

**K.S.R. COLLEGE OF ENGINEERING (Autonomous) –TIRUCHENGODE.****Vision of the Institution**

- We envision to achieve status as an excellent educational institution in the global knowledge hub, making self-learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world.

**Mission of the Institution**

- To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs.
- To foster and maintain a mutually beneficial partnership with global industries and Institutions through knowledge sharing, collaborative research and innovation.

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING****Vision of the Department**

- To create ever green professionals for software industry, academicians for knowledge cultivation and researchers for contemporary society modernization.

**Mission of the Department**

- To produce proficient design, code and system engineers for software development.
- To keep updated contemporary technology and fore coming challenges for welfare of the society.

**Programme Educational Objectives (PEOs)**

**PEO1** : Figure out, formulate, analyze typical problems and develop effective solutions by imparting the idea and principles of science, mathematics, engineering fundamentals and computing.

**PEO2** : Competent professionally and successful in their chosen career through life-long learning.

**PEO3** : Excel individually or as member of a team in carrying out projects and exhibit social needs and follow professional ethics.

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING****Subject Name: Problem Solving Techniques****Subject Code: 18CS111****Year/Semester: I/ I****Course Outcomes: On completion of this course, the student will be able to**

- ❖ Outline the basics of problem solving techniques.
- ❖ Analyze the fundamental algorithms.
- ❖ Find the factors and analyze array operations.
- ❖ Evaluate the basic string operations.
- ❖ Summarize the fundamentals of java script

**Program Outcomes (POs) and Program Specific Outcomes (PSOs)****A. Program Outcomes (POs)****Engineering Graduates will be able to :**

- Engineering knowledge:** Ability to exhibit the knowledge of mathematics, science, engineering fundamentals and programming skills to solve problems in computer science.
- PO1**
- PO2** **Problem analysis:** Talent to identify, formulate, analyze and solve complex engineering problems with the knowledge of computer science. .
- PO3** **Design/development of solutions:** Capability to design, implement, and evaluate a computer based system, process, component or program to meet desired needs.
- PO4** **Conduct investigations of complex problems:** Potential to conduct investigation of complex problems by methods that include appropriate experiments, analysis and synthesis of information in order to reach valid conclusions.
- PO5** **Modern tool Usage:** Ability to create, select, and apply appropriate techniques, resources and modern engineering tools to solve complex engineering problems.
- PO6** **The engineer and society:** Skill to acquire the broad education necessary to understand the impact of engineering solutions on a global economic, environmental, social, political, ethical, health and safety.
- PO7** **Environmental and sustainability:** Ability to understand the impact of the professional engineering solutions in societal and Environmental contexts and demonstrate the knowledge of, and need for sustainable development.
- PO8** **Ethics:** Apply ethical principles and commit to professional ethics and responsibility and norms of the engineering practices.
- PO9** **Individual and team work:** Ability to function individually as well as on multi-disciplinary teams.
- PO10** **Communication:** Ability to communicate effectively in both verbal and written mode to excel in the career.
- PO11** **Project management and finance:** Ability to integrate the knowledge of engineering and management principles to work as a member and leader in a team on diverse projects.
- PO12** **Life-long learning:** Ability to recognize the need of technological change by independent and life-long learning.

**B. Program Specific Outcomes (PSOs)**

- PSO1** Develop and Implement computer solutions that accomplish goals to the industry, government or research by exploring new technologies.
- PSO2** Grow intellectually and professionally in the chosen field.

	<p align="center"><b>UNIT – I COMPUTER FUNDAMENTALS</b></p> <p>Introduction and Organization of Computer – Hardware, Software and Firmware – Classification of Software – Introduction to Algorithms, Pseudo code and Flowchart. Steps in Problem Solving – Problem Solving Strategies – Top down design.</p>
	<b>PART A</b>
<b>1</b>	<p><b>Define computers.</b></p> <p>A computer is a programmable machine or device that performs pre-defined or programmed computations or controls operations that are expressible in numerical or logical terms at high speed and with great accuracy.</p> <p align="center">(Or)</p> <p>Computer is a fast operating electronic device, which automatically accepts and store input data, processes them and produces results under the direction of step by step program.</p>
<b>2</b>	<p><b>Why computer is known as data processing system?</b></p> <p>Any process that uses a computer program will enter data and summarize, analyze or otherwise convert data into usable information. The process may be automated and run on a computer. It involves recording, analyzing, sorting, summarizing, calculating, disseminating and storing data. Thus Computer is known as data processing system.</p>
<b>3</b>	<p><b>What is Data and Information?</b></p> <p><b>Data</b> - Data is the fact or raw material for the information processing.  <b>Information</b> – The processed data is called information.</p>
<b>4</b>	<p><b>What are the basic operations of Computer?</b></p> <ol style="list-style-type: none"> <li>1) It accepts data or instructions by way of input.</li> <li>2) It stores data.</li> <li>3) It can process data as required by the user.</li> <li>4) It gives results in the form of output.</li> <li>5) It controls all operations inside a computer.</li> </ol>
<b>5</b>	<p><b>Give the applications computer.</b></p> <ul style="list-style-type: none"> <li>· Word Processing</li> <li>· Internet</li> <li>· Desktop publishing</li> <li>· Digital video or audio composition</li> <li>· Mathematical Calculations</li> <li>· Robotics</li> <li>· Weather analysis</li> </ul>
<b>6</b>	<p><b>What are the characteristics of computers?</b></p> <ul style="list-style-type: none"> <li>· Speed</li> <li>· Accuracy.</li> <li>· Automation.</li> <li>· Endurance.</li> <li>· Versatility.</li> <li>· Storage.</li> <li>· Cost Reduction</li> </ul>
<b>7</b>	<p><b>How will you classify computer systems?</b></p>

	<p>Based on physical size, performance and application areas, we can generally divide computers into four major categories:</p> <ol style="list-style-type: none"><li>1. Micro computer</li><li>2. MiniComputer</li><li>3. Mainframe computerand</li><li>4. SuperComputer</li></ol>																								
8	<p><b>Specify the Electronic components used for different computergenerations.</b></p> <table><tr><th>Generations</th><th>Electronic Components</th></tr><tr><td>I Generation</td><td>Vacuum tubes</td></tr><tr><td>II Generation</td><td>Transistors</td></tr><tr><td>III Generation</td><td>Integrated Circuits</td></tr><tr><td>IV Generation</td><td>Microprocessors</td></tr><tr><td>V Generation</td><td>Artificial Intelligence</td></tr></table>	Generations	Electronic Components	I Generation	Vacuum tubes	II Generation	Transistors	III Generation	Integrated Circuits	IV Generation	Microprocessors	V Generation	Artificial Intelligence												
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9	<p><b>Compare Computer withcalculator.</b></p> <table><tr><th>S.No</th><th>Characteristics</th><th>Calculator</th><th>Computer</th></tr><tr><td>1</td><td>Speed</td><td>Fast</td><td>Much Fast</td></tr><tr><td>2</td><td>Performance</td><td>Simple Calculation and numeric processing.</td><td>Complex problem and non-numeric processing also.</td></tr><tr><td>3</td><td>Memory</td><td>Less internal memory, no permanent storage, temporary storage only.</td><td>Large internal memory and large permanent storage available.</td></tr><tr><td>4</td><td>Machine</td><td>Electronic Device.</td><td>Electronic Device.</td></tr><tr><td>5</td><td>Operation</td><td>Arithmetic.</td><td>Arithmetic and logical.</td></tr></table>	S.No	Characteristics	Calculator	Computer	1	Speed	Fast	Much Fast	2	Performance	Simple Calculation and numeric processing.	Complex problem and non-numeric processing also.	3	Memory	Less internal memory, no permanent storage, temporary storage only.	Large internal memory and large permanent storage available.	4	Machine	Electronic Device.	Electronic Device.	5	Operation	Arithmetic.	Arithmetic and logical.
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10	<p><b>What are the languages used in computergenerations?</b></p> <table><tr><th>Generations</th><th>Languages used</th></tr><tr><td>I Generation</td><td>Machine Language.</td></tr><tr><td>II Generation</td><td>Assemble Language, Mnemonics</td></tr><tr><td>III Generation</td><td>High Level Language, BASIC, PASCAL, COBOL, FORTRON.</td></tr><tr><td>IV Generation</td><td>4GL</td></tr><tr><td>V Generation</td><td>Artificial Intelligence.</td></tr></table>	Generations	Languages used	I Generation	Machine Language.	II Generation	Assemble Language, Mnemonics	III Generation	High Level Language, BASIC, PASCAL, COBOL, FORTRON.	IV Generation	4GL	V Generation	Artificial Intelligence.												
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11	<p><b>Expand ENIVAC, ABC, EDVAC, EDSAC and UNIVAC.</b></p> <p><b>ENIAC</b> – Electronic Numerical Integrator and Calculator.  <b>ABC</b> – Atanasoff and Berry Computer.  <b>EDVAC</b> – Electronic Discrete Variable Automatic Calculator.  <b>EDSAC</b> – Electronic Delay Storage Automatic Calculator.  <b>UNIVAC</b> – UNIVersal Automatic Computer.</p>
12	<p><b>Who is the father of computer? Why?</b></p> <p>Charles Babbage is the father of computer, because the parts and working principle of the Analytical Engine, which is invented by Charles Babbage is similar to today's computer.</p>
13	<p><b>Expand COBOL, BASIC, FORTRON and IBM.</b></p> <p><b>COBOL</b> – Common Business Oriented Language.  <b>BASIC</b> - Beginner's All Purpose Symbolic Instruction Code.  <b>FORTRON</b> – FORMulaTRANslation.  <b>IBM</b> – International Business Machine.</p>
14	<p><b>Expand IC, SSI, MSI, LSI, and VLSI.</b></p> <p><b>IC</b> – Integrated Circuit.  <b>SSI</b> - Small Scale Integration.  <b>MSI</b> - Medium Scale Integration.  <b>LSI</b> - Large Scale Integration.  <b>VLSI</b> - Very Large Scale Integration</p>
15	<p><b>What are the components of the computer systems?</b></p> <p>Basic components of the computer system are Input Unit, Central Processing Unit, Secondary Storage Unit and Output Unit.</p>
16	<p><b>What are the functions in the input unit?</b></p> <p>An input device is a device that is used to input data or information into a computer.  Some examples of input devices include:</p> <ul style="list-style-type: none"> <li>❖ Keyboards.</li> <li>❖ Computermice.</li> <li>❖ LightPen.</li> <li>❖ Digitizer.</li> <li>❖ Touchpad.</li> <li>❖ Trackball.</li> <li>❖ Image scanner.</li> <li>❖ Webcam.</li> <li>❖ Video capture / tunercards.</li> <li>❖ Microphones.</li> <li>❖ MIDI instruments.</li> </ul>

17	<p><b>What are the functions in the output unit?</b></p> <p>In computers, a unit which delivers information from the computer to an external device or from internal storage to external storage.</p> <ul style="list-style-type: none"> <li>❖ Speakers.</li> <li>❖ Printer.</li> <li>❖ Headphone.</li> <li>❖ Monitor (or) Visual Display Unit(VDU).</li> </ul> <p>Plotter</p>
18	<p><b>What is an ALU?</b></p> <p>Arithmetic logic unit, the part of a computer that performs all arithmetic computations, such as addition and multiplication, and all logical operations such as comparison operations. The ALU is one component of the CPU (central processing unit).</p>
19	<p><b>Define Clients and Servers.</b></p> <p>A <b>client</b> is generally a single-user PC or workstation that provides a highly user-friendly interface to the end user. It runs client processes, which send service requests to the server.</p> <p>A <b>server</b> is generally a relatively large computer that manages a shared resource and provides a set of shared user services to the clients. It runs the server process, which services client requests for use of the resource managed by the server. The network may be single LAN or WAN or an internet of networks.</p>
20	<p><b>What is a CPU?</b></p> <p>The CPU (central processing unit) is the part of a computer controls the interpretation and execution of instructions. Generally, the CPU is a single microchip.</p> <p style="text-align: center;">(Or)</p> <p>The computing part of the computer. Also called the "processor," it is made up of the control unit and ALU. Today, the CPUs of almost all computers are contained on a single chip.</p> <p>The CPU, clock and main memory make up a computer. A complete computer system requires the addition of control units, input, output and storage devices and an operating system.</p>
21	<p><b>What is meant by generation in computer terminology?</b></p> <p>Generation is the period of years in which the computers are enhanced as previous.</p>

22	<b>Define personal computers.</b>
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	<p>A small, relatively inexpensive computer designed for an individual user. In price, personal computers range anywhere from a few hundred dollars to thousands of dollars.</p> <p>All are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip.</p> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>· Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications.</li> <li>· At home, the most popular use for personal computers is for playing games.</li> </ul>
23	<p><b>Define Mainframe computer.</b></p> <p>Mainframes are computers used mainly by large organizations for critical applications, typically bulk data processing such as census, industry and consumer statistics, enterprise resource planning, and financial processing.</p> <p>The term probably had originated from the early mainframes, as they were housed in enormous, room-sized metal boxes or frames.</p>
24	<p><b>Define Minicomputers.</b></p> <p>A mini computer is a multi-user or time-sharing system. It is used for medium scale data processing such as Bank account processing, Payroll processing etc., Mini computer process greater storage capacity and larger memories as compared to micro computer.</p>
25	<p><b>Define supercomputer.</b></p> <p>The fastest type of computer. Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations.</p> <p>For example, weather forecasting requires a supercomputer. Other uses of supercomputers include animated graphics, fluid dynamic calculations, nuclear energy research, and petroleum exploration.</p>
26	<p><b>Define Software.</b></p> <p>Computer instructions or data, anything that can be stored electronically is software. Or)</p> <p>Computer software or just software is a general term used to describe the role that computer programs, procedures and documentation in a computer system</p>
27	<p><b>Define Hardware.</b></p> <p>Computer hardware - (computer science) the mechanical, magnetic, electronic, and electrical components making up a computer system hardware.</p> <p>Hardware includes not only the computer proper but also the cables, connectors, power supply units, and peripheral devices such as the keyboard, mouse, audio speakers, and printers.</p>

28	<p><b>What is an instruction?</b></p> <p>An instruction is a basic command. The term instruction is often used to describe the most rudimentary programming commands. For example, a computer's instruction set is the list of all the basic commands in the computer's machine language.</p>
29	<p><b>Define memory.</b></p> <p>Computer memory refers to devices that are used to store data or programs (sequences of instructions) on a temporary or permanent basis for use in an electronic digital computer.</p>
30	<p><b>What is a volatile and non-volatile memory?</b></p> <p><b>Volatile memory:</b> also known as volatile storage is computer memory that requires power to maintain the stored information, unlike non-volatile memory which does not require a maintained power supply. It has been less popularly known as temporary memory.</p> <p><b>Non-volatile memory:</b> nonvolatile memory, NVM or non-volatile storage, is computer memory that can retain the stored information even when not powered.</p> <p><b><u>Examples of non-volatile memory</u></b></p> <ul style="list-style-type: none"> <li>· read-only memory</li> <li>· flash memory</li> <li>· most types of magnetic computer storage devices (e.g. hard / floppy disks &amp; magnetic tape)</li> <li>· optical discs.</li> <li>· Early computer storage methods such as paper tape and punchcards.</li> </ul> <p>Non-volatile memory is for long-term persistent storage. The most widely used form of primary storage today is a volatile form of random access memory (RAM), meaning that when the computer is shut down, anything contained in RAM is lost.</p>
31	<p><b>What is a primary memory?</b></p> <p>The primary memory or the main memory is part of the main computer system. The processor or the CPU directly stores and retrieves information from it. This memory is accessed by CPU, in random fashion. That means any location of this memory can be accessed by the CPU to either read information from it, or to store information in it.</p> <p><b><u>Types of Primary Memory:</u></b></p> <ul style="list-style-type: none"> <li>· RAM is RWM (Read Write Memory), the CPU can write and read information from any primary memory location implemented using RAM.</li> <li>· ROM stands for Read Only Memory.</li> </ul>
32	<p><b>What is a secondary memory?</b></p> <p>The secondary memory is much slower and also less costly. It stores the data permanently unless it is erased.</p> <p><b><u>Examples:</u></b> Floppy disk storage, CD / DVD, Pen drive, Memory chips etc.,</p>



33	<b>Define Computer Software.</b> Software is a set of programs or collection of programs that is executed by the Computer's CPU to function it in a desired way.
34	<b>What is meant by Installation and Assembling?</b> <b>Installation</b> –It is the process of loading the software package into the computer. <b>Assembling</b> – It is the process of mounting different computer peripherals into one, to make the computer to function properly.
35	<b>Define Hardware.</b> Hardware is the physical components of the computer.
36	<b>What are the types of Software?</b> Application software. System software.
37	<b>Define OS.</b> An operating system is a set of programs, which are used to control and co-ordinate the computer system.
38	<b>What are the basic functions of an OS?</b> <ul style="list-style-type: none"> <li>• Process Management.</li> <li>• Memory Management.</li> <li>• File Management.</li> <li>• Device Management.</li> <li>• Security Management.</li> <li>• User Interface.</li> </ul>
39	<b>What are the types of Operating System?</b> <ul style="list-style-type: none"> <li>• Single user operating system.</li> <li>• Multi-user operating system.</li> <li>• Time sharing operating system.</li> <li>• Virtual storage operating system.</li> <li>• Real time operating system.</li> <li>• Multiprocessing operating system.</li> </ul> Virtual machine operating system
40	<b>Define Multiprocessing.</b> Multiprocessing is the process of executing a single job by using multiple CPU's.
41	<b>What are language translators?</b> The language translators are the programs which come under system software category. They are Compilers, Interpreters and Assembler.

42	<p><b>What are a Compiler, Assembler and Interpreter?</b></p> <p><b>Compiler:</b> It is a program which is used to convert the high level language program into machine language.</p> <p><b>Assembler:</b> It is a program which is used to convert the assembly level language program into machine language.</p> <p><b>Interpreter:</b> It is a program; it takes one statement of a high level language program, translates it into machine language instruction and then immediately executes the resulting machine language instruction.</p>
43	<p><b>What is Device Driver?</b></p> <p>In computing, a device driver or software driver is a computer program allowing higher- level computer programs to interact with a hardware device. A driver typically communicates with the device through the computer bus or communications subsystem to which the hardware connects.</p>
44	<p><b>What is the purpose of a DeviceDriver?</b></p> <p>A device driver simplifies programming by acting as a translator between a hardware device and the applications or operating systems that use it. Programmers can write the higher-level application code independently of whatever specific hardware device it will ultimately control, because code and device can interface in a standard way, regardless of the software superstructure or of underlying hardware. Every version of a device, such as a printer, requires its own hardware-specific specialized commands.</p>
45	<p><b>What is a linker?</b></p> <p>A linker is a program that combines object modules to form an executable program.</p> <p>Many programming languages allow you to write different pieces of code, called modules, separately. This simplifies the programming task because you can break a large program into small, more manageable pieces. Modules has to be put together. This is the job of the linker.</p> <p>In addition to combining modules, a linker also replaces symbolic addresses with real addresses. Therefore, you may need to link a program even if it contains only one module.</p>
46	<p><b>What is a loader?</b></p> <p>In computing, a loader is the part of an operating system that is responsible for one of the essential stages in the process of starting a program, loading programs, that is, starting up programs by reading the contents of executable files (executables- files containing program text) into memory, then carrying out other required preparatory tasks, after which the program code is finally allowed to run and is started when the operating system passes control to the loaded program code.</p>
47	<p><b>What is Booting?</b></p> <p>In computing, booting (also known as "booting up") is a bootstrapping process that starts operating systems when the user turns on a computer system. A boot sequence is the initial set of operations that the computer performs when power is switched on. The boot loader typically loads the main operating system for the computer.</p>

48	<b>How can you obtain required software?</b> <ul style="list-style-type: none"> <li>• Buying Pre-defined software.</li> <li>• Buying customized software.</li> <li>• Developing the software.</li> <li>• Downloading from the Internet.</li> </ul>												
49	<b>What is application software?</b> An application software is a set of programs, that allows the computer to perform a specific data processing for the user.												
50	<b>What are the categories of application software?</b> <ul style="list-style-type: none"> <li>• Customized Application Software.</li> <li>• General Application Software</li> </ul>												
51	<b>Differentiate Application and System Software.</b> <table> <tr> <th>S No.</th> <th>Application Software</th> <th>System Software</th> </tr> <tr> <td>1</td> <td>Used to perform specific data processing or computational tasks to the user.</td> <td>System software is the code that controls the hardware.</td> </tr> <tr> <td>2</td> <td>It runs on top of the operating system and performs a number of tasks for the computer system.</td> <td>It forms the foundation and takes care of the most basic tasks of the computer system.</td> </tr> <tr> <td>3</td> <td>Example: MS-Word</td> <td>Example: Operating System</td> </tr> </table>	S No.	Application Software	System Software	1	Used to perform specific data processing or computational tasks to the user.	System software is the code that controls the hardware.	2	It runs on top of the operating system and performs a number of tasks for the computer system.	It forms the foundation and takes care of the most basic tasks of the computer system.	3	Example: MS-Word	Example: Operating System
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52	<b>What is algorithm?</b> Algorithm means the logic of a program. It is a step-by-step description of how to arrive at a solution of a given problem												
53	<b>What are the steps to solve the problem in a computer system?</b> <ul style="list-style-type: none"> <li>• Problem must be analyzed thoroughly.</li> <li>• Solution method is broken down into a sequence of small tasks.</li> <li>• Based on this analysis, an algorithm must be prepared to solve the problem.</li> <li>• The algorithm is expressed in a precise notation. This notation is known as “Computer Program”.</li> <li>• The Computer program is fed to the computer.</li> <li>• The instruction in the program executes one after another and outputs the expected result.</li> </ul>												
54	<b>How can you measure the quality of algorithm?</b> The primary factors that are often used to judge the quality of an algorithm are time requirement, memory requirement, and accuracy of solution.												

55	<b>What is decision table?</b> A decision table is a table containing the selection of conditions to be tested and how those conditions should be nested to arrive at the proper action.
56	<b>What are the characteristics of an algorithm?</b> <ol style="list-style-type: none"> <li>1. In algorithms each and every instruction should be precise.</li> <li>2. In algorithms each and every instruction should be unambiguous.</li> <li>3. The instructions in an algorithm should not be repeated infinitely.</li> <li>4. Ensure that the algorithm will ultimately terminate.</li> <li>5. The algorithm should be written in sequence.</li> <li>6. It looks like normal English.</li> <li>7. The desired result should be obtained only after the algorithm terminates.</li> </ol>
57	<b>How many types the Algorithm can be represented?</b> Normal English Program Flowchart Pseudo code Decision table
58	<b>What is Flowchart?</b> A Flowchart is a pictorial representation of an algorithm. It is often used by programmer as a program planning tool for organizing a sequence of step necessary to solve a problem by a computer.
59	<b>What is the need of Flowchart symbols?</b> Each symbol of different shapes denotes different shapes denote different types of instructions. The program logic through flowcharts is made easier through the use of symbol that has standardized planning.
60	<b>What is pseudocode?</b> “Pseudo” means imitation of false and “code” refers to the instruction written in the programming language. Pseudo code is programming analysis tool that is used for planning program logic.
61	<b>What is structured programming?</b> A structured programming is a more specific approach to solve a programming problem by using only the three basic logic structures. They are sequence logic, selection logic and Iteration logic.
62	<b>What are the rules for drawing a flowchart?</b> The standard symbols should only be used. The arrowheads in the flowchart represent the direction of flow of control in the problem. The usual direction of the flow of procedure is from top to bottom or left to right. The flow lines should not cross each

	<p>other.</p> <p>Be consistent in using names and variables in the flowchart. Keep the flowchart as simple as possible.</p> <p>Words in the flowchart symbols should be common statements and easy to understand.</p> <p>Chart main line of logic, and then incorporate all the details of logic.</p> <p>If a new page is needed for flowcharting, then use connectors for better representation.</p> <p>Don't chart every details or the flowchart will only be graphical represented.</p>
63	<p><b>What is sequence logic?</b></p> <p>Sequence logic is used for performing instructions one after another in a sequence.</p>
64	<p><b>What is selection logic?</b></p> <p>Selection logic is used for selecting the process path out of two or more alternative paths in the program logic. It uses three control structures called if...then, if... then...else and switch...case.</p>
65	<p><b>What is Iteration logic?</b></p> <p>Iteration logic is used for producing loops in program logic when one or more instructions may be executed several times depending on some condition. It uses two control structures called do...while, and repeat...until.</p>
66	<p><b>What are the rules for writing pseudo code?</b></p> <p>Write on statement per line.</p> <p>Capitalize initial keywords.</p> <p>Indent to show hierarchy.</p> <p>End multi line structure.</p> <p>Keep statements language independent.</p>
67	<p><b>What is a program?</b></p> <p>A program is a set instruction written to carryout a particular task, so that Computer can perform some specified task.</p>
68	<p><b>What are the various problem solving aspects available?</b></p> <p>Problem definition phase</p> <p>Getting started on a problem</p> <p>The use of Specific examples</p> <p>Similarities among problems</p> <p>Working backwards from the solution</p> <p>General problem solving strategies</p>
69	<p><b>Define Top Down design.</b></p> <p>Top down design is a strategy that we can apply to take solutions of a computer problem from a vague outline to a precisely defined algorithm and program implementation.</p> <p>A technique for algorithm design that tries to accommodate this human limitation is known as top down design or stepwise refinement.</p> <p>It is a approach used to convert the high level language into low level language.</p>

**PART B**

1	Define computer. Explain the characteristics briefly?
2	Describe evolution of computer?
3	Explain various generations of computers with features?
4	Explain the basic computer organization in detail?
5	Explain the fundamental units of a computer with a block diagram?
6	Explain the classification of computers?
7	Describe briefly about Secondary storage devices?
8	Elaborate the various Input and Output Devices?
9	Give the categories of Software with example?
10	State different language translators and explain their functions?
11	Explain in detail the steps involved in Software Development Process?
12	Explain flowchart in detail?
13	Describe in detail about algorithm? Give example.
14	Elaborate pseudo code with example.
15	Problems based on flowchart, pseudocode and algorithms.
16	Explain about the various steps involved in problem solving.
17	What are the various problem solving strategies available?
18	Explain about the Top down design approach in detail.

**UNIT – II FUNDAMENTAL ALGORITHMS**

Exchanging the Values – Counting – Summation of Set of Number – Factorial Computation – Generation of the Fibonacci Sequence – Reversing the Digits of an Integer – Decimal to Binary Conversion and vice versa.

**Part A**

<b>1</b>	<p><b>What is the Algorithm for exchanging values of two variables?</b></p> <p>There are three primary algorithms to exchange the values of two variables.</p> <p>Exchange with Temporary Variable</p> <pre>temp = a; a = b; b = temp;</pre> <p>Exchange Without Temporary Variable Using Exclusive Or</p> <pre>a = a ^ b; b = b ^ a;</pre>
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	$a = a \wedge b;$ Exchange Without Temporary Variable Using Arithmetic $a = a + b;$ $b = b - a;$ $a = a - b;$
2	<b>Define Counting Sort.</b> Counting sort is a sorting technique based on keys between a specific range. It works by counting the number of objects having distinct key values (kind of hashing). Then doing some arithmetic to calculate the position of each object in the output sequence.
3	<b>Write the algorithm description for exchanging the values.</b> Save the original value of a in t Assign to a the original value of b Assign to b the original value of a that is stored in t
4	<b>Write Pascal Implementation for exchanging the values.</b> <pre> Procedure exchange (var, a,b : integer); Var t : integer; Begin t:=a; a:=b; b:=t; end </pre>
5	<b>What are the two steps available in counting process?</b> <pre> Current_count := previous_count+1 previous_count := Current_count </pre>
6	<b>Explain the algorithm description of counting.</b> Prompt then read the number of marks to be processed. Initialize count to zero. While there are still marks to be processed repeatedly do (a) Read next mark, (b) If it is a pass (i.e. $\geq 50$ ) then add one to count. Write out total number of passes
7	<b>Give General Algorithm for sum of digits in a given number.</b> <ol style="list-style-type: none"> <li>1. Get the number</li> <li>2. Declare a variable to store the sum and set it to 0</li> <li>3. Repeat the next two steps till the number is not 0</li> <li>4. Get the rightmost digit of the number with help of remainder '%' operator by dividing it with 10 and add it to sum.</li> <li>5. Divide the number by 10 with help of '/' operator</li> <li>6. Print or return the sum</li> </ol>

8	<p><b>Write formula for Swap values of variables a and b.</b></p> <pre> tmp := a; a := b; b := tmp; </pre>
9	<p><b>Write Pascal Implementation for <u>Factorial</u>.</b></p> <pre> program factorial;  function fact(n: integer): longint; begin     if (n = 0) then         fact := 1     else         fact := n * fact(n - 1); end;  var     n: integer;  begin     for n := 0 to 16 do         writeln(n, '!' = ', fact(n)); end. </pre>

10	<p><b>Write Pascal implementation for Generation of the Fibonacci Sequence.</b></p> <pre> program Fibonacci;  function fib(n:integer): integer; begin     if (n &lt;= 2) then         fib := 1     else         fib := fib(n-1) + fib(n-2); end;  var     i:integer;  begin     for i := 1 to 16 do         write(fib(i), ', '); </pre>
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	<pre>writeln('...'); end.</pre>
11	<p><b>Write algorithm for Reversing the Digits of an Integer.</b></p> <p>Input: num</p> <p>(1) Initialize rev_num = 0</p> <p>(2) Loop while num &gt; 0</p> <p>    (a) Multiply rev_num by 10 and add remainder of num divide by 10 to rev_num</p> <p>        rev_num = rev_num*10 + num%10;</p> <p>    (b) Divide num by 10</p> <p>(3) Return rev_num</p>
12	<p><b>Write Steps for Decimal to Binary Conversion.</b></p> <p><b>Step – 1</b> Divide the decimal number which is to be converted by two which is the base of the binary number.</p> <p><b>Step – 2</b> The remainder which is obtained from step 1 is the least significant bit of the new binary number.</p> <p><b>Step – 3</b> Divide the quotient which is obtained from the step 2 and the remainder obtained from this is the second least significant bit of the binary number.</p> <p><b>Step – 4</b> Repeat the process until the quotient remains zero.</p> <p><b>Step – 5</b> The last remainder obtained from the division is the most significant bit of the binary number. Hence arrange the number from most significant bit to the least significant bit (i.e., from bottom to top).</p>
<b>PART B</b>	
1	Write the algorithm and steps for Exchanging the Values.
2	Write the algorithm and steps for Counting the n numbers.
3	Write the algorithm and Pascal's implementation for Summation of Set of Number.
4	Write the algorithm and Pascal's implementation for Factorial Computation.
5	Write the algorithm and Pascal's implementation Generation of the Fibonacci Sequence.
6	Write the algorithm and steps for– Reversing the Digits of an Integer.
7	Problem based on Binary to decimal conversions and vice versa.

### UNIT – III FACTORS AND ARRAY TECHNIQUES

Finding the Square Root of a Number – Smallest Divisor of an Integer – Computing Prime Factors of an Integer – GCD of Two Integers – Generating Prime Numbers – Finding the largest number in an array – Removal of Duplicates from an Ordered Array – Finding the kth smallest element.

#### Part A

<b>1</b>	<p><b>Write algorithm for Finding the Square Root of a Number.</b></p> <ol style="list-style-type: none"> <li>1. Start with an arbitrary positive start value x (the closer to the root, the better).</li> <li>2 Initialize y = 1.</li> <li>3. Do following until desired approximation is achieved.               <ol style="list-style-type: none"> <li>a) Get the next approximation for root using average of x and y</li> <li>b) Set y = n/x</li> </ol> </li> </ol>
<b>2</b>	<p><b>Write algorithm for Smallest Divisor of an Integer.</b></p> <ol style="list-style-type: none"> <li>1. Establish the integer n</li> <li>2. If n is even then 2 is the smallest divisor.</li> </ol> <p>Else:</p> <p>Compute <math>r = \sqrt{n}</math>;</p> <p>Initialize divisor d = 3;</p> <p>While not an exact divisor and <math>r \neq \sqrt{n}</math></p> <p>Generate next divisor d in odd sequence by <math>d = d + 2</math>;</p>
<b>3</b>	<p><b>Write algorithm for Computing Prime Factors of an Integer.</b></p> <p>Following are the steps to find all prime factors.</p> <ol style="list-style-type: none"> <li><b>1)</b> While n is divisible by 2, print 2 and divide n by 2.</li> <li><b>2)</b> After step 1, n must be odd. Now start a loop from i = 3 to square root of n. While i divides n, print i and divide n by i. After i fails to divide n, increment i by 2 and continue.</li> <li><b>3)</b> If n is a prime number and is greater than 2, then n will not become 1 by above two steps. So print n if it is greater than 2.</li> </ol>

4	<p><b>Write algorithm for Computing GCD of Two Integers.</b></p> <p>Begin</p> <p>    if a = 0 OR b = 0, then</p> <p>        return 0</p> <p>    if a = b, then</p> <p>        return b</p> <p>    if a &gt; b, then</p> <p>        return find GCD(a-b, b)</p> <p>    else</p> <p>        return find GCD(a, b-a)</p> <p>End</p>
5	<p><b>Write algorithm for Generating Prime Numbers.</b></p> <p>Step 1: Input N &amp; M</p> <p>Step 2: While (N &lt; M)</p> <p>    I=2</p> <p>Step 4: While (I&lt;N)</p> <p>Step 5: IF N%I == 0</p> <p>    go to Step 7</p> <p>Step 6: I++</p> <p>Step 7: IF I==NUM</p> <p>    Print NUM</p> <p>Step 7: N++</p>
6	<p><b>Write algorithm for to find largest array element.</b></p> <p>START</p> <p>    Step 1 → Take an array A and define its values</p> <p>    Step 2 → Declare largest as integer</p> <p>    Step 3 → Set 'largest' to 0</p> <p>    Step 4 → Loop for each value of A</p> <p>    Step 5 → If A[n] &gt; largest, Assign A[n] to largest</p> <p>    Step 6 → After loop finishes, Display largest as largest element of array</p> <p>STOP</p>

7	<p><b>How to Remove Duplicates from Sorted Array?</b></p> <pre>// nums is passed in by reference. (i.e., without making a copy) int len = removeDuplicates(nums);  // any modification to nums in your function would be known by the caller. // using the length returned by your function, it prints the first len elements. for (int i = 0; i &lt; len; i++) {     print(nums[i]); }</pre>
8	<p><b>Write an algorithm to find the kth smallest element.</b></p> <p>Select a pivot and partition the array with pivot at correct position j</p> <p>If position of pivot, j, is equal to k, return A[j].</p> <p>If j is less than k, discard array from start to j, and look for (k-j)th smallest element in right sub array, go to step 1.</p> <p>If j is greater than k, discard array from j to end and look for kth element in left subarray, go to step 1.</p>
9	<p><b>What does sorting mean?</b></p> <p>Ordering the data in an increasing or decreasing fashion, according to some linear relationship among the data items is called sorting.</p>
10	<p><b>Define the The brute force solution is to implement two nested loops.</b></p> <pre>for i = 0; i &lt; size(a); i++ {     for j = i+1; j &lt; size(a); j++ {         if(a[i] == a[j]) return a[i]     } }</pre>

<b>PART B</b>	
1	Define the Technique for finding the square root of a number.
2	Define the factors available for Smallest divisor of an integer.
3	Compute the Prime factors of an integer.
4	Find the GCD of two integers and write the necessary algorithm to it.
5	How to generate prime numbers using factor and array techniques?
6	Using the array technique find the largest number in an array.
7	Write code for removing the duplicates from an ordered array.
8	Write the technique for finding the kth smallest element.

## UNIT – IV TEXT PROCESSING AND PATTERN SEARCHING

Text Line Length Adjustment – Left and Right Justification of text – Keyword searching in text – Text Line Editing – Linear Pattern Search – Sub Linear Pattern Search.

### Part A

<b>1</b>	<b>What is Text Searching?</b> To find within a text $t$ a match for a pattern $p$ , where text, pattern, and match can be interpreted in different ways.
<b>2</b>	<b>What are the different ways of text searching?</b> Simple text searching Rabin-Karp algorithm Knuth-Morris-Pratt algorithm Boyer-Moore(-Horspool) algorithm Approximate matching Regular expression
<b>3</b>	<b>Why do we want Text Searching?</b> Search for a student's name in a students list <ul style="list-style-type: none"> <li>• Search for a word or phrase in a document</li> <li>• Search for approximate file name in a directory</li> <li>• Search for a phone number in a form</li> </ul>
<b>4</b>	<b>What are the Assumptions and Notations for text Searching?</b> Big-O notation for time complexity $p$ for pattern to be searched, $t$ for source text $m =  p $ and $n =  t $
<b>5</b>	<b>What is Simplest Text searching?</b> The simplest to implement Compare $t$ against $p$ letter by letter until match or end of text is found Example we are going to search for "001" in "010001"

6	<p><b>Define Rabin-Karp Algorithm.</b></p> <p>Idea: create a fingerprint for every substring in t that has the same length as p</p> <ul style="list-style-type: none"> <li>• Compare the letters only when the fingerprint match</li> <li>• We need to find fingerprint function that fulfills:</li> <li>• Maps strings with length m to q values</li> <li>• Distribute the string evenly among the q values</li> <li>• Easy to compute</li> </ul>
7	<p><b>Define Knuth-Morris-Pratt Algorithm.</b></p> <p>During searching, often we have found partial match, which means we already have some information about the text and the pattern, can we use this information to speed up the search?</p> <ul style="list-style-type: none"> <li>• Idea: Use the information of the pattern and the text to shift the position of comparison hopefully more than 1 position</li> </ul>
8	<p><b>Write an algorithm for shift table.</b></p> <pre> knuth_morris_pratt_search(p,t) { 1 m = p.length 2 n = t.length 3 knuth_morris_pratt_shift(p,shift) 4 i=0, j=0 5 while(i+m&lt;=n){ 6 while(t[i+j]==p[j]){ 7 j=j+1 8 if(j&gt;=m) return i 9 } 10 i = i+shift[j-1] 11 j = max(j-shift[j-1],0) 12 } 13 return -1 } </pre>

9	<p><b>Define Boyer-Moore Algorithm.</b></p> <p>Idea: why don't search from right to left?</p> <ul style="list-style-type: none"> <li>Algorithm: Implemented with simple text searching plus two heuristics: occurrence and match.</li> </ul> <p>Occurrence: If we know the character in <math>t[i+m-1]</math> is not contained in the pattern, then we can shift over this position to <math>i=i+m</math></p> <ul style="list-style-type: none"> <li>Match: Use partial match – similar to KnuthMorris-Pratt shift table, but for reverse pattern</li> </ul>
10	<p><b>What are the Features of Regular Expression?</b></p> <ul style="list-style-type: none"> <li>concatenations: simplest feature, allow a search for a concatenated list of characters: "html", "abcd". Symbolized as "."</li> <li>alternations: allows a search from a list of options, example: (jpg gif) would match the string "jpg" and the string "gif"</li> <li>repetition: allows a search for repetitive pattern, which makes the query pattern easier. Example: "(0 1)*" will match any binary text such as "000011" or "11001"</li> </ul>
11	<p><b>What is Regex Matching?</b></p> <p>Require four methods:</p> <ul style="list-style-type: none"> <li>eps: to mark trees that can match empty string</li> <li>start: to mark the initial candidates</li> <li>match_letter: to match a letter with the candidates</li> <li>next: to find the next candidates</li> </ul>



<b>PART B</b>	
1	Write the steps involved in Text Line Length Adjustment.
2	Write the algorithm steps involved in Left and Right Justification of text.
3	Explain the text processing steps of Keyword searching in text.
4	Explain the text processing and pattern searching steps of Text Line Editing.
5	Write in detail about Linear Pattern Search.
6	Write about Sub Linear Pattern Search in detail.

### UNIT – V JAVA SCRIPT

Introduction – External Java Script – Java Script Basics: Comments, Variables, Data types, operators, if statement, switch, loop and function. Java Script Objects: Objects, Array and String.

#### Part A

**1**

**Mention the advantages of java/java script.**

- a. Use sending data continuously File storage Massively parallel computing
- b. Smart forms – includes various controls like text box, radio button, text area control etc.
- d. Peer-to-Peer Interaction – used in various client/server model.
- e. Games – Combine the ability to easily include networking in your programs with java's powerful graphics and you have the recipe for truly awesome multiplayer games. Chat – Used in various chat applications.
- f. Whiteboards – Java programs are not limited to sending ext and data
- g. across the network.
- h. A number of programmers have developed whiteboard software that allows users in diverse locations to draw on their computers

2	<p><b>What are Style Sheets?</b></p> <p>Style sheets are collections of style information that are applied to plain text. Style information includes font attributes such as type size, special effects (bold,italic,underline), color and alignment. Style sheets also provide broader formatting instructions by specifying values for quantities such as line spacing and left and right margins.</p>
3	<p><b>Define function in java script.</b></p> <p>Function is a part of a program or in other words function is a module in java program which can be called or invoked any number of times from the main program. Function can be called any number of times but it can accept any input values or parameters, however it can return only one output at a time.</p>

4	<p><b>Define External JavaScript file.</b></p> <p>We can create external JavaScript file and embed it in many html page.It provides code re usability because single JavaScript file can be used in several html pages.</p> <p>An external JavaScript file must be saved by .js extension. It is recommended to embed all JavaScript files into a single file. It increases the speed of the webpage.</p>
5	<p><b>Define JavaScript Comment.</b></p> <p>The JavaScript comments are meaningful way to deliver message. It is used to add information about the code, warnings or suggestions so that end user can easily interpret the code.</p> <p>The JavaScript comment is ignored by the JavaScript engine i.e. embedded in the browser.</p>

6	<p><b>Mention the Advantages of JavaScript comments</b></p> <p>There are mainly two advantages of JavaScript comments.</p> <ol style="list-style-type: none"> <li>1. To make code easy to understand It can be used to elaborate the code so that end user can easily understand the code.</li> <li>2. To avoid the unnecessary code It can also be used to avoid the code being executed. Sometimes, we add the code to perform some action. But after sometime, there may be need to disable the code. In such case, it is better to use comments.</li> </ol>
7	<p><b>What are theTypes of JavaScript Comments?</b></p> <p>There are two types of comments in JavaScript.</p> <ol style="list-style-type: none"> <li>1. Single-line Comment</li> <li>2. Multi-line Comment</li> </ol>

8	<p><b>Define Javascript variable.</b></p> <p>A JavaScript variable is simply a name of storage location. There are two types of variables in JavaScript : local variable and global variable. There are some rules while declaring a JavaScript variable (also known as identifiers).</p> <ol style="list-style-type: none"> <li>1. Name must start with a letter (a to z or A to Z), underscore( _ ), or dollar( \$ ) sign.</li> <li>2. After first letter we can use digits (0 to 9), for example value1.</li> <li>3. JavaScript variables are case sensitive, for example x and X are different variables.</li> </ol>
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9	<p><b>Define the Example of JavaScript variable</b></p> <pre> &lt;script&gt; var x = 10; var y = 20; var z=x+y; document.write(z); &lt;/script&gt; </pre>
10	<p><b>Define JavaScript Global Variable</b></p> <p>A JavaScript global variable is declared outside the function or declared with window object. It can be accessed from any function.</p>
11	<p><b>Define Javascript Data Types</b></p> <p>JavaScript provides different data types to hold different types of values. There are two types of data types in JavaScript.</p> <ol style="list-style-type: none"> <li>1. Primitive data type</li> <li>2. Non-primitive (reference) data type</li> </ol>

12	<p><b>Define JavaScript Operators</b></p> <p>There are following types of operators in JavaScript.</p> <ol style="list-style-type: none"> <li>1. Arithmetic Operators</li> <li>2. Comparison (Relational) Operators</li> <li>3. Bitwise Operators</li> <li>4. Logical Operators</li> <li>5. Assignment Operators</li> <li>6. Special Operators</li> </ol>
13	<p><b>Define JavaScript If-else</b></p>

	<p>The JavaScript if-else statement is used <i>to execute the code whether condition is true or false</i>. There are three forms of if statement in JavaScript.</p> <ol style="list-style-type: none"> <li>1. If Statement</li> <li>2. If else statement</li> <li>3. if else if statement</li> </ol>
<b>14</b>	<p><b>Define JavaScript Switch</b></p> <p>The JavaScript switch statement is used <i>to execute one code from multiple expressions</i>. It is just like else if statement that we have learned in previous page. But it is convenient than <i>if..else..if</i> because it can be used with numbers, characters etc.</p>
<b>15</b>	<p><b>Define JavaScript Loops</b></p> <p>The JavaScript loops are used <i>to iterate the piece of code</i> using for, while, do while or for-in loops. It makes the code compact. It is mostly used in array. There are four types of loops in JavaScript.</p> <p>for loop, while loop, do-while loop, for-in loop</p>

<b>PART B</b>	
1	What are the various java script objects? Explain each with an example?
2	Explain about the external java script with example program.
3	Explain about the different variables and data types in java scripts in detail.
4	Write a program for conditional statement in java script.
5	Explain about the various data types in java scripts with syntax examples.
6	Programs on various java scripts.