



**PUNE VIDYARTHI GRIHA'S  
COLLEGE OF ENGINEERING AND TECHNOLOGY, PUNE-9  
(AFFILIATED TO UNIVERSITY OF PUNE, PUNE)**

**DEPARTMENT OF COMPUTER ENGINEERING**

**CURRICULUM BOOK**

**ACADEMIC YEAR: 2019-20**

**FOR THE PROGRAMME  
T.E.(COMPUTER ENGINEERING)**



**PUNE VIDYARTHI GRIHA'S**

**COLLEGE OF ENGINEERING AND TECHNOLOGY**

#### **VISION**

**TO ACHIEVE EXCELLENCE IN ENGINEERING EDUCATION**

#### **MISSION**

- To satisfy all stakeholders
- To develop ethical, highly motivated engineering professionals with good human values, requisite skills and competencies
- To adopt innovative teaching mechanisms
- To promote research culture
- To contribute to country's economic development
- To be responsive to changes in technology, socio-economic and environmental conditions

**Department of Computer Engineering**

**Vision of the Department**

To empower students to meet challenges of 21<sup>st</sup> century by imparting quality education in Computer Engineering

**Mission**

- 1) To impart knowledge through innovative teaching-learning process to cater the needs of industries and higher education
- 2) To inculcate good human values, professional competencies and create awareness about global technologies in the field of Computer Engineering

**PEOs**

**The students of Computer engineering after passing out should**

**PEO1.** Graduates of the program will possess strong fundamental concepts in engineering science and Technology to address future challenges of Computer Engineering.

**PEO2.** Possess knowledge and skills in the field of Computer Science and Engineering for solving engineering problems with innovative approaches

**PEO3.** Possess behavioral aspects for research, entrepreneurship and higher studies in the field of Computer Science & Information Technology.

**PEO4.** Have commitment to ethical practices, societal contributions through communities and life-long learning.

**PEO5.** Possess better interpersonal and presentation skills leading to responsible & competent professionals at global level.

**POs:**

The students in the CSE program will attain: (Course Objectives)

1. an ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, and engineering and technology;
2. an ability to identify a problem and provide a systematic solution by conducting experiments, as well as analyzing and interpreting the data;
3. an ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints;
4. an ability to identify, formulate, and provide systematic solutions to complex engineering problems and validate the solution;
5. an ability to use the techniques, skills, modern engineering tools and technologies necessary for practice as a IT professional;
6. an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems with necessary constraints and assumptions;
7. an ability to analyze the local and global impact of computing on individuals, organizations and society;
8. an ability to understand professional, ethical, legal, security and social issues and responsibilities;
9. an ability to function effectively as an individual or as a team member to accomplish a desired goal(s) in multidisciplinary environment;
10. an ability to engage in life-long learning and continuing professional development to cope up with fast changes in the technologies/tools with the help of open electives, professional organizations and extra-curricular activities;
11. an ability to communicate effectively in engineering community at large by means of effective presentations, report writing, paper publications, demonstrations;
12. an ability to understand engineering, management, financial aspects, performance, optimizations and time complexity necessary for professional practice;
13. an ability to apply design and development principles in the construction of software systems of varying complexity.

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Savitribai Phule University of Pune  
Third Year Computer Engineering (2015 Course)  
(with effect from 2017-18)

Semester I

Course Code	Course	Teaching Scheme			Examination Scheme and Marks						Credit	
		Hours / Week			In-Sem	End-Sem	TW	PR	OR	Total	TH/ TUT	PR
		Theory	Tutorial	Practical								
310241	<a href="#">Theory of Computation</a>	03	--	--	30	70	--	--	--	100	03	--
310242	<a href="#">Database Management Systems (DBMS)</a>	03	--	--	30	70	--	--	--	100	03	--
310243	<a href="#">Software Engineering &amp; Project Management</a>	03	--	--	30	70	--	--	--	100	03	--
310244	<a href="#">Information Systems &amp; Engineering Economics</a>	03	--	--	30	70	--	--	--	100	03	--
310245	<a href="#">Computer Networks (CN)</a>	04	--	--	30	70	--	--	--	100	04	--
310246	<a href="#">Skills Development Lab</a>	--	02	04	--	--	50	--	50	100	02	02
310247	<a href="#">DBMS Lab</a>	--	--	04	--	--	25	50	--	75	--	02
310248	<a href="#">CN Lab</a>	--	--	02	--	--	25	50	--	75	--	01
Total Credit											18	05
Total		16	02	10	150	350	100	100	50	750	23	
310249	<a href="#">Audit Course 3</a>										Grade	

310249-Audit Course 3 (AC3) Options:

**AC3-I:** Cyber Security

**AC3-II:** Professional Ethics and Etiquettes

**AC3-III:** Emotional Intelligence

**AC3-IV:** MOOC- Learn New Skills

**AC3-V:** Foreign Language (Japanese- Module 3)

**Abbreviations:**

**TW:** Term Work   **TH:** Theory

**OR:** Oral

**TUT:** Tutorial

**PR:** Practical

**Sem:** Semester

TE COMPUTER

Semester I

Theory of Computation

Course Title:	Theory Of Computation	Course Number: 310241	
Designation of Course	Professional Core		
Teaching Scheme: 3 Hours/Week		Laboratories: -	
Course Assessment Methods	Direct methods	Theory Examination In Sem:30 Marks	Theory Examination End Sem:70 Marks
	Indirect Methods	Assignments, Class Test	
Prerequisites	Discrete Mathematics (210241), Principles of Programming Languages (210254)		
Introduction of Course: This course comprises of Study of computing machines by describing, classifying and comparing different types of computational models. The course encourages students to study & develop fundamentals for 'Computational Theory'.			
Course Objectives			
1	To Study abstract computing models		
2	To learn Grammar and Turing Machine		
3	To learn about the theory of computability and complexity.		
Course Outcomes			
CO1	Design deterministic Finite Automata, Context Free Grammar, Push down Automata, Turing machine for required inputs and outputs		
CO2	subdivide problem space based on input subdivision using constraints		
CO3	apply linguistic theory		
Course Contents			
Unit-I	Formal Language Theory and Finite Automata		
	Introduction to Formal language, introduction to language translation logic, Essentials of translation, Alphabets and languages, Finite representation of language, Finite Automata (FA): An Informal Picture of FA, Finite State Machine (FSM), Language accepted by FA, Definition of Regular Language, Deterministic and Nondeterministic FA(DFA and NFA), epsilon- NFA, FA with output: Moore and Mealy machines - Definition, models, inter-conversion. Case Study: FSM for vending machine, spell checker		
Unit-II	Regular Expressions (RE)		
	Introduction, Operators of RE, Building RE, Precedence of operators, Algebraic laws for RE, Conversions: NFA to DFA, RE to DFA Conversions: RE to DFA, DFA to RE Conversions: State/loop elimination, Arden’s theorem Properties of Regular Languages: Pumping Lemma for Regular languages, Closure and Decision properties. Case Study: RE in text search and replace		
Unit-III	Context Free Grammars (CFG) and Languages		
	Introduction, Regular Grammar, Context Free Grammar- Definition, Derivation, Language of grammar, sentential form, parse tree, inference, derivation, parse trees, ambiguity in grammar and Language- ambiguous Grammar, Simplification of CFG: Eliminating unit productions,		



	useless production, useless symbols, and $\epsilon$ -productions, <b>Normal Forms-</b> Chomsky normal form, Greibach normal form, Closure properties of CFL, Decision properties of CFL, Chomsky Hierarchy, <b>Application of CFG:</b> Parser, Markup languages, XML and Document Type Definitions. Case Study- CFG for Palindromes, Parenthesis Match		
<b>Unit-IV</b>	<b>Turing Machines (TM)</b>		
	Turing Machine Model, Representation of Turing Machines, Language Acceptability by Turing Machines, Design of TM, Description of TM, Techniques for TM Construction, Variants of Turing Machines, The Model of Linear Bounded Automata , TM & Type 0 grammars, TM's Halting Problem.		
<b>Unit- V</b>	<b>Pushdown Automata(PDA)</b>		
	Basic Definitions, Equivalence of Acceptance by Finite State & Empty stack, PDA & Context Free Language, Equivalence of PDA and CFG, Parsing & PDA: Top-Down Parsing, Top-down Parsing Using Deterministic PDA, Bottom-up Parsing, Closure properties and Deterministic PDA.		
<b>Unit-VI</b>	<b>Undecidability &amp; Intractable Problems</b>		
	A Language that is not recursively enumerable, An un-decidable problem that is RE, Post Correspondence Problem, The Classes P and NP : Problems Solvable in Polynomial Time, An Example: Kruskal's Algorithm, Nondeterministic Polynomial Time, An NP Example: The Traveling Salesman Problem, Polynomial-Time Reductions NP Complete Problems, An NP-Complete Problem: The Satisfiability Problem, Tractable and Intractable, Representing Satisfiability, Instances, NP Completeness of the SAT Problem, A Restricted Satisfiability Problem: Normal Forms for Boolean Expressions, Converting Expressions to CNF, The Problem of Independent Sets, The Node-Cover Problem.		
<b>Text Books</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publication</b>
T1	John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman	Introduction to Automata Theory Languages and Computation	Addison-Wesley, ISBN 0-201-44124-1.
T2	H.L. Lewis, Christos H. Papadimitriou,	Elements of the Theory of Computation	Prentice Hall, ISBN-10: 0132624788; ISBN-13: 978-0132624787
<b>Reference Books</b>			
R1	John Martin	Introduction to Languages and The Theory of Computation	2nd Edition, Mc Graw Hill Education, ISBN-13: 978-1-25-900558-9, ISBN-10: 1-25-900558-5
R2	Vivek Kulkarni	Theory of Computation	Oxford University Press ISBN 0-19-808458-7
R3	Michael Sipser	Introduction to the Theory of Computation	Cengage Learning, ISBN-13: 9781133187813
R4	Kavi Mahesh	Theory of Computation : A Problem-Solving Approach	Wiley India, ISBN10 8126533110
R5	Daniel Cohen	Introduction to Computer Theory	Wiley & Sons, ISBN 9788126513345
<b>Self-Learning Facilities</b>	Books, Examples		
<b>Web Resources</b>	NTPL Videos		
<b>Research papers for reference</b>	<b>Author</b>	<b>Title of Paper</b>	<b>Journal/Transaction</b>

1			
2			
3			
<b>Contents beyond Syllabus</b>			
<b>Additional Experiments</b>			
<b>Bridging Courses</b>			
<b>Tutorials</b>			
<b>Presentations</b>			

### Database Management Systems

<b>Course Title:</b> Database Management Systems		<b>Course Number:</b>		<b>Course Code: 310242</b>	
<b>Year: 2017-18</b>		<b>Semester: I</b>			
<b>Designation of Course</b>		Professional Core			
<b>Teaching Scheme: 3 Hrs/Week</b>		<b>Tutorial: -</b>			
<b>Course Assessment Methods</b>	<b>Direct methods</b>	In-semester Examination: 30 Marks	End Semester Examination: 70 Marks		
			Practical/Term Work		
	<b>Indirect Methods</b>	Assignments, Presentations	Quiz, Q&A session, Group Discussion		
<b>Prerequisites</b>	Discrete Mathematics (210241), Data Structures (210243 & 210252)				
<b>Course Objectives</b>					
1	To understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.				
2	To provide a strong formal foundation in database concepts, technology and practice.				
3	To give systematic database design approaches covering conceptual design, logical design and an overview of physical design.				
4	Be familiar with the basic issues of transaction processing and concurrency control.				
5	To learn and understand various Database Architectures and Applications				
6	To learn a powerful, flexible and scalable general purpose database to handle big data.				
7	To develop basic, intermediate and advanced Database programming skills				
8	To develop basic Database administration skills				
9	To percept transaction processing.				
<b>Course Outcomes</b>					
CO1	Design E-R Model for given requirements and convert the same into database tables.				
CO2	Use database techniques such as SQL & PL/SQL.				
CO3	Use modern database techniques such as NOSQL.				
CO4	Explain transaction Management in relational database System.				
CO5	Describe different database architecture and analyses the use of appropriate architecture in real time environment.				
CO6	Use advanced database Programming concepts .				
CO7	Develop the ability to handle databases of varying complexities.				
<b>Course Contents</b>					
<b>Unit-I</b>	<b>Introduction</b>				
	Introduction to Database Management Systems, Purpose of Database Systems, Database-System Applications, View of Data, Database Languages, Database System Structure, Data Models, Database Design and ER Model: Entity, Attributes, Relationships, Constraints, Keys, Design Process, Entity Relationship Model, ER Diagram, Design Issues, Extended E-R Features, converting E-R & EER diagram into tables.				
	<b>Practical/Tutorial</b>				

<b>Unit-II</b>	<b>SQL AND PL/SQL</b>
	<p><b>SQL:</b> Characteristics and advantages, SQL Data Types and Literals, DDL, DML, DCL, TCL, SQL Operators, Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Updating using Views, Indexes, SQL DML Queries: SELECT Query and clauses, Set Operations, Predicates and Joins, Set membership, Tuple Variables, Set comparison, Ordering of Tuples, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update and Delete Queries. <b>PL/SQL:</b> concept of Stored Procedures &amp; Functions, Cursors, Triggers, Assertions, roles and privileges, Embedded SQL, Dynamic SQL.</p>
	<b>Practical/Tutorial</b>
	<ul style="list-style-type: none"> <li>• Study of Open Source Relational Databases : MySQL.</li> <li>• Design and Develop SQL DDL statements which demonstrate the use of SQL objects such as Table, View, Index, Sequence, Synonym.</li> <li>• Design at least 10 SQL queries for suitable database application using SQL DML statements: Insert, Select, Update, Delete with operators, functions, and set operator.</li> <li>• Design at least 10 SQL queries for suitable database application using SQL DML statements: all types of Join, Sub-Query and View.</li> <li>• Unnamed PL/SQL code block: Use of Control structure and Exception handling is mandatory. Write a PL/SQL block of code for the following requirements:-</li> </ul> <p>Schema:</p> <ol style="list-style-type: none"> <li>1. Borrower(Rollin, Name, DateofIssue, NameofBook, Status)</li> <li>2. Fine(Roll_no,Date,Amt)</li> </ol> <p>☑ Accept roll_no &amp; name of book from user.</p> <p>☑ Check the number of days (from date of issue), if days are between 15 to 30 then fine amount will be Rs 5per day.</p> <p>☑ If no. of days&gt;30, per day fine will be Rs 50 per day &amp; for days less than 30, Rs. 5 per day.</p> <p>☑ After submitting the book, status will change from I to R.</p> <p>☑ If condition of fine is true, then details will be stored into fine table.</p> <p><b>Frame the problem statement for writing PL/SQL block inline with above statement.</b></p> <ul style="list-style-type: none"> <li>• Cursors: (All types: Implicit, Explicit, Cursor FOR Loop, Parameterized Cursor) Write a PL/SQL block of code using parameterized Cursor, that will merge the data available in the newly created table N_RollCall with the data available in the table O_RollCall. If the data in the first table already exist in the second table then that data should be skipped.</li> </ul> <p><b>Frame the separate problem statement for writing PL/SQL block to implement all types</b></p> <ul style="list-style-type: none"> <li>• PL/SQL Stored Procedure and Stored Function.</li> </ul> <p>Write a Stored Procedure namely proc_Grade for the categorization of student. If marks scored by students in examination is &lt;=1500 and marks&gt;=990 then student will be placed in distinction category if marks scored are between 989 and900 category is first class, if marks 899 and 825 category is Higher Second Class Write a PL/SQL block for using procedure created with above requirement.</p> <p>Stud_Marks(name, total_marks) Result(Roll,Name, Class)</p> <p><b>Frame the separate problem statement for writing PL/SQL Stored Procedure and</b></p>

	<p><b>function, inline with above statement. The problem statement should clearly state the requirements.</b></p> <ul style="list-style-type: none"> <li>Database Trigger (All Types: Row level and Statement level triggers, Before and After Triggers). Write a database trigger on Library table. The System should keep track of the records that are being updated or deleted. The old value of updated or deleted records should be added in Library_Audit table.</li> </ul> <p><b>Frame the problem statement for writing Database Triggers of all types, in-line with above statement. The problem statement should clearly state the requirements.</b></p>
<b>Unit-III</b>	<b>Relational Database Design</b>
	Relational Model: Basic concepts, Attributes and Domains, CODD's Rules, Relational Integrity: Domain, Referential Integrities, Enterprise Constraints, Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Algorithms for Decomposition, 2NF, 3NF, BCNF, Modeling Temporal Data.
	<b>Practical/Tutorial</b>
<b>Unit-IV</b>	<b>Database Transactions and Query Processing.</b>
	Basic concept of a Transaction, Transaction Management, Properties of Transactions, Concept of Schedule, Serial Schedule, Serializability: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules, Concurrency Control: Need, Locking Methods, Deadlocks, Time-stamping Methods, Recovery methods : Shadow-Paging and Log-Based Recovery, Checkpoints, Query Processing, Query Optimization, Performance Tuning.
	<b>Practical/Tutorial</b>
<b>Unit- V</b>	<b>Parallel and Distributed Databases</b>
	Introduction to Database Architectures: Multi-user DBMS Architectures, Case study- Oracle Architecture. <b>Parallel Databases:</b> Speedup and Scale up, Architectures of Parallel Databases. <b>Distributed Databases:</b> Architecture of Distributed Databases, Distributed Database Design, Distributed Data Storage, Distributed Transaction: Basics, Failure modes, Commit Protocols, Concurrency Control in Distributed Database.
	<b>Practical/Tutorial</b>
	<ul style="list-style-type: none"> <li>Write a program to implement MogoDB database connectivity with PHP/ python/Java Implement Database navigation operations (add, delete, edit etc. ) using ODBC/JDBC.</li> <li>Implement MYSQL/Oracle database connectivity with PHP/ python/Java Implement Database navigation operations (add, delete, edit,) using ODBC/JDBC.</li> <li>Using the database concepts covered in Part-I &amp; Part-II &amp; connectivity concepts covered in Part C, students in group are expected to design and develop database application with following details:</li> </ul> <p><b>Requirement Gathering and Scope finalization</b> <b>Database Analysis and Design:</b> ☑ Design Entity Relationship Model, Relational Model, Database Normalization</p> <p><b>Implementation :</b></p>

	☐ Front End : Java/Perl/PHP/Python/Ruby/.net ☐ Backend : MongoDB/MYSQL/Oracle ☐ Database Connectivity : ODBC/JDBC •		
<b>Unit-VI</b>	<b>NoSQL Database</b>		
	Introduction to NoSQL Database, Types and examples of NoSQL Database- Key value store, document store, graph, Performance, Structured verses unstructured data, Distributed Database Model, CAP theorem and BASE Properties, Comparative study of SQL and NoSQL, NoSQL Data Models, Case Study-unstructured data from social media. Introduction to Big Data, HADOOP: HDFS, MapReduce.		
	<b>Practical/Tutorial</b>		
	<ul style="list-style-type: none"> <li>• Study of Open Source NOSQL Database: MongoDB (Installation, Basic CRUD operations, Execution)</li> <li>• Design and Develop MongoDB Queries using CRUD operations. (Use CRUD operations, SAVE method, logical operators).</li> <li>• Implement aggregation and indexing with suitable example using MongoDB.</li> <li>• Implement Map reduces operation with suitable example using MongoDB.</li> <li>• Design and Implement any 5 query using MongoDB.</li> <li>• Create simple objects and array objects using JSON</li> <li>• Encode and Decode JSON Objects using Java/Perl/PHP/Python/Ruby</li> </ul>		
<b>Text Books</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publication</b>
T1	Silberschatz A., Korth H., Sudarshan S.	Database System Concepts	McGraw Hill Publishers, ISBN 0-07-120413-X, 6th edition
T2	Connally T, Begg C.	Database Systems	Pearson Education, ISBN 81-7808-861-4
<b>Reference Books</b>			
R1	C J Date	An Introduction to Database Systems	Addison-Wesley, ISBN: 0201144719
R2	S.K.Singh	Database Systems : Concepts, Design and Application	Pearson, Education, ISBN 978-81-317-6092-5
<b>Self-Learning Facilities, Web Resources, Research papers for reference</b>	<a href="http://www.tutorialspoint.com">www.tutorialspoint.com</a> <a href="http://www.mysqltutorial.org">www.mysqltutorial.org</a> <a href="http://www.mongodb.org">www.mongodb.org</a>		
<b>Contents beyond Syllabus</b>	-		
<b>Additional Experiments</b>	-		
<b>Bridging Courses</b>	-		
<b>Tutorials</b>	-		
<b>Presentations</b>	-		

Software Engineering and Project Management

Course Title:	Software Engineering and Project Management	Course Number:	310243
Designation of Course	Professional Core		
Teaching Scheme: 3 Hrs/Week			
Course Assessment Methods	Direct methods	In-sem Examination: 30 Marks	End Semester Examination: 70 Marks
	Indirect Methods	Assignments, Presentations	Seminars, Quiz, Q&A session, Group Discussion
Prerequisites	Fundamentals of Programming Languages (110003, 110011)		
Course Objectives			
1	To learn and understand the principles of Software Engineering		
2	To be acquainted with methods of capturing, specifying, visualizing and analyzing software requirements		
3	To apply Design and Testing principles to S/W project development		
4	To understand project management through life cycle of the project.		
5	To understand software quality attributes		
Course Outcomes			
CO1	Decide on a process model for a developing a software project		
CO2	Classify software applications and Identify unique features of various domains		
CO3	Design test cases of a software system		
CO4	Understand basics of IT Project management		
CO5	Plan, schedule and execute a project considering the risk management		
CO6	Apply quality attributes in software development life cycle		
Course Contents			
Unit-I	Introduction to Software Engineering, Software Process Models		
	Software Engineering Fundamentals: Nature of Software, Software Engineering Principles, The Software Process, Software Myths. Process Models :A Generic Process Model, Prescriptive Process Models: The Waterfall, Incremental Process(RAD), Evolutionary Process, Unified Process, Concurrent. Advanced Process Models & Tools: Agile software development: Agile methods, Plan-driven and agile development, Extreme programming Practices, Testing in XP, Pair programming. Introduction to agile tools: JIRA, Kanban, Case Studies: An information system (mental health-care system), wilderness weather system		
	Practical		
Unit-II	Software Requirements Engineering& Analysis		
	Requirements Engineering: User and system requirements, Functional and non-functional requirements, Types & Metrics, A spiral view of the requirements engineering process. Software Requirements Specification (SRS): The software requirements Specification document, The structure of SRS, Ways of writing a SRS, structured & tabular SRS for an insulin pump case study, Requirements elicitation & Analysis: Process, Requirements validation, Requirements management. Case Studies: The information system. Case study - Mental health care patient management system (MHC-PMS).		
	Practical		
Unit-III	Design Engineering		



	Design Process & quality, Design Concepts, The design Model, Pattern-based Software Design. Architectural Design :Design Decisions, Views, Patterns, Application Architectures, Modeling Component level Design: component, Designing class based components, conducting component-level design, User Interface Design: The golden rules, Interface Design steps & Analysis, Design Evaluation, Case Study: Web App Interface Design		
	<b>Practical</b>		
<b>Unit-IV</b>	<b>Project Management: Process, Metrics, Estimations &amp; Risks</b>		
	Project Management Concepts: The Management Spectrum, People, Product, Process, Project, The W5HH Principle, Metrics in the Process and Project Domains, Software Measurement : size & function oriented metrics(FP & LOC), Metrics for Project and Software Quality, Project Estimation :Observations on Estimation, Project Planning Process, Software Scope and feasibility, Resources: Human Resources, Reusable software, Environmental Resources. Software Project Estimation, Decomposition Techniques, Empirical Estimation Models: Structure, COCOMO II, Estimation of Object-oriented Projects, Specialized Estimation Case Study: Software Tools for Estimation, Project Scheduling: Basic Concepts, Defining a Task Set for the Software Project, Defining Task Network, Scheduling with time-line charts, Schedule tracking Tools:- Microsoft Project, Daily Activity Reporting & Tracking (DART)		
	<b>Practical</b>		
<b>Unit- V</b>	<b>Project Management: Risk Management, Configuration Management, Maintenance and Reengineering</b>		
	Project Risk Management : Risk Analysis & Management: Reactive versus Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Risks Monitoring and Management, The RMMM plan for case study project Software Configuration Management : The SCM repository, SCM process, Configuration management for WebApps, Case study: CVS and Subversion Tools, Visual Source Safe from Microsoft & Clear Case. Maintenance & Reengineering: Software Maintenance, Software Supportability, Reengineering, Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering		
	<b>Practical</b>		
<b>Unit-VI</b>	<b>Software Testing</b>		
	Introduction to Software Testing, Principles of Testing, Testing Life Cycle, Phases of Testing, Types of Testing, Verification & Validation, Defect Management, Defect Life Cycle, Bug Reporting, GUI Testing, Test Management and Automation		
	<b>Practical</b>		
<b>Text Books</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publication</b>
T1	Roger Pressman	Software Engineering: A Practitioner's Approach	McGraw Hill, ISBN 0-07-337597-7
T2	Ian Sommerville	Software Engineering	Addison and Wesley, ISBN 0-13-703515-2
<b>Reference Books</b>			
R1	Carlo Ghezzi	Fundamentals of Software Engineering	Prentice Hall India, ISBN-10: 0133056996
R2	Rajib Mall	Fundamentals of Software Engineering	Prentice Hall India, ISBN-13: 978- 8120348981
R3	Pankaj Jalote	"An Integrated Approach to Software Engineering",	Springer, ISBN 13: 9788173192715
R4	. S K Chang	Handbook of Software Engineering and	World Scientific, Vol I, II, ISBN: 978-981-02-4973-1



		Knowledge Engineering	
R5	Tom Halt	Handbook of Software Engineering	Clanye International, ISBN- 10: 1632402939
<b>Self-Learning Facilities</b>			
<b>Web Resources</b>			
<b>Research papers for reference</b>	<b>Author</b>	<b>Title of Paper</b>	<b>Journal/Transaction</b>
<b>Contents beyond Syllabus</b>			
<b>Additional Experiments</b>			
<b>Bridging Courses</b>			
<b>Assignments</b>			
1	Explain Agile Process Model Tool JIRA in Detail.		
2	Explain Kanban which is a tool of Agile Process Model.		
<b>Tutorials</b>			
<b>Presentations</b>			

**Information Systems and Engineering Economics**

<b>Course Title:</b> Information Systems and Engineering Economics		<b>Course Number:</b> 310244		<b>Course Code: :</b> 310244	
<b>Year: 2019-2020</b>		<b>Semester: V</b>			
<b>Designation of Course</b>		Professional Core			
<b>Teaching Scheme: 3 Hrs/Week</b>		<b>Tutorial:</b>			
<b>Course Assessment Methods</b>	<b>Direct methods</b>	In-semester Examination: 30 Marks		End Semester Examination: 70 Marks	
				Practical/Oral/Term Work	
	<b>Indirect Methods</b>	Assignments, Presentations		Seminars, Quiz, Q&A session, Group Discussion	
<b>Prerequisites</b>					
<b>Course Objectives</b>					
1	To prepare the students to various forms of the Information Systems and its application in organizations				
2	To expose the students to the managerial issues relating to information systems and help them identify and evaluate various options in Information Systems				
3	To Prepare engineering students to analyze cost / revenue data and should be able to do economic analyses in the decision making process to justify or reject alternatives / projects on an economic basis for an organization.				
<b>Course Outcomes</b>					
CO1	Understand the need, usage and importance of an Information System to an organization				
CO2	Understand the activities that are undertaken while managing, designing, planning, implementation, and deployment of computerized information system in an organization				
CO3	Further the student would be aware of various Information System solutions like ERP, CRM, Data warehouses and the issues in successful implementation of these technology solutions in any organizations				
CO4	Outline the past history, present position and expected performance of a company engaged in engineering practice or in the computer industry				
CO5	Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives				
CO6	Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives				
<b>Course Contents</b>					
<b>Unit-I</b>	<b>Basic of Management Theory &amp; Practices</b>				
	Role of Information Systems in Organizations, The Information System Manager and his challenges, Concepts of Information Systems, Information Systems and Management Strategy Case Studies - Information Systems in the Indian Railways, Information Systems in an e-Commerce Organization.				
	<b>Practical/Tutorial</b>				
<b>Unit-II</b>	<b>Management Information System (MIS)</b>				

	Managing Information Systems, Ethical and Social Issues, Information Technology Infrastructure and Choices, Information Systems Security and Control, Case Studies -Information Technology Infrastructure in a Bank, Information Technology Infrastructure in a manufacturing / process industry.		
	<b>Practical/Tutorial</b>		
<b>Unit-III</b>	<b>Leveraging Information Systems</b>		
	Information Systems Development and Project Management, Managing Data Resources, Business Process Integration and Enterprise Systems, ICT for Development and E-Governance, Case Studies - in-house or cloud based ERP implementation, UIDAI Unique Identification Authority of India.		
	<b>Practical/Tutorial</b>		
<b>Unit-IV</b>	<b>Money and Economic Value</b>		
	Engineering Economic Decisions, Time Value of Money, Understanding Money Management, Case Studies- Economic decisions done in Multi-national companies.		
	<b>Practical/Tutorial</b>		
<b>Unit- V</b>	<b>Economics and Management</b>		
	Equivalence Calculations under Inflation, Present-Worth Analysis, Annual-Equivalence Analysis. Case Studies -comparative analysis of software enterprises from relevant domains		
	<b>Practical/Tutorial</b>		
<b>Unit-VI</b>	<b>Understanding Cash Flow and Taxes</b>		
	Accounting for Depreciation and Income Taxes, Project Cash-Flow Analysis, Understanding Financial Statements, Case Studies - cash flow analysis done in start-up companies.		
	<b>Practical/Tutorial</b>		
<b>Text Books</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publication</b>
T1	Rahul De,	“MIS: Management Information Systems in Business, Government and	Wiley India, ISBN: 13: 978-81-265-2019-0.

		Society”,	
T2	Chan S. Park	"Fundamentals of Engineering Economics”,	III rd Ed. Education, ISBN 13: 978-02-737-7291-0
<b>Reference Books</b>			
R1	Turban and Wali,	“Information Technology on Management	Willey India, ISBN:9788126558711
R2	William G. Sullivan, Elin M. Wicks, C. Patrick Koelling,	Engineering Economy	Pearson Education, ISBN13: 978-01-334-3927-4
<b>Self-Learning Facilities, Web Resources, Research papers for reference</b>	Nil		
<b>Contents beyond Syllabus</b>			
<b>Additional Experiments</b>			
<b>Bridging Courses</b>			
<b>Tutorials</b>			
<b>Presentations</b>			

### Computer Networks

<b>Course Title:</b> Computer Networks		<b>Course Number:</b> 310245		<b>Course Code: :</b>	
<b>Year: 2019-2020</b>		<b>Semester: V</b>			
<b>Designation of Course</b>		Professional Core			
<b>Teaching Scheme: 4 Hrs/Week</b>		<b>Tutorial:</b>			
<b>Course Assessment Methods</b>	<b>Direct methods</b>	In-semester Examination: 30 Marks	End Semester Examination: 70 Marks		
			Practical/Oral/Term Work		
	<b>Indirect Methods</b>	Assignments, Presentations	Quiz, Q&A session, Group Discussion		
<b>Prerequisites</b>	Computer Organization and Architecture (210244)				
<b>Course Objectives</b>					
1	To understand the fundamental concepts of networking standards, protocols and technologies				
2	To learn different techniques for framing, error control, flow control and routing.				
3	To learn role of protocols at various layers in the protocol stacks				
4	To learn network programming				
5	To develop an understanding of modern network architectures from a design and performance perspective				
<b>Course Outcomes</b>					
CO1	Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies				
CO2	Demonstrate design issues, flow control and error control				
CO3	Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols				
CO4	Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community				
CO5	Illustrate Client-Server architectures and prototypes by the means of correct standards and technology				
CO6	Demonstrate different routing and switching algorithms				
<b>Course Contents</b>					
<b>Unit-I</b>					

	<b>Physical Layer</b>
	Introduction of LAN; MAN; WAN; PAN, Ad-hoc Network, Network Architectures: Client-Server; Peer To Peer; Distributed and SDN, OSI Model, TCP/IP Model, Topologies: Star and Hierarchical; Design issues for Layers, Transmission Mediums: CAT5, 5e, 6, OFC and Radio Spectrum, Network Devices: Bridge, Switch, Router, Brouter and Access Point, Manchester and Differential Manchester Encodings; IEEE802.11: Frequency Hopping (FHSS) and Direct Sequence (DSSS)
	<b>Practical</b>
	<b>Lab Assignment on Unit I:</b> <b>Part A:</b> Setup a wired LAN using Layer 2 Switch and then IP switch of minimum four computers. It includes preparation of cable, testing of cable using line tester, configuration machine using IP addresses, testing using PING utility and demonstrate the PING packets captured traces using Wireshark Packet Analyzer Tool. <b>Part B:</b> Extend the same Assignment for Wireless using Access Point
<b>Unit-II</b>	<b>Logical Link Control</b>
	Design Issues: Services to Network Layer, Framing, Error Control and Flow Control. Error Control: Parity Bits, Hamming Codes (11/12-bits) and CRC. Flow Control Protocols: Unrestricted Simplex, Stop and Wait, Sliding Window Protocol, WAN Connectivity : PPP and HDLC
	<b>Practical</b>
	<b>1. (Use C/C++)</b> Write a program for error detection and correction for 7/8 bits ASCII codes using Hamming Codes or CRC. Demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode.( 50% students will perform Hamming Code and others will perform CRC)  <b>2. (Use JAVA/PYTHON)</b> Write a program to simulate Go back N and Selective Repeat Modes of Sliding Window Protocol in peer to peer mode and demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode
<b>Unit-III</b>	<b>Medium Access Control</b>
	Channel allocation: Static and Dynamic, Multiple Access Protocols: Pure and Slotted ALOHA, CSMA, WDMA, IEEE 802.3 Standards and Frame Formats, CSMA/CD, Binary Exponential Back -off algorithm, Fast Ethernet, Gigabit Ethernet, IEEE 802.11a/b/g/n and IEEE 802.15 and IEEE 802.16 Standards, Frame formats, CSMA/CA.
<b>Unit-IV</b>	<b>Network Layer</b>
	Switching techniques, IP Protocol, IPv4 and IPv6 addressing schemes, Subnetting , NAT, CIDR, ICMP, Routing Protocols: Distance Vector, Link State, Path Vector, Routing in Internet: RIP ,OSPF, BGP, Congestion control and QoS, , MPLS, Mobile IP, Routing in MANET : AODV, DSR
	<b>Practical</b>

	<p><b>1. (Use JAVA/PYTHON)</b> Write a program to demonstrate subnetting and find the subnet masks.</p> <p><b>2.(Mandatory Assignment)</b> Use network simulator NS2 to implement: a. Monitoring traffic for the given topology b. Analysis of CSMA and Ethernet protocols c. Network Routing: Shortest path routing, AODV. d. Analysis of congestion control (TCP and UDP).</p> <p><b>3. (Mandatory Assignment)</b> Configure RIP/OSPF/BGP using packet Tracer</p>
<b>Unit- V</b>	<b>Transport Layer</b>
	Services, Berkley Sockets, Addressing, Connection establishment, Connection release, Flow control and buffering, Multiplexing, TCP, TCP Timer management, TCP Congestion Control, Real Time Transport protocol(RTP), Stream Control Transmission Protocol (SCTP), Quality of Service (QoS), Differentiated services, TCP and UDP for Wireless.
	<b>Practical</b>
	<p><b>1. (Mandatory Assignment) (Use C/C++)</b> Write a program using TCP socket for wired network for following</p> <p>a. Say Hello to Each other ( For all students)</p> <p>b. File transfer ( For all students)</p> <p>c. Calculator (Arithmetic) (50% students)</p> <p>d. Calculator (Trigonometry) (50% students)</p> <p>Demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode</p> <p><b>2.(Mandatory Assignment) (Use C/C++)</b> Write a program using UDP Sockets to enable file transfer (Script, Text, Audio and Video one file each) between two machines. Demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode.</p> <p><b>3. (Mandatory Assignment) (Use C/C++)</b> Write a program to analyze following packet formats captured through Wireshark for wired network. 1. Ethernet 2. IP 3.TCP 4. UDP</p>

	<p><b>4. (Use JAVA/PYTHON)</b> Write a program using TCP sockets for wired network to implement</p> <p>a. Peer to Peer Chat</p> <p>b. Multiuser Chat</p> <p><b>5. (Use JAVA/PYTHON)</b> Write a program using UDP sockets for wired network to implement</p> <p>a. Peer to Peer Chat</p> <p>b. Multiuser Chat</p> <p>Demonstrate the packets captured traces using Wireshark Packet Analyzer Tool for peer to peer mode</p>		
<b>Unit-VI</b>	<b>Application Layer</b>		
	Domain Name System (DNS), Hyper Text Transfer Protocol (HTTP), Email: SMTP, MIME, POP3, Webmail, FTP, TELNET, Dynamic Host Control Protocol (DHCP), Simple Network Management Protocol (SNMP)		
	<b>Practical</b>		
	<p><b>1. (Use JAVA/PYTHON)</b> Write a program for DNS lookup. Given an IP address input, it should return URL and vice-versa.</p> <p><b>2.</b> Installing and configure DHCP server and write a program to install the software on remote machine</p>		
<b>Text Books</b>	<b>Author</b>	<b>Title of Book</b>	<b>Publication</b>
T1	Andrew S. Tenenbaum,	"Computer Networks",	PHI, ISBN 81-203-2175-8.
T2	Fourauzan B.,	"Data Communications and Networking",	5th Edition, Tata McGraw- Hill, Publications, ISBN: 0 – 07 – 058408 – 7
<b>Reference Books</b>			
R1	Kurose, Ross	"Computer Networking a Top Down Approach Featuring the Internet",	Pearson, ISBN-10: 0132856204



R2	Matthew S. G,	"802.11 Wireless Networks",	O'Reilly publications, ISBN: 81-7656-992-5
R3	C. Siva Ram Murthy and B. S. Manoj	"Ad Hoc Wireless Networks: Architectures and Protocols"	Prentice Hall, ISBN-10: 8131706885; ISBN-13: 978-8131706886
R4	Holger Karl and Andreas Willing	Holger Karl and Andreas Willing	Wiley India , ISBN: 9788126533695
R5	Eldad Perahia, Robert Stacey	"Next Generation Wireless LANs",	Cambridge, ISBN-10: 1107016762; ISBN-13: 978-1107016767
R6	Efraim Turban, Linda Volonino, Gregory R. Wood	"Computer Networking a Top Down Approach Featuring the Internet"	10th Edition, Wiley; ISBN13: 978-1-118- 96126-1
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