## Details of Laboratories in CSE Department

| Laboratory / Practical Paper Name | Course Objectives |
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| Physics – 2 Lab | To provide students the ability to design and conduct experiments, analyze and interpret experiment data by performing the following experiments related to the study of the theory paper:<br><br>Experiments on Electricity and Magnetism<br>• Determination of dielectric constant of a given dielectric material.<br>• Determination of resistance of ballistic galvanometer by half deflection method and study of variation of logarithmic decrement with series resistance.<br>• Determination of the thermo-electric power at a certain temperature of the given thermocouple.<br>• Determination of specific charge (e/m) of electron by J.J. Thomson's method.<br><br>Quantum Physics<br>• Determination of Planck's constant using photocell.<br>• Determination of Lande'g factor using Electron spin resonance spectrometer.<br>• Determination of Stefan's radiation constant<br>• Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.<br>• Determination of Rydberg constant by studying Hydrogen/ Helium spec<br><br>Modern Physics<br>• Determination of Hall co-efficient of semiconductors.<br>• Determination of band gap of semiconductors.<br>• To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells. |

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| Analog & Digital Electronics Lab | To provide students the ability to design and conduct experiments, analyze and interpret experiment data by performing the following experiments related to the study of the theory paper:<br><br>ANALOG Electronics<br>• Design a Class A amplifier<br>• Design a Phase-Shift Oscillator<br>• Design of a Schmitt Trigger using 555 timer.<br><br>DIGITAL Electronics<br>• Design a Full Adder using basic gates and verify its output / Design a Full Subtractor circuit using basic gates andverify its output.<br>• Construction of simple Decoder & Multiplexer circuits using logic gates.<br>• Realization of RS / JK / D flip flops using logic gates.<br>• Design of Shift Register using J-K / D Flip Flop.<br>• Realization of Synchronous Up/Down counter.<br>• Design of MOD- N Counter<br>• Study of DAC. |
| Data Structure & Algorithm Lab | • To provide students with solid foundation in implementing different Data Structures such as Arrays, Stack, Queues, Linked List, Tree Traversal in C Language.<br><br>• To train the students to effectively analyze problems, design experiments and use proper   Data Structures with minimum time and space complexity and analyze the output with appropriate test data.<br><br>• To provide students with solid foundation in implementing different Sorting/Searching techniques in C Language. |
| Computer Organization Lab | To provide students the ability to design and conduct experiments, analyze and interpret experiment data by performing the following experiments related to the study of the theory paper:<br><br>1. Familiarity with IC-chips, e.g.a) Multiplexer , b) Decoder, c) Encoder d) Comparator<br>2. Truth Table verification and clarification from Data-book.<br>3. Design an Adder/Subtractor composite unit.<br>4. Design a BCD adder.<br>5. Design of a 'Carry-Look-Ahead' Adder circuit.<br>6. Use a multiplexer unit to design a composite ALU.<br>7. Use ALU chip for multi-bit arithmetic operation.<br>8. Implement read write operation using RAM IC.<br>9. (a) & (b) Cascade two RAM ICs for vertical and horizontal expansion. |

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| Technical Report Writing and Language Practice Lab | • English being an important tool for today's international communication, the objective of the course is to develop in students the ability to use English in an all-round way, to make them job proficient so that in their future work, higher learning and social interaction they are able to exchange information effectively both in spoken and written forms.<br>• To train students to improve their reading, writing & listening skills.<br>• To train students to interact confidently through formal, informal and semi formal speaking with emphasis on clarity, diction, tone, pitch and voice quality.<br>• To train students to make presentations, face interview sessions and handle Group Discussions.<br>• To train students in a manner so that they succeed in competitive exams like CAT, TOEFL, GMAT, ILES etc. |
| Numerical Methods Lab | To provide students with the ability to implement numerical solution of engineering problems in C programming language by performing the following experiments related to the study of the theory paper:<br><br>1. Numerical interpolation using Newton's forward, backward and Lagrange's interpolation method.<br>2. Numerical integration using Trapezoidal rule, Simpson's 1/3 rule and Weddle's rule.<br>3. Numerical solution of a system of linear equations using Gauss elimination direct method and Gauss-Seidel iterative method.<br>4. Numerical solution of Algebraic Equation by Regula-Falsi and Newton-Raphson methods.<br>5. Numerical solution of ordinary differential equation using Euler's method and Runga-Kutta method.<br>6. Solution of numerical method problems in MATLAB.<br><br>To train students so that they can apply numerical methods in solving numerical problems using computer. |
| Communication Engineering & Coding Theory Lab | To provide students the ability to design and conduct experiments, analyze and interpret experiment data by performing experiments from the following related to the study of the theory paper:<br>• Generation of Amplitude Modulation (Design using transistor or Balanced Modulator Chip (to view the waveshapes)<br>• Generation of FM using VCO chip (to view the wave shapes)<br>• Generation of PAM<br>• Generation of PWM & PPM (using IC 555 Timer) |

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| Software Tools | This lab aims at providing the students the first hand experience of handling a software application. Visual Basic language – a windows programming tool is used in building the students in this process. The objectives are:<br><br>1. A thorough knowledge in Visual Basic programming language in Visual Studio 6 which includes Project Creation, Form creation, use of different form components, Database connectivity<br><br>2. A simple group project development in any of the following application areas:<br>a) Payroll accounting system.<br>b) Library circulation management system.<br>c) Inventory control system.<br>d) University examination & grading system.<br>e) Patient information system.<br>f) Tourist information system.<br>g) Judiciary information system.<br>h) Flight reservation system.<br>i) Bookshop automation software.<br>j) Time management software.<br>and many more. |
| Computer Architecture Lab [Pre-requisite: Analog & Digital Electronics and Computer Organization lab] | To provide the students the knowledge of performing the following hardware experiments Hardware Description Language (VHDL or Verilog) Simulation:<br>• HDL introduction<br>• Basic digital logic base programming with HDL<br>• 8-bit Addition, Multiplication, Division<br>• 8-bit Register design<br>• Memory unit design and perform memory operations.<br>• 8-bit simple ALU design<br>• 8-bit simple CPU design<br>• Interfacing of CPU and Memory<br>To provide students the concepts and practice of VHDL to help them work in VLSI area in future |

| Design & Analysis of Algorithm Lab | To provide students the ability to implement the algorithms studied in the theory paper by performing individual lab experiments for each of the following topics:<br><br>• Divide & Conquer – Binary search, Merge sort, Quick sort, Find max, min element from an array of integers<br><br>• Dynamic programming - Find the minimum number of scalar multiplication needed for chain of matrix, Implement all pair of Shortest path for a graph ( Floyed- Warshall Algorithm ), Implement Traveling Salesman Problem, Implement Single Source shortest Path for a graph ( Dijkstra , Bellman Ford Algorithm)<br><br>• Brunch and Bound - Implement 15 Puzzle Problem<br><br>• Backtracking  - Implement 8 Queen problem, Graph Coloring Problem or Hamiltonian Problem<br><br>• Greedy method - Knapsack Problem or Job sequencing with deadlines, Minimum Cost Spanning Tree by Prim's Algorithm or Minimum Cost Spanning Tree by Kruskal's Algorithm<br><br>• Graph Traversal Algorithm  - Implement Breadth First Search (BFS), Implement Depth First Search (DFS) |
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| Microprocessor and Microcontrollers Lab | To prepare Students to excel in 8085 microprocessor programming and to have a successful careers in computing industry that meet the needs of Indian and multinational companies. To provide Students with solid foundation in concept of 8085 & 8086 microprocessor, different peripherals, interfacing different peripherals with 8085 microprocessor and assembly language so that they will be able to use the knowledge in Assembly Level Language program development. To train Students to effectively analyze assembly language.<br><br>Students will demonstrate<br><br>• the knowledge of assembly language computing.<br><br>• the ability to analyze assembly language and to identify & define the computing requirements appropriate to its solution.<br><br>• to write assembly level program.<br><br>• an ability to work at assembly level of programming.<br><br>Students will have an ability to apply knowledge of assembly language to develop 8085 microprocessor based programs.<br><br>Students will be able to<br><br>• use current techniques of assembly level of programming like 8085 microprocessor Simulator for developing microprocessor based applications.<br><br>• recognize the need for, and an ability to engage in , continuing microprocessor programming development. |
| Object Oriented Programming Lab | To provide students with the ability to implement object oriented programming in Java by performing experiments from the following topic:<br><br>1. Experiment on class, constructor, overloading, inheritance, overriding<br>2. Experiment on wrapper class, arrays<br>3. Experiment on developing interfaces- multiple inheritance, extending interfaces<br>4. Experiment on creating and using packages<br>5. Experiment on multithreaded programming<br>6. Experiment on applet programming<br><br>To train students in solving problems in Object Oriented Programming. |

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| Database Management System Lab | To train students in the use of SQL and PL/SQL in Oracle Database<br><br>To provide Students with the foundation in Relational database Management system.<br><br>To Prepare Students to excel in Post Graduate programs and to have a successful career in Database applications that meet the needs of Indian and multinational companies.<br><br>To train Students to effectively use this knowledge to study, analyze, design and construct software applications involving Database. |
| Operating System Lab | To provide students the ability to implement the algorithms studied in the theory paper by performing lab experiments for each of the following topics:<br><br>1. Managing Unix/Linux Operating System - shell script, Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock, I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Backup schedules and methods Kernel loading, init and the inittab file, Run-levels. Password file management, Password security, Shadow file, Groups and the group file, user-management commands<br><br>2. Process - starting new process, replacing a process image, duplicating a process image, waiting for a process, zombie process.<br><br>3. Signal - signal handling, sending signals, signal interface, signal sets.<br><br>4. Semaphore - programming with semaphores.<br><br>5. POSIX Threads - programming with pthread functions.<br><br>6. Inter-process communication – pipes, named pipes, message passing & shared memory. |
| Network Lab | To provide Students with the fundamental concepts of data, signals, digital and analog transmission, multiplexing techniques, various techniques of physical, data link, network, transport and application layer.<br><br>To train Students with good scientific and engineering breadth so as to design and implement LAN networks and its related technologies in the data communication industries.<br><br>To prepare Students in developing networking management applications by using different networking protocols like TCP, UDP, HTTP, FTP, SMTP, SNMP, DNS. |

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| Seminar Lab | To inculcate in Students professional and ethical attitude, effective communication skills, and an ability to relate computing issues to broader social context.

To train the students to study and present a technical topic to a range of audiences which include teachers and their fellow mates.

To train the students to prepare PowerPoint slides relevant to the given topic.

To provide Students with an academic environment aware of excellence, leadership, written ethical codes and guidelines, and the lifelong learning needed for a successful professional career. |
| Internet Technology Lab | To provide Students with the foundation of TCP/IP internet, internet protocol and standardization, internet address, routing algorithms, enterprise networking, various security techniques like firewalls so that they are able to design and implement various types of networks in the data communication industries.

To prepare the Students to excel in the field of internetworking as competent network specialist, network administrators, network designers and network consultants.
To prepare Students to excel in web development by learning the basic of web based programming.

To provide Students with solid foundation of the concept so that they will be able to use this knowledge in real world.

To train Students to effectively comprehend, analyze, design and construct programs of low complexity. |
| Software Engineering Lab | To train students in requirement study for standard applications with the knowledge of project schedule preparation, use case diagram, class diagram, sequence diagram, calculation of Function Point, Test plan and process & product metrics. |
| Artificial Intelligence Lab | Here students will learn & be able to implement different concepts & mechanisms of  Artificial Intelligence like heuristic searching techniques, knowledge & reasoning, predicate logic, knowledge representation, probabilistic reasoning, planning, natural language processing, learning & expert systems using PROLOG & LISP programming languages. |
| Project Lab | To train students in requirement study of software project, analyze, design, code and test the software applications using state of the art technology and tools.

To train students in software development methodology and project documentation.

To inculcate in students professional and ethical attitude and teamwork skills.
To train students in effective communication and presentation skill.
To train students in learning new topic by literature survey, book & paper study and analyze result. |

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| Practical Training Evaluation | To evaluate the students' performance in the industrial training. Exposure of students to industry and/or technology training. |