

# Sandip University

Neelam Vidya Vihar, Vill.: Sijoul. P.O. : Mailam, Dist.:Madhubani, Bihar -847235

Website : <http://www.sandipuniversity.edu.in>

Toll-Free No.- 1800-313-2714 Ph: 7549991044.

School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Second Year	Semester -IV
Course: Computer Organization And Architecture	Course Code:CS401T
Tutorial : 1 Hrs/Week	
Theory: 3 Hours/Week	Max. University Theory Examination: 60 Marks
	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2.5 Hrs	Credit: 4

Objectives :	
1	Explain the basic sub systems of a computer, their organization, structure and operation.
2	Illustrate the concept of programs as sequences of machine instructions.
3	Demonstrate different ways of communicating with I/O devices and standard I/O interfaces.
4	Describe memory hierarchy and concept of virtual memory.
5	Describe arithmetic and logical operations with integer and floating-point operands.
6	Illustrate organization of a simple processor, pipelined processor and other computing systems.

Unit Number	Details	Hours
1	Basic Structure of Computers: Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement. Machine Instructions and Programs: Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions	9
2	Input/output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB.	9
	Memory System: Basic Concepts, Semiconductor RAM Memories, Read	

3	Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Replacement Algorithms, Performance Considerations, Virtual Memories, And Secondary Storage.	8
4	Arithmetic: Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating-point Numbers and Operations.	8
5	Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Micro programmed Control. Pipelining, Embedded Systems and Large Computer Systems: Basic Concepts of pipelining, Examples of Embedded Systems, Processor chips for embedded applications, Simple Microcontroller, The structure of General-Purpose Multiprocessors.	8
Total (Hrs)		42

Course Outcome	
Student Should able to :	
CO1	Explain the basic organization of a computer system.
CO2	Demonstrate functioning of different sub systems, such as processor, Input/output, and memory
CO3	Illustrate hardwired control and micro programmed control. pipelining, embedded and other computing systems.
CO4	Design and analyse simple arithmetic and logical units.

Resources	
Recommended Books	1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002.
Reference Books	1. William Stallings: Computer Organization & Architecture, 9th Edition, Pearson, 2015.
E-Resources	<a href="http://nptel.ac.in/">http://nptel.ac.in/</a>

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Second Year	Semester -IV
Course: Formal Language & Automata Theory	Course Code: CS402T
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
Tutorial : 1 Hrs/Week	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2.5 Hrs	Credit: 4

## Objectives :

1	To build concepts regarding the fundamental principles of Grammars, Automata Theory, Turing Machines.
2	To learn formal Programming Language Theory and Regular Expressions.
3	To learn Grammar and Turing Machine Designing.
4	To study the abstract computing model.
5	To study automata theory and types and applications of formal grammar.

Unit Number	Details	Hours
1	Why study the Theory of Computation, Languages and Strings: Strings, Languages. A Language Hierarchy, Computation, Finite State Machines (FSM):Deterministic FSM, Regular languages, Designing FSM, Nondeterministic FSMs,From FSMs to Operational Systems, Simulators for FSMs, Minimizing FSMs Canonical form of Regular languages, Finite State Transducers, Bidirectional Transducers	10
2	Regular Expressions (RE): what is a RE?, Kleene's theorem, Applications of REs, Manipulating and Simplifying REs. Regular Grammars: Definition, Regular Grammars and Regular languages. Regular Languages (RL) and Non-regular Languages: How many RLs, To show that a language is regular, Closure properties of RLs, to show some languages are not RLs.	10
3	Context-Free Grammars(CFG): Introduction to Rewrite Systems and Grammars, CFGs and languages, designing CFGs, simplifying CFGs, proving that a Grammar is correct, Derivation and Parse trees, Ambiguity, Normal Forms. Pushdown Automata (PDA): Definition of non-deterministic PDA, Deterministic and Nondeterministic PDAs, Non-determinism and Halting, alternative equivalent definitions of a PDA, alternatives that are not	10

	equivalent to PDA.	
4	Context-Free and Non-Context-Free Languages: Where do the Context-Free Languages(CFL) fit, Showing a language is context-free, Pumping theorem for CFL, Important closure properties of CFLs, Deterministic CFLs. Algorithms and Decision Procedures for CFLs: Decidable questions, Undecidable questions. Turing Machine: Turing machine model, Representation, Language acceptability by TM, design of TM, Techniques for TM construction.	10
5	Variants of Turing Machines (TM), The model of Linear Bounded automata: Decidability: Definition of an algorithm, decidability, decidable languages, Undecidable languages, halting problem of TM, Post correspondence problem. Complexity: Growth rate of functions, the classes of P and NP, Quantum Computation: quantum computers, Church-Turing thesis.	10
Total (Hrs)		50

### Course Outcome

Student Should able to :

CO1	Understand the basic concepts of formal languages of finite automata techniques.
CO2	Solve regular expressions and various problems to minimize FA.
CO3	Apply various languages to construct context free grammar .
CO4	Solve various problems of applying normal form techniques, Push down automata and Turing Machines.

### Resources

Recommended Books	1. Elaine Rich, Automata, Computability and Complexity, 1 <sup>st</sup> Edition, Pearson Education,2012/2013 2. K L P Mishra, N Chandrasekaran , 3 <sup>rd</sup> Edition, Theory of Computer Science, PHI, 2012
Reference Books	1. John E Hopcroft, Rajeev Motwani, Jeffery D Ullman, Introduction to Automata Theory, Languages, and Computation, 3 <sup>rd</sup> Edition, Pearson Education, 2013 2. Michael Sipser : Introduction to the Theory of Computation, 3 <sup>rd</sup> edition, Cengage learning,2013 3. C K Nagpal, Formal Languages and Automata Theory, Oxford University press, 2012
E-Resources	<a href="http://nptel.ac.in/">http://nptel.ac.in/</a>

### Tutorials:

Tutorial assessment shall be conducted for the Project, Tutorials, Industrial Visit report and Seminar. Tutorial is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by subject teacher of the school. At the end of the semester, the final grade for a Tutorial shall be assigned based on the performance of the student and is to be submitted to the University.

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Second Year	Semester -IV
Course: Programming in Python & JAVA	Course Code: CS403T
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2.5 Hrs	Credit: 3

## Objectives :

1	Learn fundamental features of object oriented language and JAVA.
2	Set up Java JDK environment to create, debug and run simple Java programs.
3	Create multi-threaded programs and event handling mechanisms
4	Introduce event driven Graphical User Interface (GUI) programming using applets and swings.

Unit Number	Details	Hours
1	An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings.	10
2	Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements.	8
3	Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing	12

	Access Control, Understanding static, Introducing final, Arrays Revisited, Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.	
4	Introduction to Python Programming: Features/characteristic of Python, Basic syntax, Writing and executing simple program, Basic Data Types, Declaring variables, Performing assignments, arithmetic operations, Simple input-output, Precedence of operators, Type conversion, Conditional Statements: if, if-else, nested if -else Looping: for, while, nested loops, Terminating loops, skipping specific conditions	8
5	String, collection lists and Tuples: Declaring strings, String Manipulation using string functions, Introduction to Collection list, Manipulating Collections Lists. Tuples-Introduction to Tuples, Manipulating Tuples.	12
	Dictionaries , Functions and Modules: Concepts of dictionary, Techniques to create updates & delete dictionary items. Functions: Defining a function, Calling a function, Advantages of functions, Types of functions, Function parameters, Formal parameters, Actual parameters, Anonymous functions, Global and Local variables. Modules: Importing module, Creating & exploring modules, Math module, Random module, Time module.	
Total (Hrs)		50

### Course Outcome

Later effective conclusion of course, a Student Should able to :

CO1	Explain the object-oriented concepts and JAVA.
CO2	Develop computer programs to solve real world problems in Java.
CO3	Develop simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles using Applets and swings.

### Resources

Recommended Books	1. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.
Reference Books	1. Mahesh Bhawe and Sunil Patekar, "Programming with Java", First Edition, Pearson Education, 2008, ISBN:9788131720806 2. Herbert Schildt, The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2003. 3. Rajkumar Buyya, S Thamarasi selvi, xingchen chu, Object oriented Programming with java, Tata McGraw Hill education private limited. 4. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.
E-Resources	<a href="http://nptel.ac.in/">http://nptel.ac.in/</a>

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Second Year	Semester -IV
Course: Design and analysis of Algorithm	Course Code: CS404T
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
Tutorial : 1 Hrs/Week	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2.5 Hrs	Credit: 4

## Objectives :

1	Explain various computational problem solving techniques.
2	Apply appropriate method to solve a given problem.
3	Describe various methods of algorithm analysis.

Unit Number	Details	Hours
1	<b>Introduction:</b> What is an Algorithm? Algorithm Specification, Analysis Framework, <b>Performance Analysis:</b> Space complexity, Time complexity. <b>Asymptotic Notations:</b> Big-Oh notation ( $O$ ), Omega notation ( $\Omega$ ), Theta notation ( $\Theta$ ), and Little-oh notation ( $o$ ), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples. <b>Important Problem Types:</b> Sorting, Searching, String processing, Graph Problems, Combinatorial Problems. <b>Fundamental Data Structures:</b> Stacks, Queues, Graphs, Trees, Sets and Dictionaries.	10
2	<b>Divide and Conquer:</b> General method, Binary search, Recurrence equation for divide and conquer, Finding the maximum and minimum, Merge sort, Quick sort, Strasse's matrix multiplication, Advantages and Disadvantages of divide and conquer. <b>Decrease and Conquer Approach:</b> Topological Sort.	10
3	<b>Greedy Method:</b> General method, Coin Change Problem, Knapsack Problem, Job sequencing with deadlines. <b>Minimum cost spanning trees:</b> Prim's Algorithm, Kruskal's Algorithm. <b>Single source shortest paths:</b>	9

	Dijkstra's Algorithm. <b>Optimal Tree problem:</b> Huffman Trees and Codes . <b>Transform and Conquer Approach:</b> Heaps and Heap Sort .	
4	<b>Dynamic Programming:</b> General method with Examples, Multistage Graphs. <b>Transitive Closure:</b> Warshall's Algorithm, <b>All Pairs Shortest Paths:</b> Floyd's Algorithm, Optimal Binary Search Trees, Knapsack problem , Bellman-Ford Algorithm ( <b>T2:5.4</b> ), Travelling Sales Person problem ( <b>T2:5.9</b> ), Reliability design.	9
5	<b>Dynamic Programming:</b> General method with Examples, Multistage Graphs. <b>Transitive Closure:</b> Warshall's Algorithm, <b>All Pairs Shortest Paths:</b> Floyd's Algorithm, Optimal Binary Search Trees, Knapsack problem , Bellman-Ford Algorithm , Travelling Sales Person problem, Reliability design deterministic algorithms, P, NP, NP-Complete, and NP-Hard classes.	8
Total (Hrs)		46

### Course Outcome

Student Should able to :

CO1	Describe computational solution to well known problems like searching, sorting etc.
CO2	Estimate the computational complexity of different algorithms.
CO3	Devise an algorithm using appropriate design strategies for problem solving.

### Resources

Recommended Books	1. Introduction to the Design and Analysis of Algorithms, Anany Levitin., 2nd Edition, 2009. Pearson. 2. Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, 2nd Edition, 2014, Universities Press
Reference Books	1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI 2. Design and Analysis of Algorithms , S. Sridhar, Oxford (Higher Education)
E-Resources	<a href="http://nptel.ac.in/">http://nptel.ac.in/</a>



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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Second Year	Semester –IV
Course : Web Application Design & Development	Course Code: CS405T
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
Tutorial : 1 Hrs/Week	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2.5 Hrs	Credit: 4

## Objectives :

1	Illustrate the Semantic Structure of HTML and CSS
2	Compose forms and tables using HTML and CSS
3	Design Client-Side programs using JavaScript and Server-Side programs using PHP
4	Infer Object Oriented Programming capabilities of PHP
5	Examine JavaScript frameworks such as jQuery and Backbone

Unit Number	Details	Hours
1	Introduction to HTML, What is HTML and Where did it come from?, HTML Syntax, Semantic Markup, Structure of HTML Documents, Quick Tour of HTML Elements, HTML5 Semantic Structure Elements, Introduction to CSS, What is CSS, CSS Syntax, Location of Styles, Selectors, The Cascade: How Styles Interact, The Box Model, CSS Text Styling.	8
2	HTML Tables and Forms, Introducing Tables, Styling Tables, Introducing Forms, Form Control Elements, Table and Form Accessibility, Microformats, Advanced CSS: Layout, Normal Flow, Positioning Elements, Floating Elements, Constructing Multicolumn Layouts, Approaches to CSS Layout, Responsive Design, CSS Frameworks.	10
3	JavaScript: Client-Side Scripting, What is JavaScript and What can it do?, JavaScript Design Principles, Where does JavaScript Go?, Syntax, JavaScript Objects, The Document Object Model (DOM), JavaScript Events, Forms, Introduction to Server-Side Development with PHP, What is	9

	Server-Side Development, A Web Server's Responsibilities, Quick Tour of PHP, Program Control, Functions	
4	PHP Arrays and Superglobals, Arrays, \$_GET and \$_POST Superglobal Arrays, \$_SERVER Array, \$_FILES Array, Reading/Writing Files, PHP Classes and Objects, Object-Oriented Overview, Classes and Objects in PHP, Object Oriented Design, Error Handling and Validation, What are Errors and Exceptions?, PHP Error Reporting, PHP Error and Exception Handling	9
5	Managing State, The Problem of State in Web Applications, Passing Information via Query Strings, Passing Information via the URL Path, Cookies, Serialization, Session State, HTML5 Web Storage, Caching, Advanced JavaScript and jQuery, JavaScript Pseudo-Classes, jQuery Foundations, AJAX, Asynchronous File Transmission, Animation, Backbone MVC Frameworks, XML Processing and Web Services, XML Processing, JSON, Overview of Web Services.	8
Total (Hrs)		46

Course Outcome	
Student Should able to :	
CO1	Adapt HTML and CSS syntax and semantics to build web pages.
CO2	Construct and visually format tables and forms using HTML and CSS
CO3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically
CO4	Appraise the principles of object oriented development using PHP
CO5	Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.

Resources	
Recommended Books	Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 1st Edition, Pearson Education India
Reference Books	<ol style="list-style-type: none"> <li>1. Robin Nixon, "Learning PHP, MySQL &amp; JavaScript with jQuery, CSS and HTML5", 4th Edition, O'Reilly Publications, 2015. (ISBN:978-9352130153)</li> <li>2. Luke Welling, Laura Thomson, "PHP and MySQL Web Development", 5th Edition, Pearson Education, 2016. (ISBN:978-9332582736)</li> <li>3. Nicholas C Zakas, "Professional JavaScript for Web Developers", 3rd Edition, Wrox/Wiley India, 2012. (ISBN:978-8126535088)</li> <li>4. David Sawyer Mcfarland, "JavaScript &amp; jQuery: The Missing Manual", 1st Edition, O'Reilly/Shroff Publishers &amp; Distributors Pvt Ltd, 2014 (ISBN:978-9351108078)</li> </ol>
E-Resources	<a href="http://nptel.ac.in/">http://nptel.ac.in/</a>

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Second Year	Semester –IV
Course: Programming in Python & JAVA Lab	Course Code: CS406P
Practical : 3 Hrs/Week	Max. University Practical Examination: 25 Marks
	Term Work : 25 Marks
Max. Time for Exam.: 3 Hrs	Credit: 1

## Practical Objectives :

1	To execute programs based on object oriented structure and concepts.
2	To perform programs and learn object based orientation.

Sr. No.	Practical Description
1	Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object
2	Write a Java Program to define a class, define instance methods for setting and Retrieving values of instance variables and instantiate its object.
3	Write a Java Program to define a class, define instance methods and overload them and use them for dynamic method invocation.
4	Write a Java Program to demonstrate use of sub class.
5	Write a Java Program to demonstrate use of nested class.
6	Write a Java Program to implement array of objects.
7	Write a Java program to practice using String class and its methods.
8	Write a Java Program to implement Vector class and its methods.
9	Write a Java Program to implement Wrapper classes and their methods.
10	Write a Java Program to implement inheritance and demonstrate use of method overriding

Sr. No.	Description
	<b>Group A: Python Programming (Any SIX Assignments)</b>
1	Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2	WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria : Grade A: Percentage $\geq 80$ Grade B: Percentage $\geq 70$ and $< 80$ Grade C: Percentage $\geq 60$ and $< 70$ Grade D: Percentage $\geq 40$ and $< 60$ Grade E: Percentage $< 40$
3	WAP to display the first n terms of Fibonacci series.
4	WAP to find factorial of the given number.
5	WAP to find sum of the following series for n terms: $1 - 2/2! + 3/3! - \dots - n/n!$
6	WAP to calculate the sum and product of two compatible matrices.
7	Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
	<b>Group B: (Any Three Assignments)</b>
8	Write a menu-driven program to create mathematical 3D objects I. curve II. sphere III. cone IV. arrow V. ring VI. Cylinder.
9	WAP to read n integers and display them as a histogram.
10	WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
	<b>Group C: (Any One Assignment)</b>
11	Create a form to design a student information system, using various tools like buttons, check boxes, radio buttons, and text boxes.
12	Create a shopping cart application based on various GUI controls.

Notes	
1	Each student should perform at least 07 experiments from the list of experiments. First five experiments are compulsory. Any 2 experiments are to be conducted from experiment no. 6 to 9.
2	The experiments from the regular practical syllabus will be performed.
3	The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly.
4	Good Laboratory Practices .

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Second Year	Semester –IV
Course: Design and Analysis of Algorithm Lab	Course Code: CS407P
Practical : 3 Hrs/Week	Max. University Practical Examination: 25 Marks
	Term Work : 25 Marks
Max. Time for Exam.: 3 Hrs	Credit: 1

Sr. No.	Practical Description
1	Create a Java class called Student with the following details as variables within it. (i) USN (ii) Name (iii) Branch (iv) Phone Write a Java program to create nStudent objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.
2	Write a Java program to implement the Stack using arrays. Write Push(), Pop(), and Display() methods to demonstrate its working.
3	Design a superclass called <i>Staff</i> with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely <i>Teaching</i> (domain, publications), <i>Technical</i> (skills), and <i>Contract</i> (period). Write a Java program to read and display at least 3 <i>staff</i> objects of all three categories.
4	Write a Java program to read two integers <i>a</i> and <i>b</i> . Compute $a/b$ and print, when <i>b</i> is not zero. Raise an exception when <i>b</i> is equal to zero.
5	Sort a given set of <i>n</i> integer elements using <b>Quick Sort</b> method and compute its time complexity. Run the program for varied values of $n > 5000$ and record the time taken to sort. Plot a graph of the time taken versus <i>n</i> on graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.
6	Sort a given set of <i>n</i> integer elements using <b>Merge Sort</b> method and compute its time complexity. Run the program for varied values of $n > 5000$ , and record the time taken to sort. Plot a

	graph of the time taken versus $n$ on graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.
7	Implement in Java, the <b>0/1 Knapsack</b> problem using (a) Dynamic Programming method (b) Greedy method.
8	From a given vertex in a weighted connected graph, find shortest paths to other vertices using <b>Dijkstra's algorithm</b> . Write the program in Java.
9	Find Minimum Cost Spanning Tree of a given connected undirected graph using <b>Kruskal's algorithm</b> . Use Union-Find algorithms in your program.
10	Find Minimum Cost Spanning Tree of a given connected undirected graph using <b>Prim's algorithm</b> .
11	Write Java programs to (a) Implement All-Pairs Shortest Paths problem using <b>Floyd's algorithm</b> . (b) Implement <b>Travelling Sales Person problem</b> using Dynamic programming.

#### Notes

Each student should perform at least 9 experiments from the list of experiments. First Five Experiments are compulsory. Any two experiments on DC Machine & one on single phase induction. Report on industrial visit is compulsory.

The experiments from the regular practical syllabus will be performed. The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly.

For good Laboratory Practices Minimum one visit should be arranged to electrical Machine manufacturing company.

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Second Year	Semester –IV
Course: Web Application Design & Development Lab	Course Code: CS408P
Practical : 3 Hrs/Week	Max. University Practical Examination: 25 Marks
	Term Work :25 Marks
Max. Time for Exam.: 3 Hrs	Credit: 1

## Practical Objectives :

1	To understand the differences between microcontrollers and microprocessors.
2	To understand concepts and techniques required in embedded software for microprocessors and micro controllers and measurement of various analog parameters.

Sr. No.	Practical Description
1	Addition of two 16 bit number using 8051.
2	Multiplication of two numbers using MUL command.
3	Find the smallest number among a given set of numbers.
4	Find the largest number among a given set of numbers.
5	Arrange 'n' numbers in ascending order.
6	Arrange 'n' numbers in descending order
7	Interface a ADC and a temperature sensor to measure temperature.
8	Interface a DAC & Generate a stair case wave form –with step duration and no. of steps as variables.
9	Flash a LED connected at a specified output port terminal.
10	Interface a stepper motor and rotate it clock wise or anti clock wise through given angle steps.

Notes	
1	Each student should perform all experiments however at least 3 should be based on 8085, at least 3 based on 8051 and at least 3 based on PIC microcontroller.
2	The experiments from the regular practical syllabus will be performed.
3	The regular attendance of students during the syllabus practical course will be monitored and marks will be given accordingly.
4	Good Laboratory Practices.

#### Practical/Oral/Presentation:

Practical/Oral/Presentation shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University.



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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Second Year	Semester –IV
Course: Internship / Training	Course Code: CS 409P
Days : 4 Weeks	Term Work: --
	Credit: 3

## Practical Objectives :

1	As an intern, each student gets an opportunity to apply the skills and knowledge base acquired on campus and to experience a real world environment of responsibility.
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Sr. No.	Practical Description
1	Students will go Industrial training of minimum 04 weeks in any industry or reputed organization after the IIIrd semester examination in summer. They will also prepare an exhaustive technical report of the training which will be duly signed by the officer under whom training was taken in the industry/organization. They will have to present about the training before a committee consisting of faculty members constituted by the concerned Head of the Department.

