid cloud, Community cloud	6
Unit 4: Virtualization: Introduction and benefits, Implementation Levels of Virtualization, Virtualization at the OS Level Virtualization Structure, Virtualization Mechanism, Open-Source Virtualization Technology, Xen Virtualization Architecture, Binary Translation with Full Virtualization, Paravirtualization, Virtualization of CPU, Memory and I/O Devices	8
Unit 5: Infrastructure as a Service (IaaS): Introduction to IaaS - IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors,	7

Machine Image, Virtual Machine (VM). Resource Virtualization - Server, Storage, Network. Virtual Machine(resource) provisioning and manageability, storage as a service, Data storage in cloud computing (storage as a service). Renting, EC2 Compute Unit, Platform and Storage, pricing, customers. **Platform as a Service (PaaS):** Introduction to PaaS - What is PaaS, Service Oriented Architecture (SOA). Cloud Platform and Management - computation, storage **Software as a Service (SaaS):** Introduction to SaaS, Web services, Web 2.0, Web OS, Case Study on SaaS	
Unit 6: Case study on Open Source and Commercial Clouds – Amazon EC2, Google Compute Engine, Microsoft Azure, Cloud foundry, OpenStack	5

Text Books

1. Cloud Computing for Dummies, Judith Hurwitz, R. Bloor, M. Kanfman, F. Halper, WileyIndia Edition, Unit - I, II, IV, V
2. Cloud Computing Black Book, Jayaswal, Kallakurchi, Houde, Shah, Jayaswal, Kallakurchi, Houde, Shah, Unit-III
3. Cloud Security, Ronald Krutz and Russell Dean Vines, Wiley-India, Unit -VI
4. Enterprise Cloud Computing, Gautam Shroff, Cambridge, Unit -VI

Reference Books

1. Google Apps, Scott Granneman, Pearson
2. Cloud Security & Privacy, Tim Mather, S. Kumaraswammy, S. Latif, SPD, O'REILLY
3. Cloud Computing: A Practical Approach, Anthony T.Velte, et.al, McGraw Hill
4. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej Goscinski, Wiley India
5. Cloud Computing for Dummies, Judith Hurwitz, Marcia Kaufman, Fern Halper, Robin Bloor, Wiley Publication
6. Cloud Computing Bible, Barrie Sosinsky, Wiley India
7. Cloud Computing, Michael Miller, Que Publishing

Course Plan

Course Title : Database Engineering	
Course Code : 201CSL303	**Semester : V**
Teaching Scheme : L-T-P : 3-0-0	**Credits : 3**
Evaluation Scheme : ISE + MSE Marks : 20 + 30	**ESE Marks : 50**

Course Description:

This course introduces the fundamental concepts, principles and tools of database system. The course includes relational data model and languages, database design techniques, SQL, data storage and indexing techniques. Also the focus is given on concurrency control and recovery techniques.

Course Objectives:

1. To understand fundamental concepts of database systems.
2. To gain familiarity with SQL, PLSQL and DBMS.
3. To learn database design techniques.
4. To understand indexing, transaction management and recovery techniques.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C303.1	Understand fundamental concepts of database systems.	Understand
C303.2	Construct logical design of database using E-R Diagram.	Evaluate
C303.3	Study and apply SQL queries , PLSQL procedures to design & manage the database.	Apply
C303.4	Analyze & construct good database design.	Analyze
C303.5	Understand transaction concepts and concurrency control techniques.	Apply
C303.6	Understand failures in database and appropriate recovery techniques.	Understand

Prerequisite:	Set Theory and Data Structures

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C303.1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	2
C303.2	-	2	2	-	-	-	-	-	-	-	-	-	-	-	5
C303.3	-	3	3	1	-	-	-	-	-	-	-	2	2	-	3
C303.4	-	2	2	-	-	-	-	-	-	-	-	2	2	-	4
C303.5	2	2	-	-	-	-	-	-	-	-	-	-	-	-	3
C303.6	2	-	2	-	-	-	-	-	-	-	-	-	-	-	2

Content	Hours
Unit 1: Introduction to databases and E-R model Purpose of Database Systems, View of data, Database architecture, Database users and administrator, E-R model**:** Entity sets, Relationship sets, Mapping Constraints, Keys, E-R Diagram, Reducing E-R Diagrams to relational schemas, Extended E-R features: Specialization, Generalization, and Aggregation.	6
Unit 2: Relational Model, SQL and PLSQL Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagram, Relational Algebra. SQL: Overview of the SQL Query Language, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Aggregate Functions, Nested Subqueries, Modification of the Database, Join Expressions, Views. PLSQL: Triggers, Stored Procedures, PL/SQL Processing with Cursors, PL/SQL Stored Functions	8
Unit 3: Relational Database Design Referential Integrity, features of good relational designs, functional dependency, closure of a set of functional dependencies and Canonical cover. Normalization: Purpose of normalization, First Normal Form (1NF), Second Normal Form (2NF), Third Normal Form (3NF), Boyce-Codd Normal Form (BCNF).	7
Unit 4: Data Storage and Indexing Storage and File structure: Overview of physical storage media, RAID, File Organization, Organization of Records in Files, Data Dictionary Storage, Database Buffer. Indexing and Hashing: Basic Concepts, Ordered Indices, B+ Tree Index Files, Multiple Key Access. Static Hashing, Dynamic Hashing, Index definition in SQL.	7
Unit 5: Transaction Management and Concurrency Control Transaction concept, A Simple Transaction model, Transaction Atomicity and Durability, Serializability, Lock-Based Protocols, Time-Stamp Based Protocols, Validation-Based Protocols	6
Unit 6: Recovery Systems Failure Classification, Storage, Recovery and Atomicity – Log based recovery, Checkpoints, Recovery Algorithm**,** Buffer Management.	4

Text Books:

1. A. Silberschatz, H.F. Korth, S. Sudarshan, "Database System Concepts", 6th Edition, McGraw Hill Education. (Unit 1,2, 3,4,5 ,6)
2. Thomos Connolly, Carolyn Begg, "Database Systems - A practical approach to Design,

Implementation and Management", 3rd Edition, Pearson Education. (Unit 3- Normalization)

3. Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition, Cengage Learning, (Unit 2- PLSQL)

Reference Books:

1. Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems", Pearson Education, Fifth Edition**.**
2. Raghu Ramkrishnan, Johannes Gehrke, "Database Management System", Fourth Edition, McGraw Hill Education.

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc19_cs46/preview

Course Plan

Course Title : Wireless Sensor Networks	
Course Code : 201CSL304-1	Semester : V
Teaching Scheme : L-T-P : 3-1-0	Credits : 4
Evaluation Scheme : ISE + MSE Marks : 20 + 30	ESE Marks : 50

Course Description:

Wireless communication is one of the fastest growing components in the computer industry. All electronic devices seem to be able to communicate wirelessly these days. This course covers basic techniques in the design and operation of wireless sensor networks. The course also intends to study of wireless sensor network characteristics, protocols. It also the techniques in infrastructure development.

Course Objectives:

1. To introduce Ad Hoc wireless networks and its classifications.
2. To introduce sensor networks and its examples.
3. To introduce characteristics sensor networks.
4. Study of MAC protocols in WSN.
5. Study of network protocols for WSN.
6. Study and analysis of infrastructure establishment for WSN.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

COs		BTL
C304-1.1	Define Ad Hoc wireless networks with its classification.	Understand
C304-1.2	Describe WSN with its characteristics.	Remember
C304-1.3	Study of various protocols in WSN.	Understand
C304-1.4	Explain sensor networks infrastructure management and control techniques.	Analyze

Prerequisite:	Computer Networks

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C304-1.1	2	1	3	-	-	-	-	-	-	-	-	-	-	-	2
C304-1.2	1	1	2	-	-	-	-	-	-	-	-	-	-	-	1
C304-1.3	1	3	1	-	-	-	-	-	-	-	-	-	-	-	2
C304-1.4	2	2	-	-	-	-	-	-	-	-	-	-	-	-	4

Content	Hours
Unit 1: Introduction Ad Hoc wireless networks Cellular and Ad Hoc wireless networks, Applications, Issues in Ad Hoc wireless networks, MAC Protocols for ad hoc wireless networks – Introduction, Issues in designing MAC protocol, Design goals of MAC protocol, Classification of MAC protocols	4
Unit 2: Introduction to Sensor Networks Unique Constraints and Challenges, Advantages of Sensor Networks, Sensor Network Applications, Medium Access Control, The S-MAC Protocol, IEEE 802.15.Standard and ZigBee: General Issues.	6
Unit 3: Characteristics Of WSN: Characteristic requirements for WSN - Challenges for WSNs – WSN vs Adhoc Networks - Sensor node architecture – Commercially available sensor nodes –Imote, IRIS, Mica Mote, EYES nodes, BTnodes, TelosB, Sunspot -Physical layer and transceiver design considerations in WSNs, Energy usage profile, Choice of modulation scheme, Dynamic modulation scaling, Antenna considerations.	8
Unit 4: Medium Access Control Protocols: Fundamentals of MAC protocols - Low duty cycle protocols and wakeup concepts – Contention based protocols - Schedule-based protocols - SMAC - BMAC - Traffic-adaptive medium access protocol (TRAMA) - The IEEE 802.15.4 MAC protocol.	6
Unit 5: Routing Protocol for sensor Network Geographic, Energy-Aware Routing , Unicast Geographic Routing , Routing on a Curve , Energy-Minimizing Broadcast , Energy-Aware Routing to a Region , Attribute-Based Routing , Directed Diffusion , Rumor Routing , Geographic Hash Tables.	6
Unit 6: Sensor Network Infrastructure Establishment Topology Control , Clustering , Time Synchronization , Clocks and Communication Delays, Interval Methods, Reference Broadcasts, Localization and Localization Services, Ranging Techniques , Range-Based Localization Algorithms, Other Localization Algorithms,	6

Location Services.

	List of Assignments		
Ass. No.	**Name of Tutorial Assignments**	**S/O**	**Hours**
1	Cellular and Ad Hoc wireless networks with its applications.	S	1
2	MAC Protocols for ad hoc wireless networks	S	1
3	Applications and Advantages of Sensor Networks.	S	1
4	Medium Access Control and IEEE 802.15 standards for WSN.	S	1
5	WSN vs Adhoc Networks.	S	1
6	Commercially available sensor nodes.	S	1
7	Contention based protocols & Schedule-based WSN protocols.	S	1
8	Routing protocols for WSN.	S	
9	WSN infrastructure establishment.	S	1
10	Localisation techniques in WSN.	S	1

Text Books:
1. C.S.R.Murthy & B.S. Manoj, "Ad Hoc wireless Networks– Architecture and Protocols ",Pearson Education.
2. Feng Zhao and LeonidesGuibas ,**"Wireless sensor networks",** Elsevier publication - 2004

Reference Books:
1. O.K.Tonguz & G.Ferrari, **"**Ad Hoc Wireless Networks- A communication Theoretic perspective**",** Wiley India.
2. Charles E. Perkins ,"Ad Hoc Networking" , Pearson Education.
3. William Stallings ,"Wireless Communications and Networks", Pearson Education – 2004.

Online Resources:
1. "Silicon Labs" YouTube channel.
2. https://www.sciencedirect.com/topics/computer-science/wireless-sensor-networks

Course Plan

Course Title : Software Defined Networks	
Course Code : 201CSL304-2	Semester : V
Teaching Scheme : L-T-P : 3-1-0	Credits : 4
Evaluation Scheme : ISE + MSE Marks : 20 + 30	ESE Marks : 50

Course Description: This course introduces software defined networking, an emerging paradigm in computer networking that allows a logically centralized software program to control the behavior of an entire network and understanding frameworks like Open Daylight Controller, Floodlight Controller, Bandwidth Calendaring, Data Center Orchestration including SDN programming.

Course Objectives:
1. To learn the fundamentals of software defined networks.
2. To understand the separation of the data plane and the control plane.
3. To study about the SDN Programming.
4. To study about the various applications of SDN

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C304-2.1	Analyze the evolution of software defined networks	Analyze
C304-2.2	Understand the various components of SDN and their uses	Understand
C304-2.3	Explain the use of SDN in the current networking scenario	Understand
C304-2.4	Design and develop various applications of SDN	Create

Prerequisite:	Knowledge of computer networking.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C304-2.1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	4
C304-2.2	3	2	-	-	-	-	-	-	-	-	-	-	-	-	2
C304-2.3	3	2	2	-	-	-	-	-	-	-	-	-	-	-	2
C304-2.4	3	3	3	3	3	-	-	-	-	-	-	-	-	-	6

D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY
KASABA BAWADA KOLHAPUR-416006
(An Autonomous Institute) B. Tech. Curriculum

T. Y. B. Tech. Computer Science & Engineering

SEM-V (AcademicYear-2022-23)

Content	Hours
Unit 1: History of Software Defined Networking (SDN), Modern Data Centre, Traditional Switch Architecture, Why SDN, Evolution of SDN, How SDN Works, Centralized and Distributed Control and Date Planes	6
Unit 2: Open Flow Specification, Drawbacks of Open SDN, SDN via APIs, SDN via Hypervisor, Based Overlays, SDN via Opening up the Device, SDN Controllers, General Concepts	6
Unit 3: Multitenant and Virtualized Multitenant Data Center, SDN Solutions for the Data Center Network, VLANs, EVPN, VxLAN, NVGRE	6
Unit 4: Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs, Network Functions Virtualization (NFV)	6
Unit 5: Software Defined Networks: Concepts, Implementation and Applications	6
Unit 6: Juniper SDN Framework, IETF SDN Framework, Open Daylight Controller, Floodlight Controller, Bandwidth Calendaring, Data Center Orchestration	6

Ass. No.	Name of Assignment	S/O	Hours
	List of Assignments		
1	Understanding SDN network configuration	S	1
2	Installing and Launching the SDN Hub	O	1
3	Understanding Mininet	S	1
4	Generate a virtual network using Mininet.	O	2
5	Installing the OpenDaylight controller.	O	1
6	Validating communications between hosts.	O	2
7	View OpenFlow Communications with Wireshark	O	1
8	Saving SDN Hub projects	O	1
9	Configuring virtual private LAN services (VPLS)	O	2

Note: Minimum 8 assignments must be completed.

Text Books:
1. Paul Goransson and Chuck Black, ―Software Defined Networks: A Comprehensive Approach, First Edition, Morgan Kaufmann, 2014.
2. Thomas D. Nadeau, Ken Gray, ―SDN: Software Defined Networks, O'Reilly Media, 2013.

Reference Books:
1. Siamak Azodolmolky, ―Software Defined Networking with Open Flow, Packet Publishing, 2013.
2. Vivek Tiwari, ―SDN and Open Flow for Beginners, Amazon Digital Services, Inc., 2013.
3. Fei Hu, Editor, ―Network Innovation through Open Flow and SDN: Principles and Design, CRC Press, 2014.

Course Plan

Course Title: Advance Programming Laboratory	
Course Code: 201CSP305	Semester: V
Teaching Scheme: L-T-P: 2-0-2	Credits: 3
Evaluation Scheme: ISE Marks: 50	ESE-POE Marks: 50

Course Description:

Python is a high-level programming language that helps in developing a wide variety of applications, including web applications, network programming, graphical user interfaces (GUIs), scientific and numeric applications. It also has a strong community around machine learning, data modeling, data analysis and artificial intelligence (AI), with extensive resources and libraries.

Course Objectives:

1. To make the student learn basics of python programming language.
2. To expose the students to various data structures.
3. To make the students aware of various Object Oriented concepts.
4. To expose the students to advanced concepts in Python

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

C305.1	Summarize the basic concepts in python.	Understand
C305.2	Identify the data structures to solve a problem.	Apply
C305.3	Demonstrate the use of Object-Oriented concepts in problem solving.	Apply
C305.4	Apply Python concepts in web application using Django framework.	Apply

Prerequisite:	Knowledge of any programming language like C/C++

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C305.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C305.2	3	2	2	-	2	-	-	-	-	-	-	-	-	-	3
C305.3	3	-	-	-	2	-	-	-	-	-	-	-	-	-	3
C305.4	2	-	-	-	2	-	-	-	-	-	-	-	1	-	3

Content	Hours
Unit 1: Getting started with Python: Python Installation and Working of it, Data types in python, Operators in python, Input and Output, detail study of python blocks	2
Unit 2: Basics of Python Programming: Control statements, Branching statements, String and Character in python, List and Tuples, Dictionaries, Arrays in python, Functions, Lambda Functions.	6
Unit 3: Files in Python: Files in Python, Directories, Building Modules, Packages, Text Processing, Regular expression in python.	3
Unit 4: OOP Concepts in Python: Procedural and Object-Oriented Programming, Objects, class, Method overloading, Polymorphism, Inheritance.	5
Unit 5: Advanced Python: Introduction to Django, Installation, Creation of local server, projects and apps using Django, database connectivity in Django, Introduction to tkinter for GUI	4
Unit 6: Python Libraries**:** Introduction to python libraries like NumPy, Pandas, Matplotlib	4

List of Assignments			
Ass. No.	**Name of Assignment**	**S/O**	**Hours**
1	Installation of Python , Jupyter Notebook	O	2
2	Exploring basics of python like datatypes, input output and strings	O	2
3	Implementation of control statements and branch statement	O	2
4	Implementation of list, tuples and dictionaries.	O	2
5	Implementation of functions and lambda function	O	2
6	Program on File handling	O	2
7	Implementation of classes and objects , constructors and destructors	O	2
8	Implementation of of inheritance ,polymorphism.	O	2
9	Creating application using Django web framework to demonstrate functionality of user login and its validation using regular expression	O	2
10	Implementation of Array operations using Numpy.	O	2
11	Implementation of data Operation in Pandas.	O	2
12	Implementations of Different graphs in Matplotlib.	O	2

❖ **S-STUDY, O-OPERATIONAL**

Text Books:
1. "Python Crash Course- a Hands-On Project Based Introduction to Programming",
Eric Matthes, No starch press, San Francisco.

Reference Books:
1. "Learn Python", Mark Lutz, 4th Edition, O'REILLY Publication.
2. "Think Python", Allen B. Downey, 2nd Edition, O'REILLY Publication
3. "Python Projects", Laura Cassell, Alan Gauld,Wrox Publication

Online Resources:
1. https://nptel.ac.in/courses/106/106/106106182
2. https://www.python.org/

Course Plan

Course Title : Cloud Computing Laboratory		
Course Code : 201CSP306		**Semester : V**
Teaching Scheme : L-T-P : 0-0-2		**Credits : 1**
Evaluation Scheme : ISE Marks:25		**ESE-POE Marks: 50**

Course Description:

The course is designed to develop skills to design and analyze Cloud Computing. It strengthens the ability to the students to identify and apply the suitable Cloud Computing for the given real world problem. It enables them to gain knowledge in practical applications of Cloud Computing.

Course Objectives:

1. To Configuring the Client/Server for Distributed System.
2. To learn the how to implement different services of cloud computing
3. To learn the deployment and configuration options in Amazon (AWS), Google Cloud, Microsoft Azure.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C306.1	Configure various virtualization tools such as Virtual Box, VMware workstation.	Understand
C306.2	Install OS on a Virtual Machine Monitor.	Understand
C306.3	Study and implement infrastructure as Service using Open Stack	Apply
C306.4	Install and configure Google App Engine.	Apply

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes

COs	POs												PSOs	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
C306.1	2	2	-	-	-	-	-	-	-	-	-	-	-	-
C306.2	-	3	3	-	-	-	-	-	-	-	-	-	-	-
C306.3	-	2	2	-	-	-	-	-	-	-	-	-	1	-
C306.4	3	-	3	-	-	-	-	-	-	-	-	-	-	-

List of Assignments

Ass. No.	Experiment List	S/O	Hours
1	RPC, RMI interface implementation	O	2
2	Configuring the Client/Server for NTP	O	2
3	Installation and configuration of type 1 Hypervisor. (Esxi)	O	2
4	Installation and configuration of type 2 Hypervisor (VMware, Virtual Box, etc.)	O	2
5	Working and Implementation of Infrastructure as a service.	O	2
6	Working and Implementation of Software as a service.	O	2
7	Working and Implementation of Platform as a services.	O	2
8	Practical Implementation of Storage as a Service.	O	2
9	Installing a private cloud. (Open Stack)	O	2
10	Installing OS on a Virtual Machine Monitor.	O	2
11	Offline migration of virtual OS.	O	2
12	Live migration of virtual OS.	O	2
13	Study and implementation of infrastructure as Service using Open Stack.	O	2
14	Install and configure Google App Engine.	O	2
15	Hands on virtualization using Xen Server.	O	2
16	Hands on containerisation using Docker.	O	2
17	Deployment and Configuration options in Amazon (AWS).	O	2
18	Deployment and Configuration options in Google Cloud.	O	2
19	Deployment and Configuration options in Microsoft Azure.	O	2

- ❖ **S-STUDY, O-OPERATIONAL**
- ❖ **Note: Minimum of 10 Experiments to be performed from the list given above.**

Text Books:
1. Cloud Security, Ronald Krutz and Russell Dean Vines, Wiley-India.
2. Enterprise Cloud Computing, Gautam Shroff, Cambridge

Reference Books:
1. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej Goscinski, Wiley India.
2. Cloud Computing for Dummies, Judith Hurwitz, Marcia Kaufman, Fern Halper, Robin Bloor, Wiley Publication.

Course Plan

Course Title : Database Engineering Laboratory	
Course Code : 201CSP307	Semester : V
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks:25	ESE-POE Marks: 50

Course Description:

This course focuses on implementation of the fundamental concepts and principles of database engineering. Focus is given on hands-on practical's considering SQL-DDL, DML commands, database connectivity and implementation of views.

Course Objectives:

1. To demonstrate fundamental concepts of database systems.
2. To gain familiarity with SQL and DBMS.
3. To construct the database for a given application.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C307.1	Install and use database management systems.	Understand
C307.2	Represent logical design of database using E-R Diagram.	Apply
C307.3	Apply and demonstrate SQL queries, PLSQL Procedures to design and manage the database.	Apply
C307.4	Analyze and construct good database design.	Analyze

Prerequisite:	Set Theory and Data Structures

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C307.1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	2
C307.2	-	2	2	-	-	-	-	-	-	-	-	-	-	-	3
C307.3	-	3	3	1	-	-	-	-	-	-	-	2	2	-	3
C307.4	-	2	2	-	-	-	-	-	-	-	-	2	2	-	4

D. Y. PATIL COLLEGE OF ENGINEERING & TECHNOLOGY
KASABA BAWADA KOLHAPUR-416006
(An Autonomous Institute) B. Tech. Curriculum

T. Y. B. Tech. Computer Science & Engineering

SEM-V (AcademicYear-2022-23)

List of Assignments

Ass. No.	Name of Tutorial Assignments	S/O	Hours
1	ER Diagram of an Organization- Draw an E-R Diagram for any organization like Insurance Company, Library systems, College Management systems, Hospital Management systems etc. Use data modelling tools like Oracle SQL developer, Tode etc. to draw ER diagram.	S	2
2	Conversion of ER Diagram to Tables- Convert the Above mentioned E-R Diagram in Relational Tables.	S	2
3	DDL Statements- Execute DDL commands to create, alter, rename, truncate and drop tables in SQL. Apply all types of constraints such as primary key, foreign key, not null, unique, check.	O	2
4	DML Statements- Use DML Queries to insert, delete, update & display records of the tables.	O	2
5	SQL character functions, String functions- Display the results using String operations.	O	2
6	Aggregate functions- Display the records using Aggregate functions and Group by, having, between, Order by clauses.	O	2
7	Join operations and set operations- Display the results of union, intersection, set difference, Cartesian product and Join operations of two different tables.	O	2
8	Views, Subqueries- Create Views for the table. Solve subqueries for given questions	O	2
9	Demonstrate PLSQL Functions and Procedures.	O	2
10	Demonstrate Cursors, and triggers using PL/SQL.	O	2
11	Database Connectivity- Write a program of Database connectivity with any object oriented language.	O	2
12	Normalize any database from first normal form to Boyce-Codd Normal Form (BCNF).	S	2
13	Functional Dependency- Write a program to find the F+ of relation schema R (A, B, C, G, H, I) and F= {A$\rightarrow$B, A$\rightarrow$ C, CG$\rightarrow$H, CG$\rightarrow$I, B$\rightarrow$H}.	O	2
14	Write a program to implement Static Hashing.	O	2

- ❖ **S-STUDY, O-OPERATIONAL**
- ❖ **Note: The instructor may choose minimum twelve experiments from list.**

Text Books:

4. A. Silberschatz, H.F. Korth, S. Sudarshan, "Database System Concepts", 6th Edition, McGraw Hill Education.
5. Thomos Connolly, Carolyn Begg, "Database Systems - A practical approach to Design, Implementation and Management", 3rd Edition, Pearson Education.
6. Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition, Cengage Learning

Reference Books:

3. Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems", Pearson Education, Fifth Edition**.**
4. Raghu Ramkrishnan, Johannes Gehrke, "Database Management System", Fourth Edition, McGraw Hill Education.

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc19_cs46/preview

Course Plan

Course Title : PROJECT-II	
Course Code : 201CSP308	Semester : V
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks : 25	ESE-POE Marks : 50

Course Description:

This course encourages student for project based learning through development of project in applied areas. The course aims to apply acquired skills of software engineering designing. The project also provides experience of working in a team with set target. The project report writing allows student to gain knowledge of technical documentation.

Course Objectives:

1. To provide hands on practice to student to enhance their Programming & designing Skills.
2. To help students to identify and implement relevant technologies for industrial and societal needs.
3. To provide every student the opportunity to get involved either individually or as a group so as to develop team skills and learn professional ethics.
4. To make the analysis and achieve the relevant outcomes for the problem identified.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C308.1	Understand and execute the problem in the form of a project with the understanding of programming & project development cycle.	Apply
C308.2	Use engineering approach, appropriate and newer technology to solve industrial and societal problem.	Apply
C308.3	Explore ideas, discuss, learn professional ethics & communicate in team so as to perform the effective presentations and prepare the documentation work necessary for the project.	Understand
C308.4	Develop skills to transfer acquired knowledge across multidisciplinary environments.	Create

Prerequisite:	Software Engineering, Programming Concepts.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C308.1	2	1	2	1	2	2	2	2	2	2	2	1	1	1	3
C308.2	3	2	2	1	3	3	2	2	2	2	2	1	2	2	3
C308.3	-	-	-	-	-	-	-	3	3	3	2	2	-	-	2
C308.4	-	-	-	-	-	-	-	-	2	1	2	2	-	-	2

Course Content:

The project work can be carried out in teams of three to four; however, evaluation will be carried out on individual contribution to the work. The contributions should clearly bring out the following:

1. Individual evaluation will be considered as per his/ her contributions to the project.
2. Use of industry standard coding practices.
3. After discussion with the guide and finalization of the topic following deliverables are expected under project.
    i. Selecting appropriate domain, problem statement formulation based on real-world problems, industry based problem etc.
    ii. Submit a synopsis after finalization of topic. The synopsis will include description of the project, design of the software, description of problems solved and solution design and conclusions.
4. Continuous assessment will be done as per the progress of project work.

Assessment for ISE (25 Marks)

Assessment	Activity	Schedule	Marks
1.	Group formation and Topic finalization (out of 3-4 topics)	After 15 days from commencement of semester	5
2.	Topic presentation and synopsis submission	After 8 days from commencement of semester	5
3.	40-45% Implementation work (Mid Semester Exam)	After 45 days from commencement of semester	5
4.	70% Implementation work (Progress presentation)	After 75 days from commencement of semester	5
5.	100% Implementation with documentation work (End Semester Exam)	After 90 days from commencement of semester	5

Course Plan

Course Title : Intellectual Property Rights (Mandatory Course-III)	
Course Code : 201CSMC309	Semester : V
Teaching Scheme : L-T-P : 2-0-0	Credits : No Credits
Evaluation Scheme : Not Applicable	ESE Marks : 50

Course Description:

This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws, Trade Marks and issues related to Patents. The overall idea of the course is to help and encourage the students for startups and innovations.

Course Objectives:

1. Understanding, defining and differentiating different types of intellectual properties (IPs) and their roles in contributing to organizational competitiveness.
2. Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.
3. Impart knowledge on intellectual property rights and various regulatory issues related to IPR.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C309.1	Define the importance of Intellectual Property Rights.	Remember
C309.2	Explain the Patents, Searching, filling and drafting of Patents.	Understand
C309.3	Understand the copyright & GI.	Understand
C309.4	Analyze the Trade Mark & Trade Secret.	Analyze

Prerequisite:	Basics of Intellectual Property Rights

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C309.1	-	-	-	-	-	-	-	2	-	-	-	1	-	-	1
C309.2	-	-	-	-	-	-	-	2	-	1	-	1	-	2	2
C309.3	-	-	-	-	-	-	-	2	-	-	-	1	-	-	2
C309.4	-	-	-	-	-	-	-	-	-	-	-	1	-	-	4

Content	Hours
Unit 1: Introduction Intellectual Property Law Basics, Types of Intellectual Property, Agencies Responsible for Intellectual Property Registration, International Organizations, Agencies, and Treaties, The Increasing Importance of Intellectual Property Rights	4
Unit 2: Patents Patents- Patentability Criteria, Types of Patents-Process, Product & Utility Models, Software Patenting and protection, Patent infringement- Case studies- Apple Vs Samsung, Enfish LLC Vs Microsoft, Overview of Patent search-Types of Searching, Public & Private Searching Databases, Basics of Patent Filing & Drafting, Indian Patents Law.	6
Unit 3 :Copy rights Fundamental of copy right, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, notice of copy right	4
Unit 4: Trade Marks Introduction , Purpose and Function of Trademarks ,Types of Marks: Trademarks, Service Marks, Certification Marks, and Collective Marks , Acquisition of Trademark Trademark Selection and Searching - Selecting and Evaluating a Mark , The Trademark Search. **The Trademark Registration Process** - Preparing the Application,Drawing of Mark ,Filing the Application, Docketing Critical Dates, and Initial Role of the U.S. Patent and Trademark Office ,The Examination Process, Post examination Procedure , Registration	6
Unit 5: Trade Secrets Determination of trade secret status, liability for misappropriations of trade secrets, protection for submission **Protection of Industrial Designs & Integrated Circuits:** Industrial Designs – Scope, protection, filing, infringement; Integrated Circuits & Layout design, Semiconductors, Unfair competition, Designs Act.	3
Unit 6: New development of Intellectual Property: Emerging trends in trade mark; copy rights, patent, International overview on intellectual property.	3

Text Books:

1. Intellectual property -the law of trademarks , copyrights, patents and trade secrets by Deborah E. Bouchoux fourth edition (unit 1and 4)
2. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property, Eastern Book Company.

Reference Books:

1. M. M. S. Karki , Intellectual Property Rights: Basic Concepts, Atlantic Publishers
2. Neeraj Pandey & Khushdeep Dharni, Intellectual Property Rights, Phi Learning Pvt. Ltd
3. Ajit Parulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India ltd
4. B. L. Wadehra. Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India
5. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010.

Online Resources:

1. https://mrcet.com/downloads/digital_notes/CSE/II%20Year/INTELLECTUAL%20 PROPERTY%20RIGHTS-NOTES.pdf
2. https://mitmecsept.files.wordpress.com/2018/10/deborah_e- bouchoux_intellectual_property_the_lbookzz-org.pdf
3. https://www.wipo.int/about-ip/en/
4. https://www.wto.org/english/tratop_e/trips_e/intel1_e.htm

Course Plan

Course Title : Information Security	
Course Code : 201CSL310	Semester : VI
Teaching Scheme : L-T-P : 3-0-0	Credits : 3
Evaluation Scheme : : ISE+MSE Marks: 20+30	ESE Marks : 50

Course Description:

This course aims to explore information security through some introductory contents and gain an appreciation of the scope and context around the course. This includes a brief introduction to the principles of cryptography, security services mechanism, network level and system level security concepts. It also explores the features of security services and packages that are practically used/available for different types of OSI/TCP-IP reference models along with relevant tools.

Special focus is expected towards learning non-cryptographic protocol vulnerabilities and taking appropriate precautionary measures against the possible threats and attacks on the end user /network system. The expected outcomes after learning the course are to get awareness and acquire required skills and knowledge for different roles of the career opportunities in the field of information security.

Course Objectives:

1. To introduce the principles of Crypto-Systems.
2. To expose students to various security services and mechanisms used.
3. To make the students aware of the security features of PGP, S/MIME, Digital Signatures, IPSec& SSL.
4. To make the students understand the system level security issues concerning threats, intruders and use of firewalls and trusted systems.
5. To make students to explore key cyber security compliance and industry Standards.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C310.1	Understand principles of Crypto-systems.	Understand
C310.2	Compare and analyze various security services and mechanisms.	Understand
C310.3	Discuss and use the features of PGP, S/MIME, DSA, IPSec, SSL in their profession.	Apply
C310.4	Define precautions of their personal computing system from possible threats and attacks.	Understand
C310.5	Explore key cyber security compliance and industry Standards	Understand

Prerequisite:	Computer Network, Modular Arithmetic &Number Theory, C / C++.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes

(POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C310.1	3	2	-	1	-	-	-	-	-	-	-	-	2	-	2
C310.2	-	1	-	-	-	-	-	-	-	-	-	-	-	1	2
C310.3	-	2	2	1	-	-	-	-	-	-	-	-	1	-	3
C310.4	1	-	1	-	-	-	-	-	-	-	-	-	1	-	2
C310.5	-	2	3	-	-	-	-	-	-	-	-	-	2	-	2

Content	Hours
UNIT 1: The OSI Security Architecture, Symmetric Cipher Models: Substitution Techniques, Transposition Techniques, Block Cipher Principles, The Data Encryption Standard.	6
UNIT 2: Principles of Public-Key Cryptosystems, The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Authentication requirements, Authentication functions, MAC and Hash functions and their requirements,	7
UNIT 3: Digital Signature, Digital Signature Standard, Authentication applications - Kerberos, X.509 Authentication service.	5
UNIT 4: Email Security - PGP, S/MIME, IP Security - IP Security Architecture, Authentication Header and Encapsulating Security Payload.	5
UNIT 5: Web and System Security - Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction, Intruders, Intruder Detection, Password Management, Firewall Design Principles, Trusted Systems.	6
UNIT 6: key cybersecurity compliance and industry Standards-Introduction to GTA, Zero Trust architecture, End Point Security-Introduction, types & examples, SASE: introduction & component of SASE Software Security Software Vulnerabilities: Buffer Overflow, Salami Attack, Format string, cross-site scripting, SQL injection, Malware: Viruses, Worms, Trojans, Logic Bomb, Bots, Rootkits Introduction to Secured Software Development Life Cycle. Case Study on Software Security.	7

Text Books:
1. William Stallings, "Cryptography and Network Security", Pearson Education, (Unit I to V)
2. Bernard Menezes, "Network Security and Cryptography", Cengage Learning, (Unit –VI)

Reference Books:
1. Atul Kahate, "Cryptography and network security", TMGH.
2. Forouzan, "Cryptography and Network Security ",TMGH.
3. Joshi et. al, "Network Security Know it All", Morgan Kaufmann Publisher

Online recourses:

1. **https://www.classcentral.com/course/swayam-cyber-security-13978**
2. **https://onlinecourses.swayam2.ac.in/nou19_cs08/preview**
3. **https://www.coursera.org/browse/computer-science/algorithms**

Course Plan

Course Title: Compiler Design	
Course Code: 201CSL311	**Semester:** VI
Teaching Scheme: L-T-P : 3-0-0	**Credits:** 3
Evaluation Scheme: ISE+MSE Marks: 20+30	**ESE Marks :** 50

Course Description:

The compiler is the programmer's primary tool. Understanding the compiler is therefore critical for programmers, even if they never build one. This course introduces students to the essential elements of building a compiler. It deals with the basic concepts of system programs as well as provides deeper insights into Compiler and its phases. This course will help students to learn about lexical analysis, parsing, semantic analysis, intermediate code generation, code optimization, and code generation.

Course Objectives:

1. To expose the students to the fundamentals of various system programs.
2. To introduce the fundamentals of Compiler and its phases.
3. To design and implement phases of a compiler.
4. To expose the students to various compiler construction tools.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C311.1	Understand the basics of system programs, assemblers, macros, linkers, loaders.	Understand
C311.2	Remember the compiler phases and study compiler construction tools.	Remember
C311.3	Design and implement basic scanner and parser.	Apply
C311.4	Understand and apply syntax-directed translation, intermediate code generation, and target code generation techniques.	Apply
C311.5	Identify appropriate code optimizing transformation for given code and perform the optimizing transformation.	Apply

Prerequisite:	Automata theory, assembly language , high level programming language

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C311.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C311.2	2	-	-	-	2	-	-	-	-	-	-	-	-	-	1
C311.3	2	1	1	-	-	-	-	-	-	-	-	-	2	-	3
C311.4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	3
C311.5	2	2	-	-	-	-	-	-	-	-	-	-	-	-	3

Content	Hours
Unit 1: Language Processors: Introduction, language processing activities, fundamentals of language processing, Language processor development tools: LEX and YACC, compiler construction tools, cousins of the compiler.	**6**
Unit 2: Assemblers, Linkers, and Loaders: Elements of assembly language programming, a simple assembly scheme, pass structure of assemblers, design of a two-pass assembler. **Macros and Macro Pre-Processors:** Macro definition and call, macro expansion, nested macro calls **Linkers & Loaders: Introduction**	**7**
Unit 3: Compilers, Phases of a compiler, role of a lexical analyzer, input buffering, specification and recognition of tokens, finite automata implications.	**5**
Unit 4: Syntax Analysis: Role of parser, top-down parsing, recursive descent and predictive parsers (LL), bottom-up parsing, operator precedence parsing, working of LR parser and introduction to its types SLR, canonical LR, and LALR.	**7**
Unit 5: Syntax Directed Translation and Intermediate Code Generation: Syntax directed definitions, construction of syntax tree, S-attributed definitions, L-attributed definitions, intermediate languages, assignment statements, back patching.	**6**
Unit 6: Code Generation and Code Optimization Issues in the design of a code generator and target machine, basic blocks and flow graphs, a simple code generator, principal sources of optimization, optimization of basic blocks, peephole optimization.	**6**

Text Books:
1. System Programming and operating systems, D. M. Dhamdhere, 2ndEdition (TMGH) (Unit 1,2)
2. Compilers - Principles, Techniques, and Tools A. V. Aho, R. Sethi and J. D. Ullman Pearson Education (Unit 3,4,5,6)

Reference Books:
1. Compiler construction D.M. Dhamdare Mc-Millan
2. Santanu Chattopadhyay, "Compiler Design", PHI Learning Pvt. Ltd., 2015

Online Resources:

1. NPTEL course on Compiler Design
   https://onlinecourses.nptel.ac.in/noc20_cs13/preview

Course Plan

Course Title : Internet of Things	
Course Code : 201CSL312-1	Semester : VI
Teaching Scheme : L-T-P : 3-0-0	Credits : 3
Evaluation Scheme : ISE + MSE Marks : 20 + 30 = 50	ESE Marks : 50

Course Description:

This course teaches a deep understanding of IoT technologies from the ground up. Students will learn IoT device programming like Raspberry Pi, sensing and actuating technologies, IoT protocol stacks like Bluetooth, Zigbee, IEEE 802.15.6; WBANS, NFC, IEEE 802.11 WLAN.

Course Objectives:

1. To learn principles and basic concepts of Internet of Things.
2. To know the basics of RFID, Sensor technologies.
3. To know the basics of IoT sensors and embedded systems.
4. To aware students about wireless communication technologies and IoT applications.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C312-1.1	Understand principles and basic concepts of IoT.	Understand
C312-1.2	Learn and apply RFID technology in various applications.	Apply
C312-1.3	Create basic applications using IoT sensors and embedded systems.	Create
C312-1.4	Understand and implement different communication technologies in IoT systems.	Apply

Prerequisite:	Fundamentals of Computer Network and Internet.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C312-1.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C312-1.2	2	2	-	2	-	-	-	-	-	-	-	-	-	-	3
C312-1.3	2	2	2	2	-	-	-	-	-	-	-	-	-	-	6
C312-1.4	3	2	2	2	-	-	-	-	-	-	-	-	-	-	3

Content	Hours
Unit 1: Introduction to IoT: IoT, Objects / Things, IoT definitions, IoT frame work, Identification technologies, Internet in IoTs.	6
Unit 2: Fundamental of IoT mechanisms: Identification of IoT objects and services, Traffic characteristics, scalability and interoperability, security and privacy, Communication capabilities, Mobility support and device power, Sensor technology, RFID technology and satellite technology.	6
Unit 3: Radio Frequency Identification Technology: RFID, IoT objects and services, principles of RFID, Components of an RFID system, RFID reader, Tags, middleware, Sensor nodes, connecting nodes, networking nodes.	6
Unit 4: IoT Sensors and Embedded Systems: Introduction to IoT sensors and actuators, models of sensors and actuators, common sensors, Introduction to Embedded systems, architecture and application areas of ardiuno, raspberry pi and cortex processors.	6
Unit 5: Communication Technologies: WPAN Technologies: Introduction to IEEE 802.15.4 standard, Bluetooth, Zigbee, IEEE 802.15.6; WBANS, NFC, IEEE 802.11 WLAN, Cellular and mobile technologies.	6
Unit 6: IoT Application Examples: Edge Computing, Smart Metering, advanced metering infrastructure, e-health / Body Area Network, Process Automation, Automotive Application, Environmental Applications, Home Automation, Control Applications.	6

Text Books:
1. Hakima Chaouchi, "The Internet of Things - Connecting objects to the web", Wiley Publications
2. Daniel Minoli, "Building the Internet of Things", Wiley Publications
3. Gareth Halfacree, "Raspberi Pi Beginner's Guide", Raspberi Press
4. Gary J. Mulett, "Introduction to Wireless Telecommunications systems and Networks", Cengage Learning (India Edition).

Reference Books:
1. Sean McManus, Mike Cook, "Raspberry Pi for Dummies", A Wiley Brand
2. Bernd Scholz, Reiter, "Architecting the Internet of Things", Springer

Course Plan

Course Title : Foundation of Artificial Intelligence	
Course Code : 201CSL312-2	Semester : VI
Teaching Scheme : L-T-P : 3-0-0	Credits : 3
Evaluation Scheme : ISE+MSE Marks: 20 + 30	ESE Marks: 50

Course Description:

AI is a part of computer science based on theoretical and applied principles of that field. These principles include the data structures used in knowledge representation, the algorithms needed to apply that knowledge, and the languages and programming techniques used in their implementation.

Course Objectives:

1. Familiarize students with Artificial Intelligence principles and techniques.
2. Introduce the facts of computational model and their applications.
3. Explore problem-solving paradigms, search methodologies and learning algorithms.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C312-2.1	Characterize different types of AI environments, transform a given real world problem to state space problem, understand and identify the stages and issues in the development of expert system.	Apply
C312-2.2	Apply different searching algorithms and heuristic methodologies to reach the goal in state-space problems.	Apply
C312-2.3	Formulate a given real world problem formally using different knowledge representation methods and draw inferences from it.	Apply
C312-2.4	Implement appropriate searching strategies for few real world environments	Apply

Prerequisite:	Knowledge of basic Computer Algorithms

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C312-2.1	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3
C312-2.2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
C312-2.3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	3
C312-2.4	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3

Content	Hours
Unit 1: Introduction: Importance of AI, Evolution of AI, Application of AI, Classification of AI with respect to environment, Intelligent agents, Different type of agents, Expert Systems, Stages in the development of Expert Systems, Difficulties in Developing Expert Systems, Applications of Expert Systems.	4
Unit 2: Representation and Search: The proportional calculus, The predicate calculus, Using inference rules to producepredicatecalculusexpression,Graphtheory,Strategiesforstatespacesearch, Introduction to heuristic search, Hill climbing and dynamic programming, Best first search algorithm, Using heuristics in games.	7
Unit 3: Adversarial Search: Problem solving by Search, Problem space State space, Blind Search-Types, Performance measurement-In formed search strategies, Heuristic functions, Local search strategies-Hill climbing, and simulated annealing.	7
Unit 4: Rule based expert system: Introduction, K rules as knowledge, representation, schemes, Expert system development teams, Structure, Characteristics, Forward chaining and backward chaining inference techniques, Media Advisor: A Demonstration, Conflict resolution, Advantages and disadvantages.	5
Unit 5: Uncertainty management in rule based expert system: Introduction, Basic probability theory, Bayesian reasoning, Forecast, Certainty factors theory and evidential reasoning, Comparison of Bayesian reasoning and certainty	6

factors.	
Unit 6: Machine Learning: Machine learning and deep learning concepts, Tensor Flow-general overview, Installing Tensor Flow, first working session, Data Flow graph, Tensor Flow Programming model, How to use Tensor Board.	7

Text Books:

1. Gorge F Luger, "Artificial Intelligence; structures and strategies for complex problem solving", Pearson Education, 5th Edition. [Units 1, 2, 3 &6]
2. Michael Negnevistsky, "Artificial Intelligence: A guide to intelligent systems", Person Education, 2nd edition. [Units 4, 5]
3. Giancarlo Zaccone, "Getting started with Tensor Flow", Packt Publishing, 2016. [Unit6].

Reference Books:

1. Dan W. Patterson, Introduction to Artificial Intelligence, Pearson Education India, 6 January2015

Online Resources:

1. https://nptel.ac.in/courses/106/102/106102220/
2. https://onlinecourses.nptel.ac.in/noc21_ge20/preview

Course Plan

Course Title : E-Commerce and Digital Marketing	
Course Code : 201CSL313-1	Semester : VI
Teaching Scheme : L-T-P : 3-1-0	Credits : 4
Evaluation Scheme : ISE+MSE Marks: 20 + 30	ESE Marks : 50

Course Description:

This course consists of introductory knowledge of E-commerce, all fundamental terminologies and basic concepts. Also it consists of basic knowledge of digital marketing further it describes online marketplace analysis & macro environment. Digital Marketing Strategy and relationship marketing is also learnt. Finally, this describes Electronic Payment System.

Course Objectives:

1. To get the knowledge about business advantages of E-commerce and digital marketing and its importance.
2. To develop a digital marketing plan and to make SWOT analysis.
3. To introduce various digital channels and business tools in social networking.
4. To understand the website and search engine optimization.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C313-1.1	Identify the importance of the e-commerce and digital marketing for successful business.	Understand
C313-1.2	Create a digital marketing plan with SWOT analysis and a target group.	Apply
C313-1.3	Identify digital channels and business tools used in social networking.	Understand
C313-1.4	Demonstrate the optimization of web site using business tools.	Apply

Prerequisite:	Knowledge of social media channels.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C313-1.1	2	2	-	-	2	-	-	-	-	-	1	1	-	2	2
C313-1.2	2	2	2	-	-	-	-	-	-	-	-	-	-	2	3
C313-1.3	1	-	1	-	2	-	-	-	-	-	-	-	-	1	2
C313-1.4	1	1	1	-	-	-	-	-	-	-	1	1	-	2	3

Content	Hours
UNIT 1: Introduction to E-commerce, frameworks & architectures Introduction, the term E-Commerce, Business models related to E-Commerce, Technical and economic challenges, Frameworks and architectures, Actors and stakeholders, Fundamental sales process, Technological elements.	4
UNIT 2: Business models of E – Commerce Business to Business, Business to customers, Customers to Customers, Business to Government, Business to Employee, E – Commerce strategy, Influencing factors of successful E– Commerce, Digital Signatures.	5
UNIT 3: Introduction to Digital Marketing How digital technologies transformed marketing?, Definitions- digital marketing and multichannel marketing- Paid, owned and earned media, the growing range of digital marketing platform, digital marketing strategy-key features of digital marketing strategy, applications of digital marketing, benefits of digital marketing, alternative digital business models, difference between e-commerce and e-business, challenges in developing and managing digital marketing strategy	6
UNIT 4: Online marketplace analysis & macro environment Introduction, situation analysis for digital marketing, the digital marketing environment, understanding customer journeys, online consumer behaviour and implications for marketing, business models for e-commerce, Online macro environment, technological forces, economic forces, political forces, Legal forces, social forces and culturalforces	8
UNIT 5: Digital Marketing Strategy and relationship marketing	

Digital Marketing strategy development, how to structure digital marketing strategy, strategy implementation, relationship marketing using digital platforms, the challenge of customer engagement, customer lifecycle management, Marketing Communications using digital media channels: Introduction, search engine marketing	**6**
UNIT 6: Electronic Payment System Introduction , Online payment Systems, prepaid and post-paid payment systems, e–cash, e– cheque, Smart Card, Credit Card , Debit Card, Electronic purse , Security issues on electronic payment system, Solutions to security issues, Biometrics and types of biometrics, Legal and ethical issues in E– Commerce, Security issues in E–Commerce, Regulatory framework of E– commerce.	**7**

List of Assignments			
Ass. No.	**Name of Assignment**	**S/O**	**Hours**
1.	Define a target group (working in groups)	O	1
2.	Creating web sites, MS Expression (working in groups)	O	1
3.	Writing the SEO content (working in groups)	O	1
4.	Google Ad Words (working in groups)	O	1
5.	CRM strategy (working in groups)	O	1
6.	Make a video and upload to YouTube	O	1
7.	Google Map on Places for Business	O	1
8.	Understanding Plagiarism Checker tools	S	1
9.	Develop a Face book Customized Page	O	1

❖ **S-STUDY, O-OPERATIONAL**
❖ **Note:** Form a group of 4-5 students in a batch for tutorial number 1-5.
   Tutorial Number 6-9 should be done by individuals.

Text Books:
1. Martin Kutz. & bookboon.com, "Introduction to E-commerce: Combining Business &

Information Technology" 1ˢᵗ Edition, (2016), (Unit 1, 2).

2. Dave Chaffey, Fiona Ellis-Chadwik , "Digital Marketing: Strategy, Implementation and Practice", Pearson Education , 6ᵗʰ Edition (Unit 3,4,5, 6).

Reference Books:

1. Pulizzi, J, "The Beginner's Guide to Digital Marketing ", Epic Content Marketing, McGraw Hill Education, (2015).
2. Jeffrey F Rayport and Bharat Bhasker, "Electronic Commerce", Tata McGraw Hill.
3. Turban, Efraim, and David King, "Electronic Commerce: A Managerial Perspective", 2010, Pearson Education Asia, Delhi.
4. Romuald Andrade, "Beginners Guide To Digital Marketing: How To Flood Your Website With Traffic In 30 Days" ,(2015).

Online Resources:

1. https://bookboon.com/en/introduction-to-e-commerce-ebook
2. https://bcw-global.com/genesisbcw/case-studies/world-food-india
3. https://www.makeinindia.com/article/-/v/world-food-india-2017-event-highlights

Course Plan

Course Title : Python Programming	
Course Code : 201CSL313-2	Semester : V
Teaching Scheme : L-T-P : 3-1-0	Credits : 4
Evaluation Scheme : ISE+MSE Marks : 20+30	ESE Marks : 50

Course Description:

Python is a high-level programming language that helps in developing a wide variety of applications, including web applications, network programming, graphical user interfaces (GUIs), scientific and numeric applications. It also has a strong community around machine learning, data modeling, data analysis and artificial intelligence (AI), with extensive resources and libraries built for these purpose.

Course Objectives:

1. To make the student learn basics of python programming language..
2. To expose the students to various data structures.
3. To make the students aware of various Object Oriented concepts.
4. To expose the students to advanced concepts in Python

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C313-2.1	Understand the basic concepts in python.	Understand
C313-2.2	Identify the data structures to solve a problem.	Apply
C313-2.3	Demonstrate the use of Object Oriented concepts in problem solving.	Apply
C313-2.4	Implement the programs using advanced Python libraries like pandas, numpy, matplotlib	Apply

Prerequisite:	Knowledge of any programming language like C/C++

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C313-2.1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
C313-2.2	3	2	2	-	-	-	-	-	-	-	-	-	-	-	3
C313-2.3	3	2	2	-	-	-	-	-	-	-	-	-	-	-	3
C313-2.4	1	2	2	2	1	-	-	-	-	-	-	-	1	-	3

Content	Hours
Unit 1: Getting Started with Python: Python Installation, first python program, Python on different OS, Running python program on terminal, input() function.	2
Unit 2: Variables and Simple Data Types: Variables, Stings, Numbers, Comments, introduction to list, tuples and dictionaries.	4
Unit 3: Conditional Statements, Loops and Functions in Python: Conditional test, if statements, using if statements with lists, functions, passing arguments, return values, passing list, Exceptions, storing data. File handling	8
Unit 4: Lists, Tuples, Sets and Dictionaries in Python: List, Changing, adding and removing elements from list, organizing a list, looping through an entire list, avoiding indentation error, making numerical list, working with part of a list, tuples, while loop, using while loop with list and dictionary. working with dictionaries, looping through a dictionary, nesting.	8
Unit 5: Advanced Python: Introduction to Django, Installation, Creation of local server, projects and apps using Django, database connectivity in Django .Introduction to tkinter for GUI	8
Unit 6: Advanced Python Libraries: Introduction to python libraries - Numpy, Pandas, Matplotlib	6

List of Assignments			
Ass. No.	Name of Assignment	S/O	Hours
1	Installation of Python , Jupyter Notebook	O	1
2	Exploring basics of python like data types, input output and strings	O	1
3	Program for Implementation of control statements and branch statement	O	1
4	Program for Implementation of list, tuples and dictionaries.	O	1
5	Program for implementation of Creating functions and lambda function	O	1
6	Program for implementation of File handling	O	1
7	Program for implementation of classes and objects , constructors and	O	1

	destructors		
8	Program for implementation of inheritance.	O	1
9	Program for implementation of polymorphism.	O	1
10	Implementation of Array operations using Numpy.	O	1
11	Implementation of data Operation in Pandas.	O	1
12	Implementations of Different graphs in Matplotlib.	O	1

Text Books:

1. "Python Crash Course- a Hands-On Project Based Introduction to Programming", Eric Matthes, No starch press, San Francisco.

Reference Books:

1. "Learn Python", Mark Lutz, 4th Edition, O'REILLY Publication.
2. "Think Python", Allen B. Downey, 2nd Edition, O'REILLY Publication.

Online Resources:

1. https://nptel.ac.in/courses/106/106/106106182
2. https://www.python.org/

Course Plan

Course Title : Web Technology Laboratory	
Course Code : 201CSP314	**Semester :** VI
Teaching Scheme : L-T-P : 2-0-4	**Credits :** 4
Evaluation Scheme : ISE Marks : 25	**ESE-POE Marks :** 50

Course Description:

This course provides the knowledge about creation of static, dynamic and interactive web application with the help of HTML, CSS, JavaScript and PHP. These technologies can be used for developing the client-side, server-side web pages for their specific web applications. The course also includes designing of own structure with the help of XML and related technologies applied in various domains. This course will help to gain the skills and project-based experience needed for entry into web application and development careers.

Course Objectives:

1. To introduce front end web designing concepts and tools.
2. To expose the students with different XML concepts and its applications.
3. To build the foundations of client side scripting languages and validation techniques.
4. To develop real life web applications using HTML and PHP.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C314.1	Understand front end web designiung techniques and develop the web applications.	Apply
C314.2	Use the different XML concepts for building the XML structure.	Apply
C314.3	Apply the knowledge of JavaScript, React for designing and validating the application.	Apply
C314.4	Create the web application to solve the real life problems using HTML and PHP	Create

Prerequisite:	Basic knowledge of C programming and object oriented programming

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C314.1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3
C314.2	3	-	2	-	-	-	-	-	-	-	-	-	-	-	3
C314.3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	3
C314.4	3	2	3	-	2	-	-	-	2	-	-	-	2	-	6

Content	Hours
Unit 1: HTML and CSS HTML Structure, XHTML, DOCTYPE, Header Elements, Conditional Style Sheet, Structural Block Elements, Terminal Block Elements, Multipurpose Block Elements, Inline Elements, Class and ID Attributes, HTML Tags. CSS Selector: Type, Class and ID Selector, Position and Group Selectors, Attribute Selectors, Pseudo-element Selectors, Pseudo-class Selectors.	3
Unit 2: XML Basics The benefits of XML, What XML, Portable Data, How XML Works, XML Documents and XML Files, Elements, Tags and Character Data, Attributes, XML Names, References, CDATA Sections, Comments, Processing Instructions, The XML Declaration, Checking Documents for well-formedness.	3
Unit 3: XMLT and XPath XML Transformations**:** An example input document, xsl:stylesheet and xsl:transform, stylesheet Processors, Templates and Template Rules, Calculating the value of an Element with xsl:value-of, Applying Templates with xsl:apply-templates, The Built-in Template Rules, Modes, Attribute Value Templates, XSLT and Namespaces, Other XSLT Elements. XPath : The Tree Structure of an XML Document, Location Paths, Compound Location Paths, Predicates, Unabbreviated Location Paths, General Xpath Expressions, Xpath Functions.	5
Unit 4: JavaScript Introduction to JavaScript, Basic program of JavaScript, variables, functions, conditions, loops and repetition, Arrays, Objects, Exceptions, Event handling In JavaScript, Validating	4

HTML form data using JavaScript.			
Unit 5: React Introducing React, Building Your First React App, Components in React, Styling in React.		3	
Unit 6: PHP- Hypertext Pre-processor PHP Basics, Data Types, Identifiers, Variables, Constants, Expressions, and Control Structures, Functions, Array, array functions, Classes and Objects, State Management: what Is Session Handling, Working with Sessions, Examples, PHP cookies, Uploading Files with _FILES, Interacting with the Database with MySqli, Executing Database Transactions.		7	

List of Assignments			
Ass. No.	**Name of Assignment**	**S/O**	**Hours**
1	Design and develop website using HTML.	O	4
2	Develop an application for demonstrating use of CSS in HTML.	O	2
3	Study and implementation of XML.	S	2
4	Implementation of student application using XSLT and conditional statement.	O	4
5	Implementation of XPATH language expression for employee application.	O	2
6	Write a JavaScript that displays text with increasing font size in the interval of 100ms in red colour.	O	2
7	Write a JavaScript to design a simple calculator.	O	4
8	Develop an application for demonstrating use of React.	O	2
9	Study of PHP basics along with different modern tool installation and configuration.	S	2
10	Implementation of PHP array with different functions.	O	2
11	Implementation object-oriented concepts in PHP.	O	2
12	Implementation of form and extract the user input using $_GET or $_POST	O	2
13	Design and develop an application for uploading various types of files using PHP.	O	2
14	Design and develop a program for storing and retrieving the information from	O	4

	session and cookies using PHP.		
15	Design and develop an application for handling different database operations (Insert, Update, Display) using PHP.	O	4
16	Design and develop the mini project for solving the different real time problems using web Technologies in the group of 4-5 students	O	8

❖ **S-STUDY, O-OPERATIONAL**

Note:

- **The instructor may choose minimum 15 assignments from assignment no. 1 to 16.**
- **Assignment no. 8 and 16 are mandatory.**

Text Books:
1. Michael Bowers, Dionysios Synodinos and Victor Sumner, "Pro HTML5 and CSS3 Design Patterns" , Apress edition – **Unit 1**
2. Atul Kahate, " XML and Related Technologies", Pearson – **Unit 2, 3**
3. Douglas Crockford , "JavaScript: The Good Parts", O'Reilly – **Unit 4**
4. Kirupa Chinnathambi, "Learning React", Paperback – **Unit 5**
5. W. Jason Gilmore, "Beginning PHP and MySQL: From Novice to Professional", Fourth Edition – **Unit 6**

Reference Books:
1. Elliotte Rusty Harold, W. Scott Means, "XML in a Nutshell", O'Reilly Publication, 3rd Edition

Online Resources:
1. http://www.php.net
2. https://www.w3schools.com

Course Plan

Course Title : Technical Communication	
Course Code : 201CSP315	Semester : VI
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks : 25	ESE- OE Marks :25

Course Description:

Technical communication is the transfer of information and understanding from one person to another person. It is a way of reaching others with facts, ideas, thoughts and values. Without technical communication, official interaction may not be possible because human interaction is essentially communicative interaction. This course provides Mastering of Technical Communication, Organization in Technical Communication, Styles in Technical Communication, Professional Speaking, Presentation skills and Comprehension of Technical Materials.

Course Objectives:

1. To create a skill set among the engineering students for their technical communication at their work place.
2. To become self-confident, industry ready fresher by mastering Styles in Technical Communication and Comprehension of Technical Materials.
3. To learn to distinguish general and technical communication.
4. To learn the process of dynamic interactive process to develop the information and understanding required for effective group functioning.
5. To understand, design, develop and present various Information Management System strategies appropriately.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C315.1	Learn to make dyanmic interchange of scientific and technical aspects.	Create
C315.2	Bring his/her perspective knowledge and ideas into focus for the audience.	Apply
C315.3	Be good technical writers or speakers to structure information in technical document or presentation.	Create
C315.4	Observe accuracy of information as well as accuracy of expression.	Apply
C315.5	Understand and implement ethics by avoiding hasty generalizations, provocative language, and racist language while referring in a group of people.	Apply
C315.6	Be successful in a job interview depends on knowledge and confidence, good speaking skills, thorough preparation and use of appropriate interview strategies.	Apply

Prerequisite:	English grammar and phonics, Basics of LSRW, Basic writing skills like Letter writing, Dialogue writing and Paragraph writing, SWOT analysis, Group speaking skills.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C315.1	-	-	-	-	-	3	-	3	3	3	3	-	-	-	6
C315.2	-	-	-	-	-	3	-	3	3	3	-	-	-	-	3
C315.3	-	-	-	-	-	3	-	3	3	3	3	-	-	-	6
C315.4	-	-	-	-	-	3	-	3	3	3	-	-	-	-	3
C315.5	-	-	-	-	-	3	-	3	3	3	-	-	-	-	3
C315.6	-	-	-	-	-	3	-	3	3	3	-	-	-	-	3

Content	Hours
Unit 1: Mastering of Technical Communication: Channels of communication-Downward, Upward, Horizontal and Diagonal Communication, Forms of Technical Communication	4
Unit 2: Organization in Technical Communication: Introduction, Spatial Organization, Chronological Organization, General to Specific Organization, Order of increasing and decreasing importance.	4
Unit 3: Styles in Technical Communication: ABC of Technical Communication-Accuracy Brevity and Clarity, Objectivity in Technical Communication.	4
Unit 4: Professional Speaking: Interview process**,** Characteristics of job interview, Pre-interview preparation technique- Self Analysis, Analyze Your Skills, Research The Organization, Job Analysis, Develop Interview File, Interview Questions And Answering Strategies.	4

Unit		Hours
Unit 5: Presentation skills: Nature of Presentation, Planning the Presentation- Define and Analyse the Purpose, Audience and Occasion; Preparing the Presentation- Develop Central and Main Idea, Organizing Your Presentation.		4
Unit 6: Comprehension of Technical Materials: SQ3R Reading Technique, Reading Instructions and Technical Manuals, Reading and Interpreting Graphic Information, Reading Practice.		4

List of Assignments			
Ass. No.	**Name of Assignment**	**S/O**	**Hours**
1	Work Ethics (Organizational Etiquettes and Body Language Etiquettes)	O	2
2	Conduction of Team Meetings	O	2
3	Project Report writing	O	2
4	Technical Paper writing	O	2
5	Technical paper presentation	O	2
6	Job application writing	O	2
7	Conference paper writing / study recent paper	O	2
8	Research on an IT industry and write a report	O	2
9	Pre-interview preparation	O	2
10	Develop interview file	O	2
11	Interview process through play	O	2
12	Write a Movie review	O	2
13	Presentation on KPO	O	2

❖ **S-STUDY, O-OPERATIONAL**

Text Books:
1. M. Ashraf Rizvi, "Effective Technical Communication", McGraw Hill Education, 2018.
2. Krishna Mohan and Meera Banerji- Developing Communication Skills by MacMillan India Ltd., Delhi.
3. Barun K. Mitra- Personality Development & Soft Skills, Oxford Publishers, Third Impression, 2017

Reference Books:

1. Essentials of Effective Communication, Ludlow and Panthon; Prentice Hall of India.
2. Simon Sweeney―English for Business Communication, Cambridge University Press, ISBN13:978-0521754507.
3. Shalini Verma- Development of Life Skills and Professional Practice, First Edition; Sultan Chand (G/L) & Company, 2014.
4. Priyadarshi Patnaik- Group Discussions and Interview Skills, Cambridge University Press.

Online Resources:

https://ve-iitg.vlabs.ac.in/Communication%20Skill.html

Course Plan

Course Title : Information Security Laboratory	
Course Code : 201CSL316	Semester : VI
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks : 25	ESE-POE Marks : Not Applicable

Course Description:

This course aims to give practical exposure on basic security attacks, encryption algorithms, and authentication techniques. Apart from security algorithms, digital signature, e-commerce applications and network security system using open source tools is also introduced.

Course Objectives:

1. To Develop code for classical Encryption Techniques to solve the problems.
2. To Build cryptosystems by applying symmetric and public key encryption algorithms.
3. To Construct code for authentication algorithms.
4. To Develop a signature scheme using Digital signature standard.
5. To demonstrate the network security system using open source tool

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C316.1	To develop code for classical Encryption Techniques to solve the problems	Apply
C316.2	To Build cryptosystems by applying symmetric and public key encryption algorithms	Apply
C316.3	To Construct code for authentication algorithm	Analyze
C316.4	To Develop a signature scheme using Digital signature standard	Apply
C316.5	To Demonstrate the network security system using open source tools	Analyze

Prerequisite:	Computer Network, Modular Arithmetic &Number Theory, C / C++.

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C316.1	3	-	3	-	2	-	-	-	-	-	-	-	-	2	3
C316.2	-	3	-	-	2	-	-	-	-	-	-	-	-	2	3
C316.3	-	3	-	1	1	-	-	-	-	-	-	-	-	2	4
C316.4	-	-	-	2	-	-	-	-	-	-	-	-	-	2	3
C316.5	-	-	-	2	-	-	-	-	-	-	-	-	-	2	4

List of Assignments			
Ass. No.	**Name of Assignment**	**S/O**	**Hours**
1	GCD Using Euclidean algorithm/Computing Multiplicative inverses/ Prime number and modular arithmetic operations.	O	2
2	Substitution/Transposition/ Product Cipher and their Analysis	O	2
3	Single round of DES algorithm/Double DES/ Triple DES and its analysis	O	2
4	RSA Algorithm to provide Confidentiality and Authentication services or any other Public-Key Algorithm.	O	2
5	Daffier–Hellman or any other key exchange Algorithm.	O	2
6	Implementation and use of any authentication functions / algorithm.	O	2
7	Generation and use of Digital Signature for real world situation.	O	2
8	Usage of PGP security package and S/MIME features.	O	2
9	Experimenting with SSL/TLS/E-Commerce Applications and identifying their Vulnerabilities.	O	2
10	Demo and usage of network traffic analysis tools.	O	2
11	Experimentation on identifying non-cryptographic Protocol Vulnerabilities and remedies thereon.	O	2
12	Experimenting on identifying software Vulnerabilities using various tools/techniques and their analysis.	O	2
13	Any other 4 Implementation/Demo/Experimentation based on the topics of syllabus.	O	2

❖ **S-STUDY, O-OPERATIONAL**

❖ **Note: The instructor may choose minimum 10 experiment from experiment No 1 to 12 & Experiment No 1 & 13 are mandatory**

Text Books:
1. William Stallings, "Cryptography and Network Security", Pearson Education.
2. Bernard Menezes, "Network Security and Cryptography", Cengage Learning.

Reference Books:
1. Security in Computing, Fourth Edition, by Charles P. Pfleeger, Pearson Education
2. Cryptography and Network Security Principles And Practice, Fourth or Fifth Edition,

William Stallings, Pearson
3. Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall.
4. Network Security Essentials: Applications and Standards, by William Stallings. Prentice Hall.

Online recourses:
1. **https://nptel.ac.in/courses/106106129**
2. **https://nptel.ac.in/courses/106106141**
3. **https://onlinecourses.swayam2.ac.in/cec21_cs14/preview**
4. **https://www.vlab.co.in/board-area-computer-science-and-engineering**

Course Plan

Course Title : Compiler Design Laboratory	
Course Code : 201CSP317	Semester : VI
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks : 25	ESE-POE Marks: NA

Course Description:

Compiler Design lab teach students how application programs work. Performing this lab gives both theoretical and practical knowledge of phases of compilers. Every computer programmer can do much better if he /she have knowledge of compilers apart from the domain and technical knowledge. Compiler design lab provides deep understanding of how programming language syntax, semantics are used in translation and also observe functioning of various compiler generation tools like LEX, YACC.

Course Objectives:

1. To make students know various language processors and their working.
2. To implement various parsing techniques.
3. To implement intermediate and target code generation techniques.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C317.1	Design and develop various phases of compiler and assembler.	Understand
C317.2	Use compiler construction tools like LEX & YACC.	Apply
C317.3	Implement various parsing techniques.	Apply
C317.4	Apply the concepts of intermediate code generation and target code generation.	Apply

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes

COs	POs												PSOs		BTL
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	
C317.1	3	2	2	-	-	-	-	-	-	-	-	-	1	-	2
C317.2	-	-	2	-	1	-	-	-	-	-	-	-	-	-	3
C317.3	3	2	2	-	-	-	-	-	-	-	-	-	1	-	3
C317.4	2	2	2	-	-	-	-	-	-	-	-	-	-	-	3

List of Assignments			
Ass. No.	**Name of Assignment**	**S/O**	**Hours**
1	Implement lexical analyzer to produce tokens for C program.	O	2
2	Write a program to generate symbol table for simple C program.	O	2
3	Implement Pass I of a two pass assembler (Front End).	O	2
4	Design of pre-processor for C program.	O	2
5	Design and implement recursive descent parser for the given grammar.	O	2
6	Implementation of operator precedence parser using precedence table and stack.	O	2
7	Write a program to calculate FIRST and FOLLOW.	O	2
8	Implementation of LR Parser for the given grammar.	O	2
9	Write a program to implement bottom up parsing.	O	2
10	Write a program to generate three address codes.	O	2

❖ **S-STUDY, O-OPERATIONAL**
❖ **Note: The instructor should take all ten experiments from list.**

Text Books:
1. System Programming and operating systems, D. M. Dhamdhere, 2nd Edition (TMGH)
2. Compilers - Principles, Techniques, and Tools A. V. Aho, R. Sethi and J. D. Ullman Pearson Education

Reference Books:
1. Compiler Design – Shantanu Chattopadhyay, PHI Learning

Online Resources:
http://vlabs.iitb.ac.in/vlabsdev/vlab_bootcamp/bootcamp/system_deligators/labs/exp2/simulation.php

Course Plan

Course Title : PROJECT-III	
Course Code : 201CSP318	Semester : VI
Teaching Scheme : L-T-P : 0-0-2	Credits : 1
Evaluation Scheme : ISE Marks : 25	ESE-POE Marks : 50

Course Description:

The course aims to create awareness amongst students to explore literature review through Research paper. This course is targeted to apply acquired skills of engineering concept in the real world domain. Also provides experience of working in a team so as to achieve the project objectives. During the work the students will utilize modern techniques, methods and approaches for system and product development.

Course Objectives:
1. To develop the ability to solve a specific problem right from its identification and literature review till the successful innovative solution of the same.
2. To develop systematic vision and skills to compare the outcomes with other techniques used previously.
3. To train the students in preparing project documentation.
4. To help the students to explore their ideas in team so as to progressively achieve the relevant output.

Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

	COs	BTL
C318.1	Apply appropriate technology and make use of tools to address the identified problems using engineering principles and arrive at innovative solutions.	Apply
C318.2	Implement a project and acquire skills to compare their results with previous work.	Apply
C318.3	Comprehend and write reports, design documentation and make effective presentation of progressive work.	Understand
C318.4	Work in a team with professional ethics so as to perform project activity.	Apply

Prerequisite:	Software Engineering, Programming Concepts.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):

COs	POs												PSOs		BTL
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
201CSP318.1	2	-	2	2	3	2	1	1	2	2	2	1	2	3	3
201CSP318.2	2	2	2	2	3	2	1	2	2	2	2	1	2	-	3
201CSP318.3	-	-	-	-	-	-	-	2	3	3	-	2	-	-	2
201CSP318.4	-	-	-	-	-	-	-	3	3	2	1	2	-	-	3

Course Content:

1. Can be group project, with a maximum of 3 to 4 students.

2. Individual contribution to the project should be judge.

3. Identification of real life problems with literature review into consideration.

4. Minimum of two hours per week as a team activity.

5. Appropriate engineering methodologies to be utilized to solve the identified issue.

6. Consolidated report to be submitted for assessment.

7. Participation, involvement and contribution in group discussions during the contact hours will be used as the evaluation for the continuous assessment.

8. Evaluation for ISE, MSE, ESE is done by checking the progress of project through presentations.

9. Project outcome to be evaluated in terms of technical, social and environmental need.

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