Curriculum and Syllabus

MASTER OF COMPUTER APPLICATION (MCA)

(With Effect from July 2016)

Department of Computer Application
Veer Surendra Sai University of Technology, Sambalpur
Burla-768018
Odisha
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA  
DEPARTMENT OF COMPUTER APPLICATION  
CURRICULUM FOR MASTER OF COMPUTER APPLICATION  
(MCA)  

<table>
<thead>
<tr>
<th>First Semester (Autumn)</th>
<th>Sub. Code</th>
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| Total | 15 | 5 | 12 | 28 |

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| Total | 15 | 5 | 12 | 28 |

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<td>Artificial Intelligence</td>
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VISION OF THE DEPARTMENT

The Department of Computer Application has a multi-objective mission:

· To enable students acquire good academic and computational skills and devotion to scientific and technical knowledge.

· To inculcate the values of perseverance, sincerity and honesty.

· To empower them to become socially and economically responsible citizens of this country.

MISSION OF THE DEPARTMENT

The Department of Computer Application at Veer Surendra Sai University of Technology, Burla aims to inculcate value based, socially committed professionalism in the students to the cause of overall development of students and society using a compound metric comprising of:

M1. To provide qualitative education and generate new knowledge by engaging in cutting edge research projects and by offering state of the art postgraduate programmes, leading to careers as Computer Science professionals in the widely diversified domains of industry, government and academia.

M2. To promote a teaching and learning process that yields advancements in state of the art in computer science, resulting in integration of intellectual foundation and technical knowledge into other scientific disciplines leading to new technologies and products.

M3. To harness human capital for sustainable competitive edge and social relevance by inculcating the philosophy of continuous learning and innovation in Computer Science and application.

PROGRAM OUTCOMES (POs)

POs describe what students are expected to know or be able to do by the time of post graduation from the programme. The Program Outcomes of the MCA Programme are described as below:

PO-1 : Strong foundation in core Computer Science and Application, both theoretical and applied concepts.

PO-2 : Ability to apply knowledge of mathematics, science, and engineering to real life problem solving.

PO-3 : Ability to analyze, design, model, and develop complex software and information management systems.

PO-4 : Ability to function effectively within teams.

PO-5 : Understanding of professional ethical responsibility.
PO-6 : Ability to communicate effectively, both in writing and oral.

PO-7 : Understanding the impact of Computer Science solutions in the societal and human context.

PO-8 : Ability to engage in lifelong learning.

PO-9 : Knowledge of contemporary issues.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Program Educational Objectives are broad statements that describe the career and professional accomplishments that the program is preparing postgraduates to achieve.

PEO-1 : Technical Knowledge

To bring the physical, analytical and computational approaches of Computer Science to bear on the challenges they take on, abstracting essential structure, recognizing sources of uncertainty, and applying appropriate models, technical tools, and evaluations to develop their solutions.

PEO-2 : Leadership

To bring to their careers the self-assurance, integrity, and technical strengths that drive innovation and the communication and collaboration skills to inspire and guide the groups they work with in bringing their ideas to fruition.

PEO-3 : Versatility

To develop abilities and talents leading to creativity and productivity in fields and professions beyond the regular MCA curriculum.

PEO-4 : Engagement

To promote lifelong self learning abilities to remain professionally effective to the society at large.

PEO-5 : Diversification

To promote among student postgraduates the ability to gain multidisciplinary knowledge through projects and industrial training, leading to a sustainable competitive edge in R&D and meeting societal needs.

PEO-6 : Projects

To inculcate group work and team management skills with cross cultural etiquettes, promoting knowledge transfer leading to conceptualization and delivery of projects with varied complexity.

PEO-7 : Ethics and Attitudes

To sensitize students towards issues of social relevance, openness to other international cultures and to introduce them to professional ethics and practice.
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
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<tr>
<td>1st</td>
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<td>PEO-1,</td>
<td><strong>CO 1:</strong> To learn foundation of programming languages in general,</td>
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<td>PEO-3,</td>
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<td>PO-3,</td>
<td>PEO-4,</td>
<td><strong>CO 2:</strong> To learn programming concept and data types manipulation at level that enables you to write C language programs for the compiler specification.</td>
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<td>PO-4,</td>
<td>PEO-5,</td>
<td><strong>CO 3:</strong> To use simple input and output statements. To use the for and do…while repetition statements to execute statements repeatedly</td>
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<td>PO-6,</td>
<td>PEO-6</td>
<td><strong>CO 4:</strong> To understand the menu driven program using the switch selection statement. To use the break, continue to alter flow control and logical operators to form complex conditional expressions in control statements.</td>
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<td><strong>CO 5:</strong> To be able to implement the program using functions, recursions pointers and its applications, arrays and its uses in fundamental areas in computer science and engineering such as searching sorting etc..</td>
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<td>PO-9</td>
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<td><strong>CO 6:</strong> To use input and output streams. To use all print formatting capabilities and create, read, write and update files. Sequential access files processing. Random access files processing.</td>
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VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

PROBLEM SOLVING AND C PROGRAMMING

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UNIT- 1  (06 Periods)
Program design an implementation issues, Programming system design technique, programming technique, basic constructs of structured programming, Modular designing of programs. Programming environment: High level language, Low level programming language, Middle level programming language, assembler, compiler, interpreter.

UNIT- 2  (08 Periods)
Introduction to C Language: What is C: Historical development of C, where C stands, Getting Started with C: The C character set, Types of C constants, Types of C variables, C keywords, identifiers, literals. C Instructions: Type Declaration Instruction, arithmetic Integer, Long, Short, Signed, unsigned, storage classes, Integer and Float Conversions, type conversion in assignment, hierarchy of operations.

UNIT – 3  (10 Periods)
Flow of Control: Decision Control Structure: Control instructions in C, if, if-else, use of logical operators, hierarchy of logical operators, arithmetic operators, relational operators, assignment operators, increment and decrement operators, conditional operators, bitwise operators, special operators, &,*,,>,”Sizeof”. Loops control structure: while loop, for loop, do-while loop, odd loop, nested loop, break, continue, case control structure, goto, exit statement.

UNIT – 4  (16 Periods)

Text Book:
2. E. Balaguruswamy, “Programming in C”, TMH Publication
3. Ashok Kamthane, “Programming with ANSI & Turbo C”, Pearson Publication

Reference Books:
1. S. K. Srivastava, “C in Depth”, BPB Publication
2. Gottfried, Schaums Outline Series, “Programming with C”, TMH Publication
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA  
DEPARTMENT OF COMPUTER APPLICATION  
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)  
MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING  

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<tr>
<td>1ST</td>
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<td>PO-1, PO-2, PO-3</td>
<td>PEO-1, PEO-3, PEO-4</td>
<td><strong>CO 1:</strong> To broaden the knowledge of standard Intel Architectures.</td>
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<td>PO-4, PO-6, PO-8</td>
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<td><strong>CO 2:</strong> To learn a microprocessor programming model at a level that enables you to write assembly language programs for the processor meeting given specifications.</td>
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<td><strong>CO 3:</strong> To learn concepts associated with interfacing a microprocessor to memory and to I/O devices.</td>
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<td><strong>CO 4:</strong> To learn how to control components of a microprocessor based system though the use of interrupts.</td>
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VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING  L    T    P    C
                                     3  1  0  4

UNIT- 1 (12 Periods)
Microprocessors: 8085 architecture, bus organization, registers, ALU, control section, pin-diagram, basic fetch and execute cycle of a program, timing diagrams, types of instructions, instruction format, data format, addressing modes, instruction set of 8085, Programming the 8085, Interrupts and ISR.

UNIT- 2 (08 Periods)
Memory Interfacing: address space partitioning, logic devices for interfacing, R/W and ROM models, memory map addresses, memory address range of 1K memory chip, memory address lines, memory word size, memory classification, memory structure and its requirements, basic concepts in memory interfacing, address decoding and memory addresses, interfacing the 8155 memory chip, absolute vs. partial decoding.

UNIT- 3 (12 Periods)
Data transfer techniques & support chips: Data transfer techniques, programmed data transfer, direct memory access data transfer, basic idea about 8212, 8255, 8257 and 8259, analog to digital interfacing, A/D and D/A converters, analog signal conditioning circuits, data acquisition systems.

UNIT- 4 (08 Periods)
8086 microprocessor & Microcontroller: Features of advanced microprocessors, 8086 microprocessor architecture, register organization, addressing modes; Microcontrollers and embedded processors, overview of the 8051 microcontroller family.

Text Books:

Reference Books:
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

FOUNDATION OF COMPUTER SCIENCE

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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</thead>
<tbody>
<tr>
<td>1st</td>
<td>Foundation of Computer Science</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td>CO1. Graduates will be able to understand basics of a Computer</td>
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<tr>
<td></td>
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<td>PO-5,</td>
<td>PEO-3,</td>
<td>System and its Computer Organization to provide an insight of how</td>
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<td></td>
<td></td>
<td>PO-7,</td>
<td>PEO-4,</td>
<td>basic Computer components work.</td>
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<td></td>
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<td>PO-8,</td>
<td>PEO-5,</td>
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<td></td>
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<td>PO-9</td>
<td>PEO-7</td>
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<td>CO2. Graduates will be able to have a basic understanding of</td>
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<td>Different programming languages and programming environment</td>
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<td></td>
<td>components.</td>
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<td>CO3. Graduates will be able to understand how different network</td>
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<td>topologies function and the communication system works.</td>
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<td>CO4. Graduates will be able to explain the working of important</td>
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<td>application softwares and their use to perform any engineering</td>
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<td>activity.</td>
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<td>CO5. Graduates will be able to get knowledge of concepts that</td>
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<td>govern the proper usage of Internet and computing resources.</td>
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<td>CO6. Graduates will be able to connect to the Internet, send e-mail,</td>
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<td>access remote servers, and identify resources available on the Web.</td>
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VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

FOUNDATION OF COMPUTER SCIENCE  

UNIT- 1  (08 Periods)
Introduction To Computer & Operating Systems : Basic concepts of Computer, Concepts of Data and Information, Organization of computer, input and output devices, Storage devices and File organization. Operating System: System software, application software, utility packages

UNIT- 2 (10 periods) Programming Languages : Machine language, assembly languages, high level languages, forth generation languages, General concepts of OOPS (Object oriented programming) and SQL (Structured Query Languages); Computer Viruses, worms; Compiler, Interpreter, Assembler; Algorithm & Flowchart.

UNIT- 3 (12 periods) Communication Technologies : Communication system elements communication modes (analog and digital, synchronous and asynchronous, simplex, half duplex and full duplex, circuit switching and packet switching) Communication media : (speed and capacity, twisted pair, coaxial fiber optics, wireless), common network components, hosts and servers, work stations, network topologies and network protocols (ISO/OSI Ref. Model and TCP/IP)

UNIT- 4 (10 Periods) Applications : Applications in business, industry, home education and training, entertainment, science and engineering and medicine, multimedia data types (graphics, images, audio video), Virtual reality applications, Internet, World Wide Web (WWW), Domain names, e-mail, teleconferencing, e-commerce, hypermedia, data warehousing.

Text Books:

2. S. K. Basandra, "Computers Today", Galgotia Publication

Reference Books:

1. Leon & Leon, "Computers Today", Leon Vikas Publication
2. S Jaiswal, "Information Technology Today", Galgotia Publication
4. V. Rajaraman "Fundamental of Computer" PHI Publication
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DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

DISCRETE MATHEMATICS

\[
\begin{array}{c|cccc}
\text{UNIT} & \text{L} & \text{T} & \text{P} & \text{C} \\
\hline
1 & 3 & 1 & 0 & 4 \\
2 & 10 & & & \\
3 & 10 & & & \\
4 & 10 & & & \\
\end{array}
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UNIT- 1
(10 Periods)
Logic: Propositional equivalence, predicates and quantifiers, Methods of proofs, proof strategy, sequences and summation, mathematical induction, recursive definitions and structural induction, program correctness.

Counting: The basics of counting, the pigeonhole principle, permutations and combinations, recurrence relations, solving recurrence relations, generating functions, inclusion-exclusion principle, application of inclusion-exclusion.

UNIT- 2
(10 Periods)
Relations: Relations and their properties, n-array relations and their applications, representing relations, closure of relations, equivalence of relations, partial orderings.
Graph theory: Introduction to graphs, graph terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamilton paths, planar graphs, graph coloring, introduction to trees, application of trees.

UNIT- 3
(10 Periods)
Group theory: Groups, subgroups, generators and evaluation of powers, cosets and Lagrange's theorem, permutation groups and Burnside's theorem, isomorphism, automorphisms, homomorphism and normal subgroups, rings, integral domains and fields.

UNIT- 4
(10 Periods)
Lattice theory: Lattices and algebras systems, principles of duality, basic properties of algebraic systems defined by lattices, distributive and complimented lattices, Boolean lattices and Boolean algebras, uniqueness of finite Boolean expressions, prepositional calculus. Coding theory: Coding of binary information and error detection, decoding and error correction.

Text Books:

Reference Books:
1. G. Shankar Rao, "Discrete Mathematical Structure", New Age Publisher
2. D. P. Acharjaya, Sreekumar "Fundamental Approach to Discrete Mathematics", New Age Publisher
<table>
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<th>Semester</th>
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<th>PEO</th>
<th>CO</th>
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</thead>
</table>
| 1st      | Computer Organization | PO-1, PO-2, PO-4, PO-5, PO-7, PO-8, PO-9 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-6, PEO-7 | CO1. Graduates will be able to understand theory of Digital Design and Computer Organization to provide an insight of how basic computer components are specified.  
CO2. Graduates will be able to Convert and calculate in binary, decimal, and hexadecimal number systems and Convert the numbers from one radix to another, .  
CO3. Graduates will be able to understand how different logic gates function and the combinatorial circuit works.  
CO4. Graduates will be able to An in depth understanding of instructions, Components associated with instruction processing, different stages of an instruction execution  
CO5. Graduates will be able to Design a pipeline for consistent execution of instructions with minimum hazards.  
CO6. Graduates will be able to demonstrate memory hierarchy and its impact on computer cost/performance. |
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DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

COMPUTER ORGANIZATION

UNIT- 1  (06 Periods)
Number system - Binary, decimal, octal, hexadecimal, Conversion - Binary to decimal, decimal to binary, octal to
decimal, decimal to octal, octal to binary, binary to octal, hexadecimal to binary, binary to hexadecimal,
hexadecimal to Decimal, decimal to hexadecimal, hexadecimal to octal, octal to hexadecimal, Binary arithmetic

UNIT- 2  (10 Periods)
Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing &
control, instruction cycle, memory reference instructions, input-output and interrupts, design of basic computer,
design of accumulator logic. Microprogrammed Control Unit: Control memory, address sequencing. Central
Processing Unit: Introduction, general register organization, stack organization, instruction formats, addressing
modes.

UNIT- 3  (16 Periods)
Pipeline and Vector processing: Parallel Processing, pipelining, arithmetic pipeline, RISC Pipeline, Vector
Processing, Array Processors. Input-Output Organization: Peripheral devices, input-output interface,
asynchronous data transfer, modes of data transfer, priority interrupt, direct memory access, input-output processor

UNIT- 4  (08 Periods)
Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory,
virtual memory, memory management hardware. Multiprocessors: Characteristics of multiprocessor,
Interconnection Structure, Interprocessor Communication & Synchronization.

Text Books:

Reference Books:
<table>
<thead>
<tr>
<th>Semester</th>
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<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
</table>
| 1st      | Open Source Programming Lab | PO-1, PO-5, PO-7, PO-8, PO-9 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-7 | CO1. Graduates will be able to describe and use the LINUX operating system.  
CO2. Graduates will be able to describe and write shell scripts in order to perform basic shell programming.  
CO3. Graduates will be able to understand the LINUX file system.  
CO4. Graduates will be able to understand the different processes running in the system along with their functions in a network. |
LIST OF EXPERIMENTS:

1. **Operating System Overview**: (UNIX/LINUX) Operating System and Software Installation
2. **Command Line Interface**: Basic Commands (pwd, whoami, grep...)
3. **User and Group Management**: (sudo, su...)
4. **File & Directories Structure Overview**: Create, delete, navigate, list, copy, rename (mkdir, cd, rm, ls...)
5. **Link, File Comparison, Meta Characters**
6. **File Compression, Decompression, Permissions**
7. **Network and Proxy Settings**: a) Networking Commands (mail...)
                                   b) Working With Remote Server (SSH, SFTP, SCP)
8. **Redirection Operators, Pipes and Filters**
9. **Process Overview and Control**.
10. **Editing Files**
11. **Shell Scripting I**
12. **Shell Scripting II**
13. **Shell Scripting III**
14. **Shell Scripting IV**
15. **Shell Scripting V**
<table>
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<th>PEO</th>
<th>CO</th>
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</thead>
<tbody>
<tr>
<td>1ST</td>
<td>Microprocessor and Assembly</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td><strong>CO 1:</strong> To broaden the knowledge of standard Intel Architectures.</td>
</tr>
<tr>
<td></td>
<td>Language Programming</td>
<td>PO-2,</td>
<td>PEO-3,</td>
<td></td>
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<td></td>
<td>PO-3,</td>
<td>PEO-4,</td>
<td><strong>CO 2:</strong> To learn a microprocessor programming model at a level that enables you to write assembly language programs for the processor meeting given specifications.</td>
</tr>
<tr>
<td></td>
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<td>PO-4,</td>
<td>PEO-5,</td>
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<td>PO-6,</td>
<td>PEO-6</td>
<td><strong>CO 3:</strong> To learn concepts associated with interfacing a microprocessor to memory and to I/O devices.</td>
</tr>
<tr>
<td></td>
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<td>PO-8</td>
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<td><strong>CO 4:</strong> To learn how to control components of a microprocessor based system though the use of interrupts.</td>
</tr>
</tbody>
</table>
LIST OF EXPERIMENTS:

1. Program for addition of two 8-bit numbers whose sum is 8-bit.
2. Program for subtraction of two 8-bit numbers whose difference is 8-bit.
3. Program for addition of two 8-bit numbers whose sum is 16-bit or more.
4. Program for addition of two 16-bit numbers whose sum is 16-bit or more.
5. Programs to find the 1’s complement of an 8-bit and a 16-bit number.
6. Programs to find the 2’s complement of an 8-bit and a 16-bit number.
7. Programs to shift an 8-bit and a 16-bit number left by 1-bit.
8. Program to swap two numbers.
9. Program to find the sum of numbers from 1 to 100.
10. Program to print numbers from 1 to 10.
11. Program for finding the largest and smallest number in a data array.
12. Program for finding the sum of a series of 8-bit decimal numbers whose sum is 16-bits.
13. Program for multiplication of two 8-bit numbers.
14. Program for division of two 8-bit numbers.
15. Code Conversion programs (Binary to Gray / Gray to Binary / ASCII to Binary / Binary to ASCII).
<table>
<thead>
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<th>PEO</th>
<th>CO</th>
</tr>
</thead>
</table>
| 1<sup>st</sup> | Problem solving and C Programming | PO-1, PO-2, PO-3, PO-4, PO-5, PO-6, PO-8, PO-9 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-6 | **CO 1:** To learn foundation of programming languages in general, Traditional view of computer hardware and its functioning.  
**CO 2:** To learn programming concept and data types manipulation at level that enables you to write C language programs for the compiler specification.  
**CO 3:** To use simple input and output statements. To use the for and do…while repetition statements to execute statements repeatedly  
**CO 4:** To understand the menu driven program using the switch selection statement. To use the break, continue to alter flow control and logical operators to form complex conditional expressions in control statements.  
**CO 5:** To be able to implement the program using functions, recursions pointers and its applications, arrays and its uses in fundamental areas in computer science and engineering such as searching sorting etc..  
**CO 6:** To use input and output streams. To use all print formatting capabilities and create, read, write and update files. Sequential access files processing. Random access files processing. |
C PROGRAMMING LABORATORY

LIST OF EXPERIMENTS:

1. Write a C program to find the area and volume of sphere.
2. Write a C program to find out whether the character pressed through the keyboard is a digit or not (using conditional operator).
3. Write a C program to shift the input data by two bits right.
4. Write a C program to swap the values of two variables with/without using a third variable.
5. Write a C program to add the individual digits of a 3-digit number by % and / operator.
6. Write a C program to print the given 3 integers in ascending order using if-else.
7. Write a C program to examine a character entered from the keyboard is a lowercase letter or upper case, digit, punctuation mark or a space character.
8. Write a C program to provide multiple functions such as ADD, SUB, MUL, DIV and MOD using switch case.
9. Write a C program to find Sum of individual digits of a positive integer.
10. Write a C program to generate the first n terms of the Fibonacci sequence.
11. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
12. Write a C program to check the given number is perfect number or not.
13. Write a C program to print the factors of a given number.
14. Write a C program to find the factorial of a given number using non-recursive and recursive function.
15. Write a C program to find the GCD (greatest common divisor) of two given integers using non-recursive and recursive function.
16. Write a C program to a) Convert decimal number to binary number b) Convert Binary number to decimal number using non recursive functions.
17. Write a C program to print Fibonacci series using recursion.
18. Write a C program to find minimum, maximum, sum and average of the given one dimensional array.
19. Write a C program to merge two sorted arrays into another array in a sorted order.
20. Write a C program to print the individual digits of a number using array.
21. Write a C program to print the binary equivalent of a given decimal number using array.
LIST OF EXPERIMENTS:

22. Write a C program that uses functions to perform the following
   a) Addition of two Matrices
   b) Multiplication of two Matrices

23. Write a C program to add two numbers using pointers.

24. Write a C program to swap two numbers using pointers.

25. Write a C program to find the length of string using pointers.

26. Write a C program to compare two strings using pointers.

27. Write a C program to find the length of a given string.

28. Write a C program to count the number of vowels in a given string and also print the vowels.

29. Write a C program to check how many alphabets and non alphabets are there in a string.

30. Write a C program to remove blank spaces from a string.

31. Write a C program to capitalize all the letters of a string.

32. Write a C program to determine if the given string is a palindrome or not.

33. Write a C program that displays the position or index in the string S where the string T begins or 1 if S does not contain T.

34. Write a C program to count the lines, words and characters in a given text.

35. Write a C program to copy one structure to another of same type.

36. Write a C program that passes a pointer to a structure and returns nothing.

37. Write a C program to define a structure named time, which contains three int members.

38. Write a C program to create a structure containing 5 strings: address1, address2, city, state and zip.

39. Create a typedef called record that can be used to create instances of this structure.
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA  
DEPARTMENT OF COMPUTER APPLICATION  
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)  

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<th>Semester</th>
<th>Course Name</th>
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<th>PEO</th>
<th>CO</th>
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</table>
| 1st      | Computer Organization | PO-1, PO-2, PO-4, PO-5, PO-7, PO-8, PO-9 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-6, PEO-7 | CO1. Graduates will be able to understand Knowledge of Digital Design and Computer Organization to provide an insight of how basic computer components are specified.  
CO2. Graduates will be able to Convert and calculate in binary, decimal, and hexadecimal number systems and Convert the numbers from one radix to another.  
CO3. Graduates will be able to understand how different logic gates function and the combinatorial circuit works.  
CO4. Graduates will be able to An in depth understanding of instructions, Components associated with instruction processing, different stages of an instruction execution  
CO5. Graduates will be able to Design a pipeline for consistent execution of instructions with minimum hazards.  
CO6. Graduates will be able to demonstrate memory hierarchy and its impact on computer cost/performance. |
LIST OF EXPERIMENTS:

1. A Study on the different components of Computer.
3. A Study on PC Assembling and De-assembling.
4. Study the features of Logisim simulator.
5. Develop circuits of all the Gates using Logisim simulator.
10. Develop Circuits for Counter using Logisim simulator.
12. Design a 4x4 RAM using Logisim simulator.
15. Design an 8-bit single cycle CPU using Logisim simulator.
### Syllabus for Master of Computer Application (MCA)

#### Data Structure

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO-1, PO-2, PO-3, PO-4, PO-5, PO-8, PO-9</th>
<th>PEO-1, PEO-3, PEO-4, PEO-5, PEO-6, PEO-7</th>
<th>CO</th>
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<tbody>
<tr>
<td>2nd</td>
<td>Data Structure</td>
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</table>

**CO1.** Graduates will be able to design algorithms using stack, queue and principles of recursion.

**CO2.** Graduates will be able to demonstrate the use of data structures like linked lists, stacks and queues.

**CO3.** Graduates will be able to understand the implementation of linked data structures such as linked lists and binary trees, balanced search trees, hash tables, priority queues.

**CO4.** Graduates will be able to explain the working of several sub-quadratic sorting algorithms including quick sort, merge sort and heap sort.

**CO5.** Graduates will be able to get knowledge of some graph algorithms such as shortest path and minimum spanning tree.

**CO6.** Graduates will be able to get knowledge of hashing techniques and their applications in Computer Science.
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DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

DATA STRUCTURE  L  T  P  C
3  1  0  4

Unit – 1 (10 Periods)
Stacks: Representation and Implementation of stack, Operations on Stack: Push & Pop, Application of stack,
Queues: representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues.

Unit – 2 (08 Periods)
Linked list: Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Doubly linked list, Polynomial representation and addition, Garbage Collection and Compaction.

UNIT – 3 (12 Periods)
Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Representation of Binary trees, Traversing Binary Trees, Search Tree (BST), Insertion and Deletion in BST, Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

UNIT – 4 (10 Periods)

Text Books:

Reference Books:
2. K Loudon, “Mastering Algorithms with C”, Shroff Publisher & Distributors Pvt. Ltd.
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<tbody>
<tr>
<td>2nd</td>
<td>Computer Networks</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td><strong>CO 1:</strong> To be able to describe communication protocols and layered network architectures and to explain Conventional computer system interfacing standards and peer to peer data link communication protocols.</td>
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<td>PO-2,</td>
<td>PEO-2,</td>
<td><strong>CO 2:</strong> To be able to design basic network systems using routing methods and analyze data communication technology.</td>
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<td>PO-3,</td>
<td>PEO-3,</td>
<td><strong>CO 3:</strong> To be able to describe the operation of a packet based sliding window protocol, Encryption and Decryption methods.</td>
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<td>PO-4,</td>
<td>PEO-4,</td>
<td><strong>CO 4:</strong> To be able to describe the operation of application layer using SMTP, TELNET, DNS, FTP etc.</td>
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<td>PO-6,</td>
<td>PEO-5,</td>
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<td>PO-9</td>
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</table>
### Unit – 1
**Overview of the Internet:** Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model. **Physical Layer:** Guided transmission media, wireless transmission media. **Data Link Layer** - design issues, CRC codes, Elementary Data Link Layer Protocols, sliding window protocol

### Unit – 2
**Multi Access Protocols** - ALOHA, CSMA, Ethernet- Physical Layer, Ethernet Mac Sub layer, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

### Unit – 3
**Network Layer:** Network Layer Design issues, store and forward packet switching, connection less and connection oriented networks-routing algorithms-optimality principle, shortest path, flooding, Distance Vector Routing, Hierarchical Routing, Congestion control algorithms, admission control. **Internetworking:** Tunneling, Internetwork Routing, Packet fragmentation, IPv4, IPv6 Protocol, IP addresses, CIDR, ICMP, ARP, RARP, DHCP.

### Unit – 4
**The Internet Transport Protocols** : UDP, TCP, The TCP Service Model, The TCP Sliding Window, The TCP Congestion Control, **Application Layer**- Introduction, providing services, Applications layer paradigms, Client server model, Standard client-server application-HTTP, FTP, electronic mail, TELNET, DNS, SSH

### Text Books:
2. Andrew S Tanenbaum, “Computer Networks”, Pearson Education

### Reference Books:
### OBJECT ORIENTED PROGRAMMING USING C++

<table>
<thead>
<tr>
<th>Semester</th>
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<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>2ND</td>
<td>Object-Oriented Programming</td>
<td>PO-1, PO-3,</td>
<td>PEO-1, PEO-2,</td>
<td><strong>CO 1</strong>: Familiar to map real world problems into the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-4, PO-7,</td>
<td>PEO-3, PEO-4,</td>
<td>programming language using classes and objects.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-8</td>
<td>PEO-5, PEO-6</td>
<td></td>
</tr>
</tbody>
</table>

**CO 2**: To solve the problems in a systematic way using class and method paradigms.

**CO 3**: Efficiently implement Inheritance, Polymorphism, Delegation, Exception handling and File handling techniques.
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

OBJECT ORIENTED PROGRAMMING USING C++

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Object Oriented Programming</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>
| 2    | Abstraction Mechanisms | 10
| 3    | Prototypes | 10
| 4    | Templates and Standard Template library | 10

**Unit – 1 (10 Periods)**
Introduction to Object Oriented Programming: user defined types, polymorphism, and encapsulation. Getting started with C++ - syntax, data-type, variables, strings, functions, exceptions and statements, namespaces and exceptions operators. Flow control, functions, recursion. Arrays and pointers, structures.

**Unit – 2 (10 Periods)**
Abstraction Mechanisms: Classes, private, public, constructors, destructors, member functions, static members, references etc. class hierarchy, derived classes. Inheritance: simple inheritance, polymorphism, object slicing, base initialization, virtual functions.

**Unit – 3 (10 Periods)**
Prototypes: linkages, operator overloading, ambiguity, friends, member operators, operator function, I/O operators etc. Memory management: new, delete, object copying, copy constructors, assignment operator, this Input/output. Exception handling: Exceptions and derived classes function exception declarations, unexpected exceptions, Exceptions when handling exceptions, resource capture and release etc.

**Unit – 4 (10 Periods)**
Templates and Standard Template library: template classes declaration, template functions, namespaces, string, iterators, hashes, iostreams and other type. Design using C++ design and development: design and programming, role of classes.

**Text Books:**


**Reference Books:**

### Quantitative Techniques

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topic</th>
<th>Periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operation Research</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Behavioral versus quantitative decision making, role of models. Linear programming, Graphical and Simplex procedure, sensitivity analysis; Transportation and Assignment problems, Application of linear programming in business and other systems.</td>
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</tr>
<tr>
<td>2</td>
<td>Integer linear Programming</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Probability</td>
<td>10</td>
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<tr>
<td></td>
<td>Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability multiplication rule, total probability, Baye’s Theorem, and independence.</td>
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<tr>
<td>4</td>
<td>Special Distributions</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Discrete uniform, Binomial, Geometric Poisson, Exponential, Normal distributions, Functions of a Random variable. Joint Distributions: Joint, marginal, and conditional distributions, Product moments, Correlation, independence of random variables, bivariate normal distribution.</td>
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</tr>
</tbody>
</table>

### Text Books:


### Reference Books:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>2\textsuperscript{nd}</td>
<td>Operating System</td>
<td>PO-1, PO-2, PO-3, PO-4, PO-6, PO-7, PO-8, PO-9</td>
<td>PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-6</td>
<td>\textbf{CO 1:} Analyzing the working of an operating system and its components. \textbf{CO 2:} Defining and Analyzing the synchronization process. \textbf{CO 3:} Identifying the working methodology of multithreaded applications. \textbf{CO 4:} Determining the reasons of deadlocks, and their remedial measures in an operating system. \textbf{CO 5:} Learning the management of different type of memories in the computer system. \textbf{CO 6:} Comparing and analyzing different file systems being used in different operating systems.</td>
</tr>
</tbody>
</table>
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

OPERATING SYSTEMS  L  T  P  C
3  1  0  4

Unit – 1 (10 Periods)
Introduction to Operating Systems: The need for OS, Types of OS, Goals of OS, Functions of OS, OS Architectures.

Unit – 2 (10 Periods)

UNIT – 3 (10 Periods)
Memory Management: Introduction, Memory partitioning, Memory allocation strategies, Paging, swapping, segmentation, virtual memory, demand paging, page replacement algorithms.

UNIT – 4 (10 Periods)

Text Books:


Reference Books:

2. Sibsankar Halder and Alex A. Aravind, “Operating System”, Pearson Education
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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</thead>
<tbody>
<tr>
<td>2\textsuperscript{nd}</td>
<td>Data Structure</td>
<td>PO-1, PO-2, PO-3, PO-4, PO-5, PO-8, PO-9</td>
<td>PEO-1, PEO-3, PEO-4, PEO-5, PEO-6, PEO-7</td>
<td>CO1. Graduates will be able to design algorithms using stack, queue and principles of recursion. CO2. Graduates will be able to demonstrate the use of data structures like linked lists, stacks and queues. CO3. Graduates will be able to understand the implementation of linked data structures such as linked lists and binary trees, balanced search trees, hash tables, priority queues. CO4. Graduates will be able to explain the working of several sub-quadratic sorting algorithms including quick sort, merge sort and heap sort. CO5. Graduates will be able to get knowledge of some graph algorithms such as shortest path and minimum spanning tree. CO6. Graduates will be able to get knowledge of hashing techniques and their applications in Computer Science.</td>
</tr>
</tbody>
</table>
LIST OF EXPERIMENTS:

1. Write a Program in C to Perform Recursion in C: a) Factorial numbers, b) Fibonacci series
2. Write a Program in C to implement Stack Using Array
3. Write a Program in C to implement Stack Using Linked List
4. Write a Program in C to implement Stack Using Array
5. Write a Program in C to implement Queue Using Array
6. Write a Program in C to implement Queue Using Linked List
7. Write a Program in C to implement Conversion of Infix to Postfix
8. Write a Program in C to implement Conversion of Infix to Postfix
9. Write a Program in C to implement Single Linked list
10. Write a Program in C to implement Doubly Linked List
11. Write a Program in C to implement Bubble Sort
12. Write a Program in C to implement Selection Sort
13. Write a Program in C to implement Insertion Sort
14. Write a Program in C to implement Quick Sort
15. Write a Program in C to implement Merge Sort
16. Write a Program in C to implement Linear Search
17. Write a Program in C to implement Binary Search Tree
18. Write a Program in C to implement Directed Graph
19. Write a Program in C to implement BFS.
20. Write a Program in C to implement DFS.
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
</table>
| 2ND      | Object-Oriented Programming | PO-1, PO-3, PO-4, PO-7, PO-8 | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-6 | **CO 1**: Familiar to map real world problems into the programming language using classes and objects.  
**CO 2**: To solve the problems in a systematic way using class and method paradigms.  
**CO 3**: Efficiently implement Inheritance, Polymorphism, Delegation, Exception handling and File handling techniques. |


LIST OF EXPERIMENTS:

1. Programs on concept of functions.
2. Programs on function overloading and handling ambiguities.
3. Programs on function calls (call by value, call by address and call by reference).
4. Programs on concept of classes and objects.
5. Programs on friend functions and friend classes.
6. Programs to perform operations using constructors and destructors.
7. Programs on different types of inheritance.
8. Programs on delegation.
9. Programs on static and dynamic polymorphism, use of virtual functions.
10. Programs to perform operator overloading using friend functions and member functions.
11. Programs to perform dynamic memory management, use of new and delete operators.
12. Programs on namespaces.
13. Programs on generic programming using template functions and template classes.
14. Programs on exception handling.
15. Programs on file handling.
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>Operating System</td>
<td>PO-1</td>
<td>PEO-1</td>
<td><strong>CO 1</strong>: Analyzing the working of an operating system and its components.</td>
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<tr>
<td></td>
<td></td>
<td>PO-2</td>
<td>PEO-2</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>PO-3</td>
<td>PEO-3</td>
<td><strong>CO 2</strong>: Defining and Analyzing the synchronization process.</td>
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<tr>
<td></td>
<td></td>
<td>PO-4</td>
<td>PEO-4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-6</td>
<td>PEO-5</td>
<td><strong>CO 3</strong>: Identifying the working methodology of multithreaded applications.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-7</td>
<td>PEO-6</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>PO-8</td>
<td></td>
<td><strong>CO 4</strong>: Determining the reasons of deadlocks, and their remedial measures in an operating system.</td>
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<td></td>
<td></td>
<td>PO-9</td>
<td></td>
<td><strong>CO 5</strong>: Learning the management of different type of memories in the computer system.</td>
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<td></td>
<td><strong>CO 6</strong>: Comparing and analyzing different file systems being used in different operating systems.</td>
</tr>
</tbody>
</table>
LIST OF EXPERIMENTS:

1. Simulate the FCFS CPU Scheduling Algorithm.
2. Simulate the SJF CPU Scheduling Algorithm.
3. Simulate the Round Robin CPU Scheduling Algorithm.
4. Simulate the Priority CPU Scheduling Algorithm.
5. Simulate the file allocation strategy using Sequential file allocation methods
6. Simulate the file allocation strategy using Indexed file allocation methods
7. Simulate the file allocation strategy using Linked file allocation methods
8. Simulate Multiple Programming with fixed Number of Tasks (MFT)
9. Simulate Multiple Programming with Varible Number of Tasks (MVT)
10. Simulate Banker’s Algorithm for Deadlock Avoidance
11. Simulate Algorithm for Deadlock Prevention
12. Simulate FIFO page replacement algorithm
13. Simulate LRU page replacement algorithm
14. Simulate LFU page replacement algorithm
15. Simulate Paging Technique of memory management
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd</td>
<td>Computer Networks</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td><strong>CO 1</strong>: To be able to describe communication protocols and layered network architectures and to explain Conventional computer system interfacing standards and peer to peer data link communication protocols.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-2,</td>
<td>PEO-2,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>PO-3,</td>
<td>PEO-3,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>PO-4,</td>
<td>PEO-4,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>PO-6,</td>
<td>PEO-5,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>PO-7,</td>
<td>PEO-6,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-8,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>PO-9</td>
<td></td>
<td></td>
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<td><strong>CO 2</strong>: To be able to design basic network systems using routing methods and analyze data communication technology.</td>
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<td><strong>CO 3</strong>: To be able to describe the operation of a packet based sliding window protocol, Encryption and Decryption methods.</td>
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<td><strong>CO 4</strong>: To be able to describe the operation of application layer using SMTP, TELNET, DNS, FTP etc.</td>
</tr>
</tbody>
</table>


LIST OF EXPERIMENTS:

1. Implement the Data link layer framing methods such as Bit Stuffing
2. Implement the Data link layer framing methods such as Character Stuffing
3. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
4. Implement Dijkstra's algorithm to compute the Shortest path through a given graph.
5. Obtain Routing table at each node using distance vector routing algorithm for a given subnet.
6. Implement Broadcast tree for a given subnet of hosts.
7. Implement the DES algorithm to encrypt 64 bit Plain Text.
8. Implement the DES algorithm to decrypt 64 bit Plain Text.
9. Implement the RSA algorithm for Encryption and Decryption.
10. Write a C program to determine if the IP address is in Class A, B, C, D, or E.
11. Write a C program to translate dotted decimal IP address into 32 bit address.
12. Write a C program to generate Hamming code.
13. Implement the following forms of IPC a) Pipes b) FIFO
14. Implement TCP Client and Server application to transfer file
15. Implement UDP Client and Server application to transfer file
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd</td>
<td>Database Management Systems</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td><strong>CO 1:</strong> Able to handle with different</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-2,</td>
<td>PEO-2,</td>
<td>Data Base languages and various data</td>
</tr>
<tr>
<td></td>
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<td>PO-3,</td>
<td>PEO-3,</td>
<td>models for Data Base.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-4,</td>
<td>PEO-4,</td>
<td><strong>CO 2:</strong> Able to write queries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-5,</td>
<td>PEO-5,</td>
<td>mathematically and design data base</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-6,</td>
<td>PEO-6</td>
<td>and normalize data.</td>
</tr>
<tr>
<td></td>
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<td>PO-7,</td>
<td></td>
<td><strong>CO 3:</strong> Understand how query are</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-8,</td>
<td></td>
<td>being processed and executed.</td>
</tr>
<tr>
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<td></td>
<td>PO-9</td>
<td></td>
<td><strong>CO 4:</strong> Deal with online transactions</td>
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<td></td>
<td></td>
<td>and control Concurrency.</td>
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<td><strong>CO 5:</strong> Understand types of Data Base</td>
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<td>failures and Recovery.</td>
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<td><strong>CO 6:</strong> Acquire knowledge about</td>
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<td></td>
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<td>advanced topics and can research on</td>
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<td>that.</td>
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</tbody>
</table>
Unit – 1 (10 Periods)
Introduction to DBMS: concept and overview of DBMS, data models, DB languages, DB users and Administrator, 3-schema architecture of DBMS, data independence. ER Model: basic concepts, design issues, keys, ER diagram, Weak entity sets, Extended ER features. Relational model: structure of relational model, Relational algebra, Extended relational algebra Operations.

Unit – 2 (10 Periods)
Relational database design: FDs, Anomalies in designing DB, Normalization using FDs, various Normal forms- 1NF, 2NF, 3NF, BCNF, 4NF, 5NF.

UNIT – 3 (10 Periods)
SQL and Integrity Constraints: Concepts of DDL, DML, DCL, various SQL operations: set operations, aggregate functions, constraints, view, nested sub queries, PL/SQL, cursor, trigger.

UNIT – 4 (10 Periods)
Internals of RDBMS: Query optimization, various optimization algorithms, Transaction processing, concurrency control and recovery management. Advanced Database: OODB, WEB based DB, Data warehousing and Data mining.

Text Books:

Reference Books:
1) Korth, Silverschatz, Abraham,” Database system concepts”, Tata McGraw Hill Publication
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>Software Engineering and OOAD</td>
<td>PO-1, PO-2, PO-3, PO-4, PO-5, PO-6, PO-7, PO-8, PO-9</td>
<td>PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-6</td>
<td><strong>CO 1</strong>: To be able to understand the concepts of software and engineering discipline in software development, different models of software development and apply knowledge of mathematics, science, and engineering.</td>
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<td><strong>CO 2</strong>: To be able to identify, formulate, and solve engineering problems, project planning and understanding characteristics of good software design.</td>
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<td><strong>CO 3</strong>: To be able to understand the software quality models and use the techniques, skills, and modern engineering tools necessary for engineering practice.</td>
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<td><strong>CO 4</strong>: To be able to analyze, design, verify, validate, implement, apply, and maintain software systems and the ability to work in one or more significant application domains.</td>
</tr>
</tbody>
</table>
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

SOFTWARE ENGINEERING  

<table>
<thead>
<tr>
<th>Unit – 1</th>
<th>(10 Periods)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction:</strong> Software Crisis, Software Processes &amp; Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models. <strong>Software Requirements analysis &amp; specifications:</strong> Requirement engineering, requirement elicitation techniques like FAST, QFD &amp; Use case approach, Requirements analysis using DFD, Data dictionaries, Requirements documentation, Nature of SRS, Characteristics &amp; organization of SRS</td>
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<table>
<thead>
<tr>
<th>Unit – 2</th>
<th>(10 Periods)</th>
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<tr>
<th>UNIT – 3</th>
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<tr>
<th>UNIT – 4</th>
<th>(10 Periods)</th>
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**Text Books:**


**Reference Books:**

### COMPUTER GRAPHICS AND MULTIMEDIA

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd</td>
<td>Computer Graphics and Multimedia</td>
<td>PO-1, PO-2,</td>
<td>PEO-1, PEO-3,</td>
<td><strong>CO1:</strong> Students will get the practical concepts of Graphics display devices, different types of graphics drawing algorithms.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-3, PO-4,</td>
<td>PEO-4, PEO-5,</td>
<td></td>
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<tr>
<td></td>
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<td>PO-6, PO-8</td>
<td>PEO-6</td>
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<td><strong>CO2:</strong> Students will get the concepts how to use of 2D and 3D Geometrical Transformations</td>
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<td><strong>CO3:</strong> Students will get the concepts of Viewing, Curves and surfaces</td>
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<td><strong>CO4:</strong> Students will get the practical concepts of Hidden Line/surface elimination techniques</td>
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<td><strong>CO5:</strong> Students will get the concepts of some Scan Conversion algorithms</td>
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<td><strong>CO6:</strong> Students will get the concepts of Illumination and Shading Models</td>
</tr>
</tbody>
</table>
UNIT – 1  (10 Periods)
Introduction to Computer Graphics & Graphics Systems: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software. Scan conversion: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham’s line algorithm, Circle generation algorithm; scan conversion of a character, polygon filling algorithm, flood fill algorithm.

UNIT – 2  (10 Periods)
2D Transformation & Viewing: Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear, Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline, Window to viewport co-ordinate transformation, clipping operations - line clipping, clipping polygons
3D Transformation & Viewing: 3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, viewport clipping, 3D viewing.

UNIT – 3  (10 Periods)
Curves: Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves. Hidden surfaces: Depth comparison, Z-buffer algorithm, Back face detection, scan-line algorithm; Hidden line elimination, wire frame methods

UNIT – 4  (10 Periods)

Text Books:

Reference Books:
1. Andleigh & Thakrar, “Multimedia”, PHI Publication
UNIT – 1 (08 Periods)
Communication Process: Elements, Objectives, Principles, Barriers in communication, Communication in Organization. Note-taking from lectures and written materials: Listening - Introduction, Advantages and Importance, How to become a good listener, Barriers in effective listening.

UNIT – 2 (12 Periods)
Written Presentation of Technical material: Preparation of Bibliography with special reference to technical reports, its structure and layout; Planning and Preparation; Use of Illustrations; Writing the Report, Formal and Informal Reports, Elements of letter writing and style of writing. Basics of Official Correspondence: Handling Correspondence, Receipt and Dispatch of Mails, Filing system, Classification of Mails; Quotation, Orders, Tenders, Sales Letters; Letter Writing - Principles, Structure and Lay out, Planning, Preparation of Resume, Advertising and Jobs Description.

UNIT – 3 (10 Periods)
Precis Writing: Steps of Precis Writing, DOS and Don'ts of Precis Writing. Principle Planning, Preparation for Presentation; Meetings, Conferences, Interviews. Audio-Visual Communications, Telephonic Conversations

UNIT – 4 (10 Periods)

Text Books:

Reference Books:
### THEORY OF COMPUTATION

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd</td>
<td>Theory of Computation</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td><strong>CO1.</strong> Understand the overview of the theoretical foundation of</td>
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<tr>
<td></td>
<td></td>
<td>PO-2,</td>
<td>PEO-3,</td>
<td>computer science from the perspective of formal languages.</td>
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<td></td>
<td></td>
<td>PO-3,</td>
<td>PEO-4,</td>
<td><strong>CO2.</strong> To classify machines by their power to recognize languages</td>
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<td></td>
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<td>PO-5,</td>
<td>PEO-5</td>
<td><strong>CO3.</strong> Employ finite state machines to solve problems in computing.</td>
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<td></td>
<td></td>
<td>PO-7,</td>
<td></td>
<td><strong>CO4.</strong> Explain deterministic and nondeterministic machines</td>
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<td>PO-9</td>
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<td><strong>CO5.</strong> Comprehend the hierarchy of problems arising in the computer</td>
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<td>sciences.</td>
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<td><strong>CO6.</strong> Students will be able to excel himself/herself as a design</td>
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<td>engineer in any industries/R&amp;D sector, pursue his research on the</td>
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<td>design field or face any competitive examinations in engineering.</td>
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THEORY OF COMPUTATION

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<tbody>
<tr>
<td>Unit 1</td>
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<td>4</td>
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</table>

**Unit – 1**

**Automata and Language Theory:** Overview of Theoretical Computer Science (including computationally intractable problems), Introduction to System software including various phases / Modules in the design of a typical compiler, Chomsky Classification, Finite Automata, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA), statement of Kleen's Theorem, Regular Expressions, Equivalence of DFAs, NFAs and Regular Expressions, Closure properties of Regular Language, Non-Regular Languages, Pumping Lemma, Use of Regular expressions in the Design of scanner (lexical analyzer).

**Unit – 2**

**Context Free Languages:** Context Free Grammar (CFG), Parse Trees, Push Down Automata (deterministic and nondeterministic) (PDA), Equivalence of CFGs and PDAs, Closure properties of CFLs, Pumping Lemma.

**UNIT – 3**

**Turing Machines and Computability Theory:** Definition of Turing Machine, Extensions of Turing machines, Non-deterministic Turing machines, Equivalence of various Turing Machine Formalisms, Church – Turing Thesis, Decidability, Halting Problem, Reducibility, Recursion Theorem.

**UNIT – 4**

**Complexity Theory:** Time and Space measures, Hierarchy theorems, Complexity classes P, NP, space complexity, Savich theorem, L, NL, PSPACE complexity, Post correspondence problem, Probabilistic computation

**Text Books:**


**Reference Books:**

### DATABASE MANAGEMENT SYSTEMS LABORATORY

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
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<th>PEO</th>
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<tbody>
<tr>
<td>3rd</td>
<td>Database Management Systems</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td><strong>CO 1:</strong> Acquire knowledge in fundamentals of Data Base Management System and be able to analyze the difference between traditional file system and DBMS.</td>
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<td>PO-2,</td>
<td>PEO-2,</td>
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<td>PO-3,</td>
<td>PEO-3,</td>
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<td>PO-4,</td>
<td>PEO-4,</td>
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<td>PO-5,</td>
<td>PEO-5,</td>
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<td>PO-6,</td>
<td>PEO-6,</td>
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<td>PO-7,</td>
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<td><strong>CO 2:</strong> Able to handle with different Data Base languages and various data models for Data Base.</td>
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<td>PO-8,</td>
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<td>PO-9</td>
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<td><strong>CO 3:</strong> Able to write queries mathematically and design data base and normalize data.</td>
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<td><strong>CO 4:</strong> Understand how query are being processed and executed.</td>
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<td><strong>CO 5:</strong> Deal with online transactions and control Concurrency.</td>
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<td><strong>CO 6:</strong> Understand types of Data Base failures and Recovery.</td>
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<td><strong>CO 7:</strong> Acquire knowledge about advanced topics and can research on that.</td>
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</tbody>
</table>
LIST OF EXPERIMENTS:

1. Execute a single line and group functions for a table.
2. Execute DCL and TCL Commands.
3. Create and manipulate various DB objects for a table.
4. Create views, partitions and locks for a particular DB
5. Write PL/SQL procedure for an application using exception handling
6. Write PL/SQL procedure for an application using cursors.
7. Write a DBMS program to prepare reports for an application using functions.
8. Write a PL/SQL block for transaction operations of a typical application using triggers.
9. Write a PL/SQL block for transaction operations of a typical application using package.
10. Design and develop an application using any front end and back end tool (make use of ER diagram and DFD).
11. Create table for various relation.
12. Implement the query in sql for a) insertion b) retrieval c) updating d) deletion.
13. Creating Views
14. Writing Assertion
15. Writing Triggers
16. Implementing operation on relation using PL/SQL
17. Creating Forms
18. Generating Reports
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
</table>
| 3rd      | Computer Graphics and Multimedia | PO-1, PO-2, PO-3, PO-4, PO-6, PO-8 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-6 | **CO1:** Students will get the concepts of Graphics display devices, different types of graphics drawing algorithms.  
**CO2:** Students will get the concepts of 2D and 3D Geometrical Transformations  
**CO3:** Students will get the concepts of Viewing, Curves and surfaces  
**CO4:** Students will get the concepts of Hidden Line/surface elimination techniques  
**CO5:** Students will get the concepts of some Scan Conversion algorithms  
**CO6:** Students will get the concepts of Illumination and Shading Models |
LIST OF EXPERIMENTS:

1. Write a Program to draw a Line using DDA Line Drawing Algorithm.
2. Write a Program to draw a Line using Bresenham’s Line Drawing Algorithm.
3. Write a Program to draw a Circle using Bresenham’s Circle Drawing Algorithm.
4. Write a Program to draw a Circle using Mid-Point Circle Drawing Algorithm.
5. Write a Program to rotate a Triangle about the Origin.
6. Write a Program to Scale a Triangle to desired Size.
7. Write a Program to translate a Triangle to desired Coordinate.
8. Write a Program to rotate a Point about an arbitrary Point.
9. Write a Program to rotate a Point about an Point (0,0).
10. Write a Program to reflect a Triangle in a desired axis or Coordinate System.
11. Write a Program to Clip a Line.
12. Write a Program to implement Sutherland – Hodgeman Polygon clipping Algorithm.
13. Write a Program to do 3D transformations - Translation, Rotation, Scaling.
14. Write a Program to do composite 3D transformations - Translation, Rotation, Scaling.
15. Write a Program to demonstrate Polygon Filling.
LIST OF EXPERIMENTS:

1. (a) Some people touch their elder’s feet and how their heads. What do they communicate?
   (b) What do the colours, red, ember and green suggest in the traffic signal?
   (c) Make a list of similar non-verbal communication.

2. What language functions do the following have?
   (a) India is a large country  (b) If you can’t do it, go to hell  (c) Thanks very much
   Give some more examples of descriptive, expressive and social functions of language.

3. Do you find the following acceptable?
   i) Amrita Pritam is a fine poetess
   ii) Smita Patil was a fine actor
   iii) Has everybody brought his book?
   iv) His only daughter is mentally retarded
   These are examples of biased language. Give some more similar examples.

4. Identify the time and tense in the following sentences.
   i) Then president is arriving tomorrow. It shows that there is no one for one correspondence between time and tense.
   a) Give sentences with the following tense and time:
      i) Present Tense expressing future time
      ii) Past Tense expressing future time
      iii) Present Tense expressing past time

   b) Do you find the following grammatical?
      i) Are you understanding what you say?
      ii) I am living in Burla since two years

   c) Make a list of verbs which do not take the progressive form.

5. How do the vowels contrast in the following paise of words:
   a) i) feel, fill (ii) pull, pool (iii) cart, cat (iv) cot, caught, : Practice pronunciation of these words
   Say the pairs of words: i) bag, beg (ii) foot, food (iii) sit, seat (iv) same, shame (v) judge, jazz (vi) major, measure
   Say the following words as noun and verb: Progress, object, record, supplement
   Say the following words with correct stress: Teacher, college, village, building, ago, above, apart, accuse, advice, education, engineer

6. Develop the idea in the following sentences into a paragraph: Cricket now is the opium of masses.

7. As the person in-charge of customer care department of a Cable Service, write a letter of reply to a customer who has complained about poor service.

8. As the Secretary of a society propose a vote of thanks at the end of a meeting

9. Draft a resolution urging the Govt. to enforce the ban on smoking in public places. Your job-did you quarrel with your employer-did you leave it in a huff? How would you handle the question?
LIST OF EXPERIMENTS:

10. As the leader of a Group discussing team sum up the main points of a discussion on the following topics: i) People above the age of sixty should not be allowed in politics ii) Imagine that in a job interview you are asked an uncomfortable question about a short break in your professional career (were you thrown out of your job-did you quarrel with your employer-did you leave it in a huff) iii) The teacher will regularly conduct interviews and group discussions. How would you handle the question?

11. Write the recommendation part of a report on creating more jobs for engineers

12. Make a brief presentation on the benefits of two insurance policies that your company has introduced.
The students are expected to give at least One presentation on their topics of interest / latest technological advancements, along with submission of Seminar Report duly recommended by the Seminar Guide, which will be assessed during presentation, by the Departmental committee constituted for this purpose. This course is mandatory and a student has to pass the course to become eligible for the award of degree. Marks will be awarded out of 100 and appropriate grades assigned as per performance and the existing regulations.
### PROGRAMMING WITH JAVA

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
</table>
| 4<sup>th</sup> | Programming with JAVA     | PO-1, PO-2, PO-3, PO-7, PO-8, PO-9 | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-6 | **CO 1**: Understand the use of core Java concept.  
**CO 2**: Understand the concept of control flow, exception and perform different operation on arrays and file.  
**CO 3**: Understand the framework to construct classes, objects as per the need of problem definition.  
**CO 4**: Understand and implement the concept of inheritance and overriding functions.  
**CO 5**: Understand and develop programs using interface and package. |
VEER SURENDRRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

PROGRAMMING WITH JAVA

<table>
<thead>
<tr>
<th>Unit</th>
<th>Topics</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Introduction: C++ Vs JAVA, JAVA and Internet and WWW, JAVA support systems, JAVA environment. JAVA program structure, Tokens, Statements, JAVA virtual machine, Constant &amp; Variables, Data Types, Declaration of Variables, Scope of Variables, Symbolic Constants, Type Casting. Operators: Arithmetic, Relational, Logical Assignments, Increment and Decrement, Conditional, Bitwise, Special, Expressions &amp; its evaluation. If statement, if...else... statement, Nesting of if...else... statements, else...if Ladder, Switch, ? operators, Loops – While, Do, For, Jumps in Loops, Labelled Loops.</td>
</tr>
<tr>
<td>2</td>
<td>Classes &amp; Methods: Defining a Class, Adding Variables and Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods. Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract methods and Classes, Visibility Control.</td>
</tr>
<tr>
<td>4</td>
<td>Local and Remote Applets Vs Applications: Writing Applets, Applets Life Cycle, Creating an Executable Applet Designing a Web Page, Applet Tag, Adding Applet to HTML File, Running the Applet, Passing Parameters to Applets, Aligning the Display, HTML Tags &amp; Applets, Getting Input from the User.</td>
</tr>
</tbody>
</table>

Text Books:
1. E. Balaguruswamy, "Programming In Java", TMH Publications

Reference Books:
### COMPILER DESIGN

<table>
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<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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<tbody>
<tr>
<td>4th</td>
<td>Compiler Design</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td>CO1. Acquire knowledge in different phases and passes of Compiler, and specifying different types of tokens by lexical analyzer, and also able to use the Compiler tools like LEX, YACC, etc.</td>
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<td></td>
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<td>PO-3,</td>
<td>PEO-3,</td>
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<td>PO-5,</td>
<td>PEO-4,</td>
<td>CO2. Parser and its types i.e. Top down and Bottom up parsers.</td>
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<td>PO-9</td>
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<td>CO4. Syntax directed translation, synthesized and inherited attributes.</td>
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<td>CO5. To understand the Techniques for code optimization, symbol table organization.</td>
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<td>CO7. To understand the Process of Code generation, its limitations and Run time environment.</td>
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<td>CO8. Students will be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers.</td>
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<td>CO9. Students will be able to excel himself/herself as a design engineer in any industries/R&amp;D sector, pursue his research on the design field or face any competitive examinations in engineering.</td>
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</tbody>
</table>
Unit – 1: (10 Periods)
**Compiler Structure:** Analysis-synthesis model of compilation, various phases of a compiler, tool based approach to compiler construction. Lexical analysis: Interface with input parser and symbol table, token, lexeme and patterns, difficulties in lexical analysis, error reporting and implementation. Regular grammar & language definition, Transition diagrams, design of a typical scanner using LEX or Flex.

Unit – 2: (10 Periods)
**Syntax Analysis:** Context free grammars, ambiguity, associability, precedence, top down parsing, top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing LL(1) grammar, Nor LL(1) grammar, Bottom up parsing, operator precedence grammars, LR parsers (SLR, LALR, LR), Design of a typical parser using YACC

UNIT – 3: (10 Periods)
**Syntax directed definitions:** Inherited and synthesized attributes, dependency graph, evaluation order, bottom up and top down evaluation of attributes, L- and S-attributed definitions. Type checking: type: type system, type expressions, structural and name equivalence of types, type conversion, overloaded function and operators, polymorphic function. Run time system: storage organization, activation tree, activation record, parameter passing symbol table, dynamic storage allocation. Intermediate code generation: intermediate representation, translation of declarations, assignments, Intermediate Code generation for control flow, Boolean expressions and procedure calls, implementation issues.

UNIT – 4 (10 Periods)
**Code generation and instruction selection:** Issues, basic blocks and flow graphs, register allocation, code generation, DAG representation of programs, code generation from DAGS, peep hole optimization, code generator generators, specification of machine. Code optimization: source of optimizations, optimization of basic blocks, loops, global dataflow analysis, solution to iterative dataflow equations, code improving transformations, dealing with aliases, data flow analysis of structured flow graphs.

Text Books:


Reference Books:

1. V.Raghvan, “Principles of Compiler Design”, TMH Publication
2. Levine, Mason and Brown, “Lex & Yacc”, O’ Reilly Publication
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
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<th>PEO</th>
<th>CO</th>
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<tbody>
<tr>
<td>4TH</td>
<td>Analysis and Design of Algorithms</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td><strong>CO 1:</strong> To be able to analyse the correctness and the running time of the basic algorithms for those classic problems in various domains and to be able to apply the algorithms and design techniques to advanced data structures.</td>
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<td>PO-2,</td>
<td>PEO-2,</td>
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<td>PO-6,</td>
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<td>PEO-7</td>
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<td><strong>CO 2:</strong> To be able to analyse the complexities of various problems in different domains and be able to demonstrate how the algorithms are used in different problem domains.</td>
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<td><strong>CO 3:</strong> To be able to design efficient algorithms using standard algorithm design techniques and demonstrate a number of standard algorithms for problems in fundamental areas in Computer Science and Engineering such as sorting, searching and problems involving graphs.</td>
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</tbody>
</table>
Unit – 1 : (10 Periods)

Unit – 2 : (10 Periods)

UNIT – 3 : (10 Periods)
Greedy Techniques: Prim’s Algorithm, Kruskal’s Algorithm, Dijkstra’s and Bellman Ford Algorithm, Huffman trees, Knapsack Problem, Dynamic Programming paradigm: Floyd’s Algorithm, Warshall’s Algorithm, Optimal Binary Search trees, Matrix multiplication Problem, 0/1 Knapsack Problem, maximum network flow problem, Naive String Matching algorithm: string matching with finite automata Knuth Morris Pratt algorithm, The Rabin-Karp Algorithm.

UNIT – 4 (10 Periods)

Text Books:

Reference Books:
PROGRAMMING WITH JAVA LABORATORY

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
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<th>CO</th>
</tr>
</thead>
</table>
| 4<sup>th</sup> | Programming with JAVA | PO-1, PO-2, PO-3, PO-7, PO-8, PO-9 | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-6 | **CO 1:** Understand the use of core Java concept.  
**CO 2:** Understand the concept of control flow, exception and perform different operation on arrays and file.  
**CO 3:** Understand the framework to construct classes, objects as per the need of problem definition.  
**CO 4:** Understand and implement the concept of inheritance and overriding functions.  
**CO 5:** Understand and develop programs using interface and package. |
LIST OF EXPERIMENTS:

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 practice using String Buffer class and its methods.
9. Write a Java Program to implement Vector class and its methods.
10. Write a Java Program to implement inheritance and demonstrate use of method overriding.
11. Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.
12. Write a program to demonstrate use of implementing interfaces.
13. Write a program to demonstrate use of extending interfaces.
14. Write a Java program to implement the concept of importing classes from user defined package and creating packages.
15. Write a program to implement the concept of threading by extending Thread Class.
16. Write a program to implement the concept of threading by implementing Runnable Interface.
17. Write a program to implement the concept of Exception Handling using predefined exception.
18. Write a program to implement the concept of Exception Handling by creating user defined exceptions.
19. Write a program using Applet to display a message in the Applet.
20. Write a program using Applet For configuring Applets by passing parameters.
21. Write a Java Program to demonstrate Keyboard event.
22. Write a Java Program to demonstrate Mouse events.
23. Write programs for using Graphics class
   - to display basic shapes and fill them
   - draw different items using basic shapes
   - set background and foreground colors.
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COMPILER DESIGN LABORATORY

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<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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</thead>
<tbody>
<tr>
<td>4th</td>
<td>Compiler Design</td>
<td>PO-1, PO-3, PO-5, PO-7, PO-9</td>
<td>PEO-1, PEO-3, PEO-4, PEO-5</td>
<td>CO1. Acquire knowledge in different phases and passes of Compiler, and specifying different types of tokens by lexical analyzer, and also able to use the Compiler tools like LEX, YACC, etc.</td>
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<td>CO2. Parser and its types i.e. Top down and Bottom up parsers.</td>
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<td>CO4. Syntax directed translation, synthesized and inherited attributes.</td>
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<td>CO5. To understand the Techniques for code optimization, symbol table organization.</td>
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<td>CO7. To understand the Process of Code generation, its limitations and Run time environment.</td>
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<td>CO8. Students will be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers.</td>
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<td>CO9. Students will be able to excel himself/herself as a design engineer in any industries/R&amp;D sector, pursue his research on the design field or face any competitive examinations in engineering.</td>
</tr>
</tbody>
</table>
LIST OF EXPERIMENTS:

1. Write a program to do following on a statement (i/p).
   - Count no. of characters.
   - Count no. of words.
   - Count no. of lines.
2. Write a program to do following on a statement (i/p).
   - Count frequency of a particular alphabet.
   - Count frequency of a particular operator.
   - Count frequency of a particular white space.
3. Write a program to do following on a statement (i/p).
   - Count no. of identifiers.
   - Count no. of keywords.
   - Count no. of operators.
   - Count no. of symbols.
4. Write a program on lex specification. Simplest lex specification file. No patterns and no actions. So all string match the default action, i.e. printing on screen, after you are done press ^d to exit.
5. Simplest lex specification file with used code and the yylex function; but without any pattern specified.
   - yylex is automatically inserted if not provided. yylex function starts the lexical analysis.
6. Providing ending character instead of ^d. after entering the text, insert the provided end mark to end your file and start with analysis.
7. Parsing a file through unix redirection.
8. Taking a file command line using yyin file pointer.
9. Write a lex specification file to change all characters in the input to stars ‘*’.
10. Write a lex specification file to show a file in double spacing.
11. Write a lex specification file to remove every line starting with ‘a’ from input file.
12. Write a lex specification file to read and add line numbers to it.
13. Write a lex specification file to enclose every line in parenthesis.
14. Write a lex specification file to enclose every word in parenthesis.
15. Write a lex specification file to put last word of the file inside the parenthesis.
16. Write a lex specification file to replace spaces of 1 to 4 spaces in a file with a ~ symbol and space of 5 to 8 with @ symbol.
17. Write a lex specification file to replace characters between a to k with * symbol and numbers between 3 to 6 with ~ symbol.
18. Write a lex specification file to find a multiple pattern of abc in a text file and replace with a ~.
## Analysis and Design of Algorithms Laboratory

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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</thead>
<tbody>
<tr>
<td>4TH</td>
<td>Analysis and Design of Algorithms</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td><strong>CO 1</strong>: To be able to analyse the correctness and the running time of the basic algorithms for those classic problems in various domains and to be able to apply the algorithms and design techniques to advanced data structures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-2,</td>
<td>PEO-2,</td>
<td><strong>CO 2</strong>: To be able to analyse the complexities of various problems in different domains and be able to demonstrate how the algorithms are used in different problem domains.</td>
</tr>
<tr>
<td></td>
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<td>PO-6,</td>
<td>PEO-3,</td>
<td><strong>CO 3</strong>: To be able to design efficient algorithms using standard algorithm design techniques and demonstrate a number of standard algorithms for problems in fundamental areas in Computer Science and Engineering such as sorting, searching and problems involving graphs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-8,</td>
<td>PEO-4,</td>
<td></td>
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<td></td>
<td></td>
<td>PO-9</td>
<td>PEO-5,</td>
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<td></td>
<td>PEO-7</td>
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</tbody>
</table>
LIST OF EXPERIMENTS:

1. Implementation of Stack, Queue and Linked list – Operations and Applications.
2. Implementation of different searching algorithms.
3. Implementation of different sorting algorithms.
4. Problem solving using Divide and Conquer technique.
5. Problem solving using Dynamic Programming technique.
6. Problem solving using Greedy technique.
7. Problem solving using Backtracking technique.
8. Problem solving using disjoint-set data structure operations.
9. Problem solving using branch and bound technique.
11. Implementation of graph traversal algorithms – Breadth-First-Search (BFS) and Depth-First-Search (DFS).
13. Implementation of different string matching algorithms.
14. Problem solving for different computational geometric problems.
15. Problem solving using Approximation technique.
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DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

MINOR PROJECT – I  L T P C
0 0 3 2

Identification of a problem related to the program of study / research interest / current technological trend, and carry out wholesome research on it leading to Findings of results / comparisons, which will facilitate development of a new / improved product, algorithm / process / comparative analysis for the benefit of the society/researchers. It may be based on database concepts, object oriented concepts, image processing, computer vision, optimization tools, compiler design, networking etc.

MCA projects should be socially relevant and application / research oriented ones. Each student is expected to do an individual project. The project work is carried out in entirely in 4th semester.

Objective of the mini project:

Working on Mini project is to get used to the larger project, which will be handled in the 6th semester

The project work constitutes an important component of the MCA programme of VSSUT and it is to be carried out with due care and should be executed with seriousness by the students. The objective of this mini project is to help the student develop the ability to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

Guidelines:

A student is expected to devote about 3-4 months in planning, analyzing, designing and implementing the project. The initiation of project should be with the project proposal that is to be treated as an assignment:

Mini-project evaluation:

The evaluation of the mini-project will be based on the project reports submitted by the student, followed by a presentation and a demonstration before the departmental evaluation committee.
### SIMULATION AND MODELING

<table>
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<th>Semester</th>
<th>Course Name</th>
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</thead>
</table>
| 5TH      | Simulation and Modeling | PO-1, PO-2, PO-3, PO-5, PO-7, PO-8, PO-9 | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-7 | **CO 1:** Understand the modelling concepts and types of models used to represent different classes of real world systems.  
**CO 2:** Applying concepts of computer simulation for types of inputs, system models, output behaviour and performance estimation.  
**CO 3:** Understand how to evaluate, validate and verify models for different systems like queuing, inventory and scheduling systems. |
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DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

SIMULATION AND MODELLING  

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<td>4</td>
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</table>

Unit – 1 : (10 Periods)

Inventory Concept: The technique of Simulation, Major application areas, concept of a System, Environment, Continuous and discrete systems, systems modeling types of models progress of a Simulation Study, Monte Carlo Method, Comparison of Simulation and Analytical Methods. Numerical Computation Technique for discrete and continuous models, Continuous System Simulation.

Unit – 2 : (10 Periods)


Unit – 3 : (10 Periods)

Discrete System Simulation and GPSS: Discrete Events, Representation of Time, generation of arrival patterns, fixed time step versus next event simulation, Simulation of a Telephone System, delayed calls. Introduction to GPSS : Creating and moving transactions, queues, facilities and storages, gathering statistics, conditional transfers, program control statements, priorities and parameters, standard numerical attributes, functions, gates, logic switches and tests, Variables, Select and Count.

Unit – 4 : (10 Periods)


Text Books:


Reference Books:

**WEB TECHNOLOGIES**

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<th>Semester</th>
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<th>PO</th>
<th>PEO</th>
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<tbody>
<tr>
<td>5TH</td>
<td>Web Technologies</td>
<td>PO-1, PO-3,</td>
<td>PEO-1, PEO-3,</td>
<td><strong>CO 1:</strong> To be able to understand the technologies and protocols</td>
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<tr>
<td></td>
<td></td>
<td>PO-4, PO-5,</td>
<td>PEO-4, PEO-5,</td>
<td>used on the Internet.</td>
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<tr>
<td></td>
<td></td>
<td>PO-7, PO-8</td>
<td>PEO-5, PEO-6</td>
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<td><strong>CO 2:</strong> To be able to understand how effectively Internet tools</td>
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<td>technologies including current web based applications, email,</td>
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<td>And social networking tools can be used.</td>
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<td><strong>CO 3:</strong> To be able to understand the basics of web search</td>
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<td></td>
<td>strategies.</td>
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<td><strong>CO 4:</strong> To be able to understand the basics of web authoring.</td>
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WEB TECHNOLOGIES

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**Unit – 1**: (10 Periods)

**Unit – 2**: (10 Periods)
Common Gateway Interface Programming: HTML forms, CGI Concepts, HTML tags Emulation, Server – Browser Communication, E-mail generation, CGI client Side applets, CGI server applets, authorization and security.

**Unit – 3**: (10 Periods)
Scripting Languages: Dynamic HTML, Cascading style sheets, Object model and Event model, Filters and Transitions, Active X Controls, Multimedia, Client side script, VB Script programming, Forms, Scripting Object.

**Unit – 4**: (10 Periods)

**Text Books:**
3. Paul Dietel and Harvey Deitel, “Java How to Program”, Prentice Hall of India

**Reference Books:**
1. Mahesh P. Matha, “Core Java A Comprehensive study”, Prentice Hall of India
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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</thead>
<tbody>
<tr>
<td>5TH</td>
<td>Mobile Computing</td>
<td>PO-1, PO-3, PO-5, PO-7, PO-8</td>
<td>PEO-1, PEO-3, PEO-5, PEO-6</td>
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</table>

**CO 1:** Introduction of an advanced element of learning in the field of wireless communication.

**CO 2:** The students to the concepts of wireless devices and mobile computing.

**CO 3:** To introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices.

**CO 4:** To understand the use of transaction and e-commerce principles over such devices to support mobile business concepts.

**CO 5:** To appreciate the social and ethical issues of mobile computing, including privacy.
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DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

MOBILE COMPUTING

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</table>

Unit – 1 : (10 Periods)

Introduction: Cellular Mobile Wireless Networks: Systems and Design Fundamentals, Propagation Models

Unit – 2 : (10 Periods)

Data management issues: mobility, wireless communication and portability, data replication Schemes, basic concept of multihopping, Adaptive Clustering for mobile Network, Multicluster Architecture.

Unit – 3 : (10 Periods)

Location Management: Introduction, Location Based Services, Automatically Locating Mobile Users, Locating and Organizing Services, Is Use and future directions, mobile IP, Comparison of TCP wireless.

Unit – 4 (10 Periods)

Transaction management: Introduction, Data Dissemination, Cache Consistency, Mobile transaction processing, mobile database research directions, Security fault tolerance for mobile N/W.

Text Books:


Reference Books:

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# DEPARTMENT OF COMPUTER APPLICATION
# SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

## SIMULATION AND MODELING LABORATORY

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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</thead>
<tbody>
<tr>
<td>5TH</td>
<td>Simulation and Modeling</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td><strong>CO 1:</strong> Understand the modelling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-2,</td>
<td>PEO-2,</td>
<td>concepts and types of models used</td>
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<tr>
<td></td>
<td></td>
<td>PO-3,</td>
<td>PEO-3,</td>
<td>to represent different classes of real</td>
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<tr>
<td></td>
<td></td>
<td>PO-5,</td>
<td>PEO-4,</td>
<td>world systems.</td>
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<td></td>
<td></td>
<td>PO-7,</td>
<td>PEO-5,</td>
<td><strong>CO 2:</strong> Applying concepts of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-8,</td>
<td>PEO-7</td>
<td>computer simulation for types of inputs,</td>
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<td>PO-9</td>
<td></td>
<td>system models, output</td>
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<td>behaviour and performance estimation.</td>
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<td><strong>CO 3:</strong> Understand how to evaluate,</td>
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<td>validate and verify models for</td>
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<td>different systems like queuing,</td>
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<td>inventory and scheduling systems.</td>
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VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA  
DEPARTMENT OF COMPUTER APPLICATION  
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)  

SIMULATION LABORATORY  
L T P C  
0 0 3 2  

LIST OF EXPERIMENTS:  

1. Programs on simulation of real time systems for automation purpose.  
2. Programs on Monte Carlo method of computation.  
3. Simulation of continuous systems.  
4. Simulation of discrete systems.  
5. Programs on generation of random numbers using Linear Congruential methods, mid-square and Rejection techniques.  
6. Programs on testing the random number set for uniformity and independence – Kolmogorov-Smirnov test, Chi-square test, Runs test and Autocorrelation test.  
7. Programs on generation of random variates according to various distributions.  
8. Programs on simulation of single and two-server queuing systems.  
9. Programs on simulation of an inventory system.  
10. Programs on simulation of a scheduling system.  
11. Programs on simulation of an auto-pilot system.  
12. Programs on simulation of a supermarket model.  
13. Programs on simulation of a telephone system.  
14. Programs on simulation of systems to include concepts of input selection, output analysis etc.  
15. Programs on validation checking.
The students are expected to appear one Comprehensive viva-voce on the topics studied up to fifth (5th) semester which will be assessed by a Departmental committee constituted for this purpose in the presence of External Expert from Academia.

This course is mandatory and a student has to pass the course to become eligible for the award of degree. Marks will be awarded out of 100 and appropriate grades assigned as per the regulations.
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<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
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</thead>
</table>
| 5TH      | Web Technologies | PO-1, PO-3, PO-4, PO-5, PO-7, PO-8 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-6 | **CO 1**: To be able to understand the technologies and protocols used on the Internet.  
**CO 2**: To be able to understand how effectively Internet tools technologies including current web based applications, email, and social networking tools can be used.  
**CO 3**: To be able to understand the basics of web search strategies.  
**CO 4**: To be able to understand the basics of web authoring. |
LIST OF EXPERIMENTS:

1. Write programs in Java to demonstrate the use of following components:
   - Text fields, buttons, Scrollbar, Choice, List and Check box.

2. Write Java programs to demonstrate the use of various Layouts like Flow Layout,
   - Border Layout, Grid Layout and card layout.

3. Write programs in Java to create applets incorporating the following features:
   i. Create a color palette with matrix of buttons
   ii. Set background and foreground of the control text area by selecting a color from color palette.
   iii. In order to select Foreground or background use check box control as radio buttons

4. Write programs in Java to do the following.
   i. Set the URL of another server.
   ii. Download the homepage of the server.
   iii. Display the contents of homepage with date, content type, and Expiration date. Last modified and length of the home page.

5. Write programs in Java using sockets to implement the following:
   i. HTTP request
   ii. FTP
   iii. SMTP
   iv. POP3

6. Write a program in Java for creating simple chat application with datagram sockets and datagram packets.

7. Write programs in Java using Servlets:
   i. To invoke servlets from HTML forms
   ii. To invoke servlets from Applets

8. Write programs in Java to create three-tier applications using servlets for conducting on-line examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.

9. Create a web page with the following using HTML
   i. To embed a map in a web page
   ii. To fix the hot spots in that map
   iii. Show all the related information when the hot spots are clicked.

10. Create a web page with the following.
    i. Cascading style sheets.
    ii. Embedded style sheets.
    iii. Inline style sheets. Use our college information for the web pages.
LIST OF EXPERIMENTS:

11. Create a database with user information. The user information should be dynamically checked from the database using JDBC, Servlets and JSP.

12. Implement DHTML application using filters.

13. Designing of scientific calculator.

14. Implement a program to find factorial of the given number.

15. Program for finding whether a given number is palindrome or not using JSP.
Identification of a problem related to the program of study / research interest / current technological trend and carry out wholesome research on it leading to Findings of results / comparisons, which will facilitate development of a new / improved product, algorithm / process / comparative analysis for the benefit of the society / researchers. It may be based on database concepts, object oriented concepts, image processing, computer vision, optimization tools, compiler design, networking etc.

MCA projects should be socially relevant and application / research oriented ones. Each student is expected to do an individual project. The project work is carried out in entirely in 5th semester.

Objectives of the mini project:

*Working on Mini project is to get used to the larger project, which will be handled in the 6th semester*

The project work constitutes an important component of the MCA programme of VSSUT and it is to be carried out with due care and should be executed with seriousness by the students. The objective of this mini project is to help the student develop the ability to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

Guidelines:

A student is expected to devote about 3-4 months in planning, analyzing, designing and implementing the project. The initiation of project should be with the project proposal that is to be treated as an assignment:

*Mini-project evaluation:*

The evaluation of the mini-project will be based on the project reports submitted by the student, followed by a presentation and a demonstration before the departmental evaluation committee.
Identification of a problem / technology related to the program of study / research interest at an Organization of repute for the entire sixth semester duration (Min. 16 Weeks or More) and carry out wholesome research / development on it leading to Findings of results / comparisons, which will facilitate development of a new / improved product, algorithm / process / comparative analysis for the benefit of the society / researchers.

MCA projects should be socially relevant and application / research oriented ones. Each student is expected to do an individual project under the Guidance of Departmental Guide and External Guide from the Industry. The project work is carried out in entirely in 6th semester.

Students are advised to carry out the project work in-order to understand systematic and good software development methodologies either in an industry / R&D institutions for duration of a full semester and submit a detailed project report. The Master’s level projects should be done individually.

Guidelines:

A student is expected to devote about 4-5 months in planning, analyzing, designing and implementing the project. The initiation of project should be with the project proposal which is to be treated as an Objective Statement.

Project evaluation:

The evaluation of the project will be based on the project reports submitted by the student, a presentation and a demonstration at the evaluation time by the Departmental Committee in the presence of External Expert from Academia. The students are also advised to publish a technical paper, based on the work carried out in the project, either in international or national conference.
Project Seminar in the sixth semester is based on the Workflow of the Major Project work done by each student in the Semester at the Industry / R&D Institute. The Successful Completion of the Seminar in the presence of Departmental Committee would ensure that the student is permitted for submission of the Major Project & Viva – Voce only after the successful completion of this seminar.

**Guidelines:**

A student is expected to submit a Seminar Report describing implementation of the project. The Seminar content must adhere to the Project Proposal Submitted Earlier in the Semester.

**Project evaluation:**

The evaluation of the project will be based on the project demonstration and seminar delivered by the student, for evaluation by the Departmental Committee in the presence of External Expert from Academia. The student is permitted for the Major Project Viva only after the successful completion of this seminar.
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DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

Elective-I and Elective-II
## SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

### DATA MINING

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<tbody>
<tr>
<td>4th</td>
<td>Data Mining</td>
<td>PO-1, PO-2,</td>
<td>PEO-1, PEO-3,</td>
<td>CO1. Understand the overview of Data Mining, Data Warehouse and OLAP.</td>
</tr>
<tr>
<td>(Elective-I</td>
<td></td>
<td>PO-3, PO-5,</td>
<td>PEO-4, PEO-5</td>
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<tr>
<td>and Elective-II)</td>
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<td>PO-7, PO-9</td>
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</table>

- CO2. Able to understand the knowledge representation in Data mining.
- CO3. Able to perform Attribute-oriented analysis in real life application.
- CO4. To understand Data mining algorithms such as Association rules, Classification, clustering and Prediction etc.
- CO5. Acquire ability to use data mining principle and methodology to solve various real and challenging problems.
- CO6. Students will be able to excel himself/herself as a design engineer in any industries/R&D sector.
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DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

DATA MINING

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</table>

UNIT-1

UNIT-2
Data Warehouse and OLAP: Data Warehouse and DBMS, Multidimensional data model, OLAP operations. Data preprocessing: Data cleaning, Data transformation, Data reduction.

UNIT-3
Data mining knowledge representation: Background knowledge, Interestingness measures, Representing input data and output knowledge, Visualization techniques.

UNIT – 4
Data mining algorithms: Association rules (Motivation and terminology, Basic idea about item sets, Generating item sets and rules efficiently, Correlation analysis), Classification (Basic learning/mining tasks, Inferring rudimentary rules: 1R algorithm, Decision trees, Covering rules), Prediction (The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbor), Linear models).

Text Book:
1. J. Han and M. Kamber, "Data Mining: Concepts and Techniques“, Morgan Kaufman Publisher
2. H. Witten and E. Frank, "Data Mining: Practical Machine Learning Tools and Techniques“, Morgan Kaufmann Publisher

Reference Books:
1. M. H. Dunham. Data Mining, “Introductory and Advanced Topics” Pearson Education Publisher
2. D. Hand, H. Mannila and P. Smyth, "Principles of Data Mining“ Prentice-Hall Publisher
<table>
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<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
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</thead>
</table>
| 4<sup>th</sup> (Elective I & II) | Cloud Computing | PO-1, PO-2, PO-3, PO-4, PO-5, PO-7, PO-8, PO-9 | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-6, PEO-7 | CO1. Graduates will be able to understand the key dimensions and the challenges of Cloud Computing.  
CO2. Graduates will be able to assess the concept of existing Hosting Platforms and computing paradigms currently being used in industry and academia.  
CO3. Graduates will be able to understand and assess the principles, practices and advantages of Cloud Computing and its evolution and features.  
CO4. Graduates will be able to familiarize with the issues related to Cloud Computing and analyse IASS/ PAAS and SAAS services along with Cloud models.  
CO5. Graduates will be able to assess the concepts of various Cloud Platforms with comparative analysis and the concepts of virtualization with the advantages in Cloud.  
CO6. Graduates will be able to identify problems, and explain, analyze, and evaluate various cloud computing solutions and to generate new ideas, innovations in cloud computing. |
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DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

CLOUD COMPUTING

<table>
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</table>

UNIT- 1
Cloud Computing Fundamental: Cloud computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs. private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications.

UNIT- 2
Cloud Applications: Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages

UNIT- 3
Cloud Services Management: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics: Cloud Computing infrastructures available for implementing cloud based services. Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat).

UNIT- 4
Application Development: Service creation environments to develop cloud based applications. Development environments for service development; Amazon, Azure, Google App.

Text Books:


Reference Books:

<table>
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<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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</thead>
</table>
| 4TH (Elective – I/II) | Natural Language Processing | PO-1, PO-2, PO-3, PO-8, PO-9 | PEO-1, PEO-2, PEO-3, PEO-5, PEO-6 | **CO 1**: To understand the natural language, its scope and application areas.  
**CO 2**: To study grammars and parsing, its types and features.  
**CO 3**: To study the details of its concept to implement the natural language.  
**CO 4**: understanding the Ambiguity Resolution by using different methodology and processes |
UNIT- 1 (10 Periods)

UNIT- 2 (10 Periods)

UNIT- 3 (10 Periods)

UNIT- 4 (08 Periods)

Text Books:
1. James Allen, “Natural Language Understanding”, 2/e, Pearson Education

Reference Books:
<table>
<thead>
<tr>
<th>4TH (Elective – I/II)</th>
<th>Software Quality</th>
<th>PO-1, PO-3, PO-4, PO-8, PO-9</th>
<th>PEO-1, PEO-3, PEO-5, PEO-6, PEO-7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CO 1:</strong> To be able to understand Software Engineering Paradigm and Life Cycle Models of software.</td>
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<td><strong>CO 2:</strong> To be able to understand some Process of Software.</td>
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<tr>
<td><strong>CO 3:</strong> To be able to learn requirements of software.</td>
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<td><strong>CO 4:</strong> To be able to understand Analysis and Design Concepts of software.</td>
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<td><strong>CO 5:</strong> To be able to understand the Principles of Software.</td>
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<td><strong>CO 6:</strong> To be able to learn about Software Testing.</td>
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<td><strong>CO 7:</strong> To be able to study software Quality Assurance.</td>
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</tbody>
</table>
UNIT- 1  

UNIT- 2  

UNIT- 3  

UNIT- 4  


Text Books:

1. Ian Sommerville, “Software engineering”, Pearson Education Asia Publishing

Reference Books:

<table>
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<tr>
<th>Semester</th>
<th>Course Name</th>
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<th>PEO</th>
<th>CO</th>
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</thead>
</table>
| 4<sup>th</sup> (Elective – I/II) | Wireless Sensor Networks | PO-1, PO-2, PO-3, PO-5, PO-7 PO-8 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-6 | **CO 1:** To be able to understand Overview of Wireless Sensor Networks & it’s Challenges.  
**CO 2:** To be able to understand Architectures of Wireless Sensor Networks.  
**CO 3:** To be able to learn different Protocols of Wireless Sensor Network.  
**CO 4:** To be able to study Infrastructure Establishment of Wireless Sensor Network.  
**CO 5:** To be able to study Sensor Network Platforms and Tools. |
UNIT- 1 (06 Periods)

UNIT- 2 (10 Periods)

UNIT- 3 (12 Periods)

UNIT- 4 (12 Periods)

**Text Books:**


**Reference Books:**

### EMBEDDED SYSTEM

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<tr>
<th>Semester</th>
<th>Course Name</th>
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<th>CO</th>
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</table>
| 4TH (Elective – I/II) | Embedded System    | PO-1, PO-2, PO-3, PO-4, PO-6, PO-8, PO-9 | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-7 | **CO 1:** To understand the difference between a microprocessor and a microcontroller.  
**CO 2:** To study microcontroller architecture and applications.  
**CO 3:** To study the different addressing modes, interrupts and interfacing with I/O devices. |
UNIT- 1:

UNIT - 2:
Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT - 3:

UNIT - 4:
Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

Text Books:

Reference Books:
<table>
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<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
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<th>CO</th>
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</thead>
</table>
| 4th (Elective I & II) | E-Commerce  | PO-1, PO-2, PO-3, PO-4, PO-6, PO-7, PO-8, PO-9 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-6, PEO-7 | CO1. Graduates will be able to understand various components of e-commerce.  
CO2. Graduates will be able to describe E-Commerce payment systems.  
CO3. Graduates will be able to understand Web marketing approaches and elements of branding.  
CO4. Graduates will be able to explain the working of Internet technology and its utility in commercial activities.  
CO5. Graduates will be able to get knowledge of some graph algorithms such as shortest path and minimum spanning tree.  
CO6. Graduates will be able to get knowledge of methods for online business dealings using e-commerce infrastructure. |
UNIT 1 (08 Periods)
Introduction to E-commerce: Introduction, E-commerce or Electronic Commerce- An Overview, Electronic Commerce – Cutting edge, Electronic Commerce Framework
Evolution of E-commerce: Introduction, History of Electronic Commerce, Advantages and Disadvantage of E-commerce, Roadmap of e-commerce in India

UNIT 2 (10 Periods)

UNIT 3 (10 Periods)

UNIT 4 (12 Periods)
Electronic Data Interchange(EDI): The Meaning of EDI, History of EDI, EDI Working Concept, Implementation difficulties of EDI, Financial EDI, EDI and Internet
E-Marketing: The scope of E-Marketing, Internet Marketing Techniques
Website Design Issues: Factors that Make People Return to Your Site, Strategies for Website Development

Text Books:

Reference Books:
<table>
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<th>Semester</th>
<th>Course Name</th>
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</table>
| 4TH             | Information Security and Cyber Laws | PO-1, PO-2, PO-8, PO-9, | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-6 | **CO1:** To recognize the developing trends in Cyber law and the legislation impacting cyberspace in the current situation.  
**CO2:** To generate better awareness to battle the latest kinds of cybercrimes impacting all investors in the digital and mobile network.  
**CO3:** To recognize the areas for stakeholders of digital and mobile network where Cyber law needs to be further evolved.  
**CO4:** To work in the direction of creating an international network of cybercrimes. Legal authorities could then be a significant voice in the further expansion of cybercrimes and cyber law legislations throughout the globe. |
UNIT 1 (12 Periods)

UNIT 2 (06 Periods)

UNIT 3 (12 Periods)

UNIT 4 (10 Periods)

Text Books:
2. V.K. Pachghare, "Cryptography and Information Security", PHI Publishing

Reference Books:
1. Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla, "Introduction to Information Security and Cyber Law", Willey Dreamtech Press.
2. Chander, Harish, "Cyber Laws and It Protection", PHI Learning Private Limited
CRYPTOGRAPHY AND NETWORK SECURITY

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<th>Semester</th>
<th>Course Name</th>
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<th>CO</th>
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</thead>
</table>
| 4TH (Elective – I/II) | Cryptography and Network Security          | PO-2, PO-5, PO-7, PO-9 | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-7 | **CO 1:** Students will have the basic knowledge of different types of Security attacks. To discuss on various types of attacks and their characteristics  
**CO 2:** To illustrate the basic concept of encryption and decryption for secure data transmission. Students will be able to analyze and compare different security mechanisms and services.  
**CO 3:** Students will be able to analyze different modern encryption algorithms. Students will have the basic knowledge of different authentication Mechanisms.  
**CO4:-** Students will have the knowledge on latest techniques used in different Security aspects (e.g. network security, web security etc.) |
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SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

CRYPTOGRAPHY AND NETWORK SECURITY  L  T  P  C
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UNIT-1  (10 Periods)
Introduction: Services, Mechanisms and attacks, the OSI security Architecture, Network security model, Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).


UNIT-2  (10 Periods)
Block Ciphers: Data Encryption Standard, Block cipher principles, block cipher modes of operation, Advanced Encryption Standard (AES)

UNIT-3  (08 Periods)

UNIT-4  (12 Periods)
E-mail Security: Security Services for Email attacks, establishing keys privacy, authentication of the source, Message Integrity

Text Books:

Reference Books:
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DEPARTMENT OF COMPUTER APPLICATION  
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

INFORMATION RETRIVAL TECHNIQUES

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<tr>
<td>4th</td>
<td>Information Retrieval</td>
<td>PO-1</td>
<td>PEO-1</td>
<td>CO1. Understand the Introductory concepts information retrieval such as Basic Concepts, Practical Issues, Retrieval Process, Architecture and Boolean Retrieval etc.</td>
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<tr>
<td></td>
<td>Techniques</td>
<td>PO-2</td>
<td>PEO-3</td>
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<td>PO-3</td>
<td>PEO-4</td>
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<td>PO-5</td>
<td>PEO-5</td>
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<td>PO-7</td>
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<td>PO-9</td>
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</table>

CO2. Able to understand Modelling concepts with examples and concepts such as IR Models, Boolean Model, Vector Model, Term Weighting, Scoring and Ranking, Language Models, Set Theoretic Models, Probabilistic Models, Algebraic Models, Structured Text Retrieval Models and Models for Browsing etc.

CO3. To understand Indexing mechanism used in information retrieval techniques.

CO4. To understand to concepts of Classification and Clustering task and may able to use it in various real life application in the area of science and engineering.

CO5. Students will be able to excel himself/herself as a design engineer in any industries/R&D sector.
# INFORMATION RETRIEVAL TECHNIQUES

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## UNIT 1
(08 Periods)

## UNIT 2
(12 Periods)
**Modeling:** Taxonomy and Characterization of IR Models, Boolean Model, Vector Model, Term Weighting, Scoring and Ranking, Language Models, Set Theoretic Models, Probabilistic Models, Algebraic Models, Structured Text Retrieval Models, Models for Browsing

**Indexing:** Static and Dynamic Inverted Indices, Index Construction and Index Compression Searching, Sequential Searching and Pattern Matching, Query Operations, Query Languages, Query Processing, Relevance Feedback and Query Expansion, Automatic Local and Global Analysis, Measuring Effectiveness and Efficiency.

## UNIT 3
(10 Periods)
**Classification and Clustering:** Text Classification and Naïve Bayes, Vector Space Classification, Support vector machines and Machine learning on documents. Flat Clustering, Hierarchical Clustering, Matrix decompositions and latent semantic indexing, Fusion and Meta learning

## UNIT 4
(10 Periods)
**Searching and Ranking:** Searching the Web, Structure of the Web, IR and web search, Static and Dynamic Ranking, Web Crawling and Indexing, Link Analysis, XML Retrieval Multimedia IR: Models and Languages, Indexing and Searching Parallel and Distributed IR, Digital Libraries

## Text Books:
2. Christopher D.Manning, Prabhakar Raghavan, HinrichSchutze, **"Introduction to Information Retrieval"**, Cambridge University Press.

## Reference Books:
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<th>Semester</th>
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</table>
| 4TH (Elective – I/II) | Real time System | PO-1, PO-2, PO-5, PO-7, PO-8 | PEO-1, PEO-4, PEO-5, PEO-6 | **CO 1:** Understand the Introductory concepts Real time System such as Basic Principles, System Calls, Files, Processes, Design and Implementation of processes, Communication between processes, RPC, Client server model, Distributed file system, Design strategies etc.  
**CO 2:** To be able to study different Models and Languages of Real Time.  
**CO 3:** To be able to learn **Kernel** of Real Time which includes Principles, Design issues, Polled Loop Systems, RTOS Porting to a Target, Comparison and study of RTOS VX works.  
**CO 4:** To be able to understand Domains of RTOS Application such as RTOS for Image Processing, Embedded RTOS for voice over IP, RTOS for fault Tolerant Applications, RTOS for Control Systems |
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**DEPARTMENT OF COMPUTER APPLICATION**  
**SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)**

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<th>REAL-TIME SYSTEMS</th>
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**UNIT- 1**  
**Distributed Operating Systems**: Topology, Network types, Communication, RPC, Client server model, Distributed file system, Design strategies.

**UNIT- 2**  
(12 Periods)  
Real Time Models and Languages: Event Based, Process Based and Graph based Models, Petrinet Models, Real Time Languages, RTOS Tasks, RT scheduling, Interrupt processing, Synchronization, Control Blocks, Memory Requirements

**UNIT- 3**  
(10 Periods)  
Real Time Kernel: Principles, Design issues, Polled Loop Systems, RTOS Porting to a Target, Comparison and study of RTOS VX works.

**UNIT- 4**  
(10 Periods)  
RTOS Application Domains: RTOS for Image Processing, Embedded RTOS for voice over IP, RTOS for fault Tolerant Applications, RTOS for Control Systems.

**Text Books:**


**Reference Books:**

1. Tanenbaum, *Distributed Operating Systems*, Pearson Education Publishing
## DISTRIBUTED SYSTEMS

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<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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<tbody>
<tr>
<td>4TH (Elective – I/II)</td>
<td>Distributed System</td>
<td>PO-1, PO-3, PO-5, PO-7, PO-8</td>
<td>PEO-1, PEO-3, PEO-4, PEO-5, PEO-6</td>
<td>CO 1: Understand the Introductory concepts Distributed System and its different characteristics. CO 2: To be able to study Communication between distributed objects. CO 3: To be able to learn about Remote Procedure Call and Remote Method Invocation. CO 4: To be able to learn Distributed File Systems such as File service architecture, Sun Network File System, Name Services and the Domain Name System, Directory Services, Global Name Service etc. CO 5: To be able to study about Design and implementation issues of Distributed Shared Memory. CO 6: To be able to understand Different Models and Case study Distributed Shared Memory.</td>
</tr>
</tbody>
</table>
UNIT- 1
Characterization of Distributed Systems: Resource Sharing and Web-Challenges, System Models, Inter process Communication, API for Internet protocols, External data representation and marshalling, Client-server communication, Group communication, Case study: Inter process Communication in UNIX.

UNIT- 2
Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure calls-Events and notifications-Case study: Java RMI, Operating System Support-Introduction-OS layer, Protection-Processes and threads, Communication and invocation OS architecture.

UNIT- 3
Distributed File Systems: File service architecture, Sun Network File System, Enhancements and further developments. Name Services, Name Services and the Domain Name System, Directory Services, Global Name Service.

UNIT- 4
Distributed Shared Memory: Design and implementation issues, Sequential Consistency and Ivy case study Release consistency and Munin case study, Other Consistency models. CORBA Case Study, Introduction, CORBA RMI-CORBA services.

Text Books:

Reference Books:
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<th>Semester</th>
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<td>(Elective-I and Elective-II)</td>
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<td>CO2. Ability to analyze Statistical Decision Theory, Sampling and Sampling Distributions and Parameter estimation.</td>
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<td>CO3. Ability of perform Hypothesis Test.</td>
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<td>CO4. Ability to understand logical operators, Implications, Tautologies, validity of arguments, and quantifiers.</td>
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<td>CO5. Ability to understand and use Regression Analysis.</td>
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<td>CO6. Ability to understand Statistical Quality control and Case Studies.</td>
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</table>
UNIT- 1 (10 Periods)
Probability and Expectation: Approaches to probability. Addition, multiplication and Bayes Theorem, Mathematical Expectation. Probability Distribution: Binomial, Poisson, Exponential, Beta and Normal Distributions.

UNIT- 2 (10 Periods)

UNIT- 3 (10 Periods)

UNIT- 4 (10 Periods)
Regression Analysis: Simple and multiple linear regression analysis up to three variables. Statistical Quality Control: Control charts for variables and attributes, Acceptance sampling. Case Studies: Application of statistics to some cases of business enterprise

Text Books:

Reference Books:
Elective-III and Elective-IV
<table>
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<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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</table>
| 5TH (Elective – III/IV)| Bio-Informatics  | PO-1, PO-2, PO-6, PO-8, PO-9 | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-6 | **CO 1:** To be able to understand scope of Bioinformatics.  
**CO 2:** To be able to understand popular bio-informatics databases.  
**CO 3:** To be able to learn fundamentals of databases and sequence alignment. |
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DEPARTMENT OF COMPUTER APPLICATION
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BIOINFORMATICS

UNIT- 1
Introduction: Historical overview, Bioinformatics Applications, Bioinformatics Major databases, Molecular biology.

UNIT- 2
Data Visualization and Statistics: Sequence Visualization, Structure visualization, statistical concepts, micro arrays, imperfect data, quantitative randomness, data analysis, tool selective, and statistics of alignment, clustering and classification.

UNIT- 3
Data Mining and Pattern Matching: Methods & Technology overview, infrastructure, pattern recognition & discovery, machine learning, text mining & tools, dot matrix analysis, substitution matrices, dynamic programming, word methods, multiple sequence alignment, tools for pattern matching.


Text Books:


Reference Books:

1. Imtiyaz Alam Khan, "Elementary Bioinformatics", Pharma Book Syndicate.
### ADVANCED JAVA PROGRAMMING

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
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<th>PEO</th>
<th>CO</th>
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<tbody>
<tr>
<td>5TH (Elective – III/IV)</td>
<td>Advanced Java Programming</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td><strong>CO 1:</strong> To learn the graphics</td>
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<tr>
<td></td>
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<td>PO-2,</td>
<td>PEO-2,</td>
<td>and animation on the web pages, using Java</td>
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<td>PO-3,</td>
<td>PEO-3,</td>
<td>Applets</td>
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<td>PO-4,</td>
<td>PEO-4,</td>
<td><strong>CO 2:</strong> To learn and design a full set of</td>
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<td>PO-5,</td>
<td>PEO-5,</td>
<td>Event driven UI widgets and other components,</td>
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<td>PO-8,</td>
<td>PEO-7</td>
<td>including windows, menus, buttons, checkboxes,</td>
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<td>text fields, scrollbars and scrolling lists,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>using Abstract Windowing Toolkit (AWT) &amp;</td>
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<td></td>
<td></td>
<td>Swings.</td>
</tr>
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<td></td>
<td><strong>CO 3:</strong> To learn Java Data Base Connectivity (JDBC) so as to retrieve and manipulate the information on any relational database through Java programs.</td>
</tr>
<tr>
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<td></td>
<td><strong>CO 4:</strong> To learn Java Bean so as to make the reusable software components.</td>
</tr>
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<td><strong>CO 5:</strong> To learn the invocation of the remote methods in an application using RMI.</td>
</tr>
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<td><strong>CO 6:</strong> To learn Hibernate for the mapping of Java classes and objects associations to the relational database tables.</td>
</tr>
</tbody>
</table>
UNIT- 1 (10 Periods)
**Advanced GUI Development using Java** : Swings, Buttons, Labels, Checkbox, Text Components and Menu Components in Swings, JTree Class, JTable Class, Events and Exception Handling, Event Classes, Event Generators, Event Listener, Key Events, Mouse Event, Exception Class, Try and Catch, Multiple Catch-Exception Types, Throw and Throws, User Defined Exceptions.

UNIT- 2 (10 Periods) **JDBC** : Java Database Connectivity, JDBC Drivers, Statements, Caching Database Results, Storing Classes, Images and Other Large Objects, Controlling Transactions, Escaping Characters, Mapping Database Types, Mapping Date Types

UNIT- 3 (10 Periods)
**Thread and Multi-Threading** : Multithreading, Multitasking and Multithreading, The Thread Class, Defining and Running a Thread, Methods of Thread Class, Lab Projects

UNIT- 4 (10 Periods)

**Text Books:**


**Reference Books:**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>5TH</td>
<td>Pattern Recognition</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td><strong>CO 1:</strong> Explain and compare a variety of pattern classification,</td>
</tr>
<tr>
<td>(Elective</td>
<td></td>
<td>PO-2,</td>
<td>PEO-2,</td>
<td>structural pattern recognition, and pattern classifier combination</td>
</tr>
<tr>
<td>– III/IV</td>
<td></td>
<td>PO-5,</td>
<td>PEO-3,</td>
<td>techniques. To explain the concept of pattern recognition and its</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-7,</td>
<td>PEO-4,</td>
<td>different phases.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-8,</td>
<td>PEO-5,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-9</td>
<td>PEO-7</td>
<td></td>
</tr>
</tbody>
</table>

**CO 2:** To discuss on the idea of feature extraction and different approaches towards prototype selection. Summarize, analyze, and relate research in the pattern recognition area verbally and in writing.

**CO 3:** Apply performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature. Apply pattern recognition techniques to real-world problems such as document analysis and recognition.

**CO 4:** Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.
UNIT- 1

UNIT- 2
Clustering: Clustering for unsupervised learning and classification, Clustering concept, K Means algorithm, Hierarchical clustering, Graph theoretic approach to pattern Clustering, Validity of Clusters.

UNIT- 3

UNIT- 4
Recent Advances: Fuzzy logic, Fuzzy Pattern Classifiers, Pattern Classification using Genetic Algorithms, Case Study Using Fuzzy Pattern Classifiers and Perception

Text Books:

Reference Books:
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
</table>
| 5TH (Elective – III/IV) | Digital Image Processing  | PO-1, PO-2, PO-3, PO-6, PO-7, PO-9 | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-7 | **CO 1:** To discuss on the basics of digital image processing and digital image formation. To illustrate different mathematical preliminaries to deal with digital image processing.  

**CO 2:** To be able to Develop Fourier transform for image processing in frequency domain. To be able to Evaluate the methodologies for image segmentation, restoration, enhancement, etc.  

**CO 3:** To be able to Implement image process and analysis algorithms. To be able to Apply image processing algorithms in practical applications. |
UNIT- 1

UNIT- 2

UNIT- 3

UNIT- 4
Applications of Image Processing: Image classification, Image recognition, Image understanding, video motion analysis, Image fusion, Steganography, Digital compositing, Mosaics, Color Image Processing

Text Books:

Reference Books:
**VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA**  
**DEPARTMENT OF COMPUTER APPLICATION**  
**SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)**  
**ADVANCED OPERATING SYSTEM**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
</table>
| 5TH (Elective – III/IV) | Advanced Operating System    | PO-1, PO-2, PO-7, PO-8, PO-9 | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-7 | **CO 1:** To be able to understand different advanced OS concepts.  
**CO 2:** To practice pipelining and I/O redirecting.  
**CO 3:** To manage UNIX-based networks and write complex shell scripts. |
UNIT- 1
Architectures of Distributed Systems: System Architecture types, issues in distributed operating systems, communication networks, communication primitives. Theoretical Foundations, inherent limitations of a distributed system, lamp ports logical clocks, vector clocks, casual ordering of messages, global state, cuts of a distributed computation, termination detection. Distributed Mutual Exclusion, the classification of mutual exclusion and associated algorithms, a comparative performance analysis.

UNIT- 2
Distributed Deadlock Detection: Deadlock handling strategies in distributed systems, issues in deadlock detection and resolution, control organizations for distributed deadlock detection, centralized and distributed deadlock detection algorithms, hierarchical deadlock detection algorithms. Agreement protocols, the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture, mechanism for building distributed file systems. design issues, log structured file systems.

UNIT- 3
Distributed shared memory: Distributed Scheduling, issues in load distributing, components of a load distributing algorithm, load distributing algorithm, performance comparison, selecting a suitable load sharing algorithm, requirements for load distributing, task migration and associated issues.
Failure Recovery and Fault tolerance: introduction, basic concepts, classification of failures, backward and forward error recovery, backward error recovery, recovery in concurrent systems, consistent set of check points, synchronous and asynchronous check pointing and recovery, check pointing for distributed database systems, recovery in replicated distributed databases.

UNIT- 4
Multiprocessor operating systems: Basic multiprocessor system architectures, inter connection networks for multiprocessor systems, Multiprocessor Operating System, structures of multiprocessor operating system.
Database Operating systems: Introduction, requirements of a database operating system Concurrency control, intra concurrency control model of database systems, the problem of concurrency control, serializability theory, distributed database systems, concurrency control algorithms, basic synchronization primitives, lock based algorithms, timestamp based algorithms, optimistic algorithms, concurrency control algorithms, data replication.

Text Books:
1. Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH Publishing

Reference Books:
1. Andrew S.Tanenbaum, "Modern operating system", PHI Publishing
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI Publishing
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education.
## SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

**HUMAN RESOURCE MANAGEMENT**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
</table>
| 5TH (Elective – III/IV) | Human Resource Management  | PO-1, PO-2, PO-4, PO-5, PO-6, PO-7, PO-8, PO-9 | PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, PEO-6, PEO-7 | **CO 1:** To be able to understand scope of Human Resource Management in industry and its definition, role and positions.  
**CO 2:** To be able to understand Procurement and Placement as Need for Human Resource Planning, placement importance and induction, employment exchange etc..  
**CO 3:** To be able to learn field of Training & Development in human resource management.  
**CO 4:** To be able to understand scope of human resource management in Job analysis & Design and Human Relations and Industrial Relations. |
UNIT- 1 (10 Periods)

UNIT- 2 (10 Periods)

UNIT- 3 (10 Periods)
Training & Development: Difference between training and Development; Principles of Training; Employee Development; Promotion-Merit v/s seniority Performance Appraisal, Career Development & Planning.

UNIT- 4 (10 Periods)

Text Books:

Reference Books:
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th (Elective-III and Elective-IV)</td>
<td>Big Data Analytics</td>
<td>PO-1,</td>
<td>PEO-1,</td>
<td>CO1. Acquire knowledge on overview of Big Data concepts such as Big data sources, Acquisition, Nuts &amp; Bolts of Big data and Features of Big Data etc.</td>
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<tr>
<td></td>
<td></td>
<td>PO-2,</td>
<td>PEO-3,</td>
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<td></td>
<td>PO-3,</td>
<td>PEO-4,</td>
<td>CO2. Students may get acquainted with various Data Analysis such as Convergence, analytic data sets, Analytic methods, analytic tools, Analysis approaches and Statistical significance tests etc.</td>
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<td></td>
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<td>PO-4,</td>
<td>PEO-5</td>
<td></td>
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<td>PO-5,</td>
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<td>PO-7,</td>
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<td>PO-9</td>
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</tbody>
</table>

CO3. To understand the Techniques for Stream Computing such as Introduction to Streams Concepts, Stream data model and architecture, Stream Computing, Sampling data in a stream and Filtering streams etc.

CO4. To understand the Predictive Analytics and Visualization : Predictive Analytics, Supervised, Unsupervised learning, Neural networks and Kohonen models etc.

CO5. Students will be able to understand different types of mining algorithm concepts such as Mining Frequent item sets, Market based model, Apriori Algorithm and Handling large data sets etc.

CO6. Students will be able to excel himself/herself as a design engineer in any industries/R&D sector, pursue his research on the design field or face any competitive examinations in engineering.
UNIT- 1 (10 Periods)
Introduction to Big Data: Analytics, Nuances of big data, Value, Issues, Case for Big data, Big data sources, Acquisition, Nuts and Bolts of Big data. Features of Big Data, Security, Compliance, auditing and protection, Evolution of Big data, Best Practices for Big data Analytics, Big data characteristics, Volume, Veracity, Velocity, Variety, Data Appliance and Integration tools, Greenplum, Informatica

UNIT- 2 (10 Periods)
Data Analysis: Evolution of analytic scalability, Convergence, parallel processing systems, Cloud computing, grid computing, map reduce, enterprise analytic sand box, analytic data sets, Analytic methods, analytic tools, Cognos, Microstrategy, Pentaho. Analysis approaches, Statistical significance, business approaches, Analytic innovation, Traditional approaches, Iterative

UNIT- 3 (10 Periods)
Stream Computing: Introduction to Streams Concepts, Stream data model and architecture, Stream Computing, Sampling data in a stream, Filtering streams, Counting distinct elements in a stream, Estimating moments, Counting oneness in a window, Decaying window, Realtime Analytics Platform(RTAP) applications, IBM Infosphere, Big data at rest, Infosphere streams, Data stage, Statistical analysis, Intelligent scheduler, Infosphere Streams

UNIT- 4 (10 Periods)
Predictive Analytics and Visualization: Predictive Analytics, Supervised, Unsupervised learning, Neural networks, Kohonen models, Normal, Deviations from normal patterns, Normal behaviours, Expert options, Variable entry, Mining Frequent itemsets, Market based model, Apriori Algorithm, Handling large data sets in Main memory, Limited Pass algorithm, Counting frequent itemsets in a stream, Clustering Techniques, Hierarchical, K-Means, Clustering high dimensional data Visualizations, Visual data analysis techniques, interaction techniques; Systems and applications

Text Books:

Reference Books:
2. Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA  
DEPARTMENT OF COMPUTER APPLICATION  
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)  

OBJECT ORIENTED DESIGN

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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</thead>
</table>
| 5th (Elective III & IV) | Object Oriented Design | PO-1, PO-2, PO-3, PO-4, PO-5, PO-6, PO-7, PO-8, PO-9 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-6, PEO-7 | CO1. Graduates will be able to have an exposure to the model, architecture, design of a software development lifecycle.  
CO2. Graduates will be able to apply class, object and behavioral modelling to design OO system.  
CO3. Graduates will be able to understand accomplish the architectural view of a modeling.  
CO4. Graduates will be able to apply OOP concepts to analyze, model and design an effective Object Oriented system.  
CO5. Graduates will be able to apply concepts of Object Oriented Analysis & Processes for Projects.  
CO6. Graduates will be able to Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, State chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation. |
UNIT- 1 (10 Periods)

UNIT- 2 (10 Periods) Basic Structural Modeling: Classes, Relationships, Common Mechanisms, and diagrams, class diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages, Object Diagrams

UNIT- 3 (10 Periods)

Case Study: Bank ATM Application, Railway Reservation System.

Text Books:

Reference Books:
## HUMAN COMPUTER INTERACTION

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>5TH</td>
<td>Human Computer Interaction</td>
<td>PO-1</td>
<td>PEO-1</td>
<td><strong>CO 1</strong>: Understand the Introductory concepts of Human Computer Interaction.</td>
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<td></td>
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<td>PO-2</td>
<td>PEO-2</td>
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<td>PO-3</td>
<td>PEO-3</td>
<td></td>
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<td>PO-5</td>
<td>PEO-4</td>
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<td></td>
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<td>PO-6</td>
<td>PEO-5</td>
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<td>PO-7</td>
<td>PEO-6</td>
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<td>PO-9</td>
<td>PEO-7</td>
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</tr>
</tbody>
</table>

**CO 2**: To study Design goals, Screen planning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow.

**CO 3**: To be able to learn information retrieval on web and statistical graphics.

**CO 4**: To study about Windows and its Components such as text and messages, Icons and increases, Multimedia, colors, uses problems, choosing colors, Software tools, Specification methods, interface, Building Tools.
UNIT- 1 (10 Periods)
Introduction: Importance of user Interface, definition, importance of good design, Benefits of good design, a brief history of Screen design. The graphical user interface, popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user, Interface popularity, characteristics and Principles of user interface. Design process, Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT- 2 (10 Periods)
Screen Designing : Design goals, Screen planning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT- 3 (10 Periods)

UNIT- 4 (10 Periods)
Interaction Devices: Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.

Text Books:
1. Wilbert O Galitz, “The essential guide to user interface design”, Pearson Education
2. Ben Shneidermann, “Designing the user interface”, Pearson Education

Reference Books:
2. Soren Lauesen,”User Interface Design”, Pearson Education
<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>5&lt;sup&gt;TH&lt;/sup&gt;</td>
<td>Intellectual Property Rights</td>
<td>PO-1</td>
<td>PEO-1</td>
<td><strong>CO 1:</strong> Understand the Introductory concepts such as types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.</td>
</tr>
<tr>
<td>(Elective – III/IV)</td>
<td></td>
<td>PO-3</td>
<td>PEO-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-4</td>
<td>PEO-3</td>
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<td></td>
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<td>PO-5</td>
<td>PEO-5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-7</td>
<td>PEO-6</td>
<td><strong>CO 2:</strong> To understand intellectual property rights &amp; law of trademarks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-9</td>
<td>PEO-7</td>
<td><strong>CO 3:</strong> To understand patent law &amp; international patent law.</td>
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<td></td>
<td><strong>CO 4:</strong> States intellectual property rights &amp; law of trademarks.</td>
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<td><strong>CO 5:</strong> The candidate demonstrates the ability to understand the industrial dynamics of innovation.</td>
</tr>
</tbody>
</table>
UNIT- 1 (10 Periods)
Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights. Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT- 2 (10 Periods)
Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT- 3 (10 Periods)
Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screret litigation.
Unfair competition: Misappropriation right of publicity, False advertising.

UNIT- 4 (10 Periods)
New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

Text Books :

### Syllabus for Master of Computer Application (MCA) - Soft Computing

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>5&lt;sup&gt;TH&lt;/sup&gt; (Elective – III/IV)</td>
<td>Soft Computing</td>
<td>PO-1</td>
<td>PEO-1</td>
<td><strong>CO 1:</strong> To know various Soft Computing techniques.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-3</td>
<td>PEO-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-4</td>
<td>PEO-3</td>
<td><strong>CO 2:</strong> To know Neural Network techniques and its applications.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-5</td>
<td>PEO-5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-7</td>
<td>PEO-6</td>
<td><strong>CO 3:</strong> To know applications of advanced Neural Networks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PO-9</td>
<td>PEO-7</td>
<td><strong>CO 4:</strong> Get knowledge of fugilogic</td>
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<td></td>
<td><strong>CO 5:</strong> Get knowledge of Applications of Hybrid soft computing techniques.</td>
</tr>
</tbody>
</table>
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER OF COMPUTER APPLICATION (MCA)

SOFT COMPUTING

<table>
<thead>
<tr>
<th>UNIT- 1</th>
<th>(10 Periods)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction to Soft Computing:</strong> Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>UNIT- 2</th>
<th>(10 Periods)</th>
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</thead>
<tbody>
<tr>
<td><strong>Genetic Algorithms:</strong> Introduction, Building block hypothesis, working principle, Basic operators and Terminologies like individual, gene, encoding, fitness function and reproduction, Genetic modeling: Significance of Genetic operators, Inheritance operator, crossover, inversion &amp; deletion, mutation operator, Bitwise operator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem), Differences &amp; similarities between GA &amp; other traditional methods, Applications of GA.</td>
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</table>

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<thead>
<tr>
<th>UNIT- 3</th>
<th>(10 Periods)</th>
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<tbody>
<tr>
<td><strong>Neural Networks:</strong> Machine Learning using Neural Network, Adaptive Networks, Feed Forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks, Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance Architectures, Advances in Neural Networks.</td>
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</table>

<table>
<thead>
<tr>
<th>UNIT- 4</th>
<th>(10 Periods)</th>
</tr>
</thead>
</table>

Text Books:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, PHI India

Reference Books:

## SOFTWARE PROJECT MANAGEMENT

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
</tr>
</thead>
</table>
| 5th (Elective III & IV) | Software Project management | PO-1, PO-2, PO-3, PO-4, PO-6, PO-7, PO-8, PO-9 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-6, PEO-7 | CO1. Graduates will be able to understand and practice the process of project management and its application in delivering successful projects.  
CO2. Graduates will be able to have good knowledge of the issues and challenges faced while doing the Software project Management.  
CO3. Graduates will be able to understand why majority of the software projects fails and how that failure probability can be reduced effectively.  
CO4. Graduates will be able to explain the organization of project scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques.  
CO5. Graduates will be able to understand and manage project’s critical issues such as Resource planning, Risk assessment and financial Planning.  
CO6. Graduates will be able to assess the quality of the project using various metrics like quality indicators and management indicators |
UNIT- 1 (10 Periods)
Introduction to Software Project Management: Project Definition, Contract Management, Activities Covered By Software Project Management, Overview Of Project Planning, Stepwise Project Planning.


UNIT- 2 (10 Periods)

UNIT- 3 (10 Periods)

UNIT- 4 (10 Periods)
Managing People and Organizing Teams: Introduction, Understanding Behavior, Organizational Behaviour: A Background, Selecting The Right Person For The Job, Instruction In The Best Methods, Motivation , The Oldman, Hackman Job Characteristics Model, Working In Groups, Becoming A Team, Decision Making, Leadership, Organizational Structures, Stress, Health And Safety

Text Books:

Reference Books:
# MARKETING SYSTEMS AND BUSINESS INTELLIGENCE

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Name</th>
<th>PO</th>
<th>PEO</th>
<th>CO</th>
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</table>
| 5\textsuperscript{TH} (Elective – III/IV) | Marketing Systems and Business Intelligence | PO-1, PO-3, PO-5, PO-7, PO-8 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-6 | **CO 1**: Understand the Introductory concepts & analyze the characteristics and contributions of enterprising people.  
**CO 2**: To analyze the characteristics and contributions of enterprising people.  
**CO 3**: To be able to learn about Product Decisions.  
**CO 4**: Identify core concepts of marketing and the role of marketing in business and society. |
UNIT- 1 (10 Periods)
Introduction: Concept, nature, scope and importance of marketing; Marketing concept and its evolution; Marketing mix; Strategic marketing planning an overview. Market Analysis and Selection: Marketing environment macro and micro components and their impact on marketing decisions; Market segmentation and positioning; Buyer behavior; consumer versus organizational buyers; Consumer decision making process. Product Decisions: Concept of a product; Classification of products; Major product decisions; Product line and product mix; Branding; Packaging and labeling; Product life cycle strategic implications; New product development and consumer adoption process. Pricing Decisions: Factors affecting price determination; Pricing policies and strategies; Discounts and rebates.

UNIT- 2 (10 Periods)
Distribution Channels and Physical Distribution Decisions: Nature, functions, and types of distribution channels; Distribution channel intermediaries; Channel management decisions; Retailing and wholesaling. Promotion Decisions: Communication Process; Promotion mix advertising, personal selling, sales promotion, publicity and public relations; Determining advertising budget; Copy designing and testing; Media selection; Advertising effectiveness; Sales promotion tools and techniques. Marketing Research: Meaning and scope of marketing research; Marketing research process. Marketing Organisation and Control: Organising and controlling marketing operations. Issues and Developments in Marketing: Social, ethical and legal aspects of marketing; Marketing of services; International marketing; Green marketing; Cyber marketing; Relationship marketing and other developments of marketing.

UNIT- 3 (10 Periods)
Introduction to Business Intelligence and Business Models: Design and implementation aspect of OLAP/Data Warehouse, BI Definitions & Concepts, Business Applications of BI, Role of DW in BI, BI system components, Components of Data Warehouse Architectures. Dimensional Modelling and DW Design: Star schema, Snowflake schema, and Fact Constellation schema, Grain of dimensional model, transactions, Recurring Snapshots, Accumulating Snapshots, Dimensions (SCD types, conformed dimensions), Clickstream Source Data (Google Analytics as a Clickstream Data Source), Facts (additive, semi-additive, non-additive), Hierarchy in dimensions, parent child relationships, Many-Many Dimensional relationship, Multi Valued Dimensions and Dimension Attributes.

UNIT- 4 (10 Periods)
Analytics concepts and use in Business Intelligence: Exploratory and statistical techniques: Cluster analysis, Data visualization, Predictive analysis: Regression, Time series, Data Mining: Hierarchical clustering, Decision tree Text analytics: Text mining, In-Memory Analytics and In-DB Analytics, Case study: Google Analytics

Text Books:
3. Jiawei Han, Micheline Kamber,"Data Mining: concepts and techniques", Elsevier Publishing

Reference Books:
<table>
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<tr>
<th>Semester</th>
<th>Course Name</th>
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<th>PEO</th>
<th>CO</th>
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</table>
| 5TH          | Artificial Intelligence | PO-1, PO-2, PO-3, PO-4, PO-5, PO-7, PO-9 | PEO-1, PEO-3, PEO-4, PEO-5, PEO-7 | CO1. Graduates will be able to assess critically the techniques presented and to apply them to real world problems.  
CO2. Graduates will be able aware of the major challenges facing AI and the complexity of typical problems within the field.  
CO3. Graduates will get to understand the major areas and challenges of AI.  
CO4. Graduates will be able to apply basic AI algorithms to solve problems.  
CO5. Graduates will be able to get a knowledge of applications in different areas of computing including the web and human interaction.  
CO6. Students will be able to excel himself/herself as a design engineer in any industries/R&D sector, pursue his research on the design field or face any competitive examinations in engineering.  |
VEER SURENDRRA SAI UNIVERSITY OF TECHNOLOGY, BURLA
DEPARTMENT OF COMPUTER APPLICATION
SYLLABUS FOR MASTER IN COMPUTER APPLICATION (MCA)

ARTIFICIAL INTELLIGENCE

Unit -1 (10 Periods)

Unit-2 (10 Periods)

Unit-3 (10 Periods)

Unit IV-4 (10 Periods)

Text Books:
2. Winston P.H, Artificial Intelligence (3rd Edigion), McGraw Hill.
3. E.Rich and K.Knight, Artificial Intelligence, - TMH

Text Books:
1. Padhy N.P., Artificial Intelligence and Intelligence Systems, Oxford